Arunachal Pradesh
Human Development Report 2005

सत्यमेव जयते

I am alarmed when I see — not only in this country but in other great countries too — how anxious people are to shape others according to their own image or likeness, and to impose on them their particular way of living. We are welcome to our way of living, but why impose it on others? This applies equally to national and international fields. In fact there would be more peace in the world if people would desist from imposing their way of living on other people and countries. I am not at all sure which is the better way of living, the tribal or our own. In some respects I am quite certain theirs is better. Therefore it is grossly presumptuous on our part to approach them with an air of superiority, to tell them how to behave or what to do and what not to do.

– Jawaharlal Nehru

Development in various ways there has to be, such as communications, medical facilities, education and better agriculture. These avenues of development should however be pursued within the broad framework of the following five fundamental principles:

1. People should develop along the lines of their own genius and we should avoid imposing anything on them. We should try to encourage in every way their own traditional arts and culture.
2. Tribal rights in land and forest should be respected.
3. We should try to train and build up a team of their own people to do the work of administration and development. Some technical personnel from outside will no doubt be needed, especially in the beginning. But we should avoid introducing too many outsiders into tribal territory.
4. We should not over administer these areas or overwhelm them with a multiplicity of schemes. We should rather work through and not in rivalry to their own social and cultural institutions.
5. We should judge results not by statistics or by the amount of money spent but by the quality of human character that is evolved.

– Jawaharlal Nehru

Extracted from the Foreword to *A Philosophy for NEFA*, by Verrier Elwin, 2nd Edition, 1959

Arunachal Pradesh

Human Development Report 2005

Published by
Department of Planning
Government of Arunachal Pradesh

Price: Rs. 500/-

Prepared by Rajiv Gandhi University, Itanagar, Arunachal Pradesh
Nodal Department for preparation: Department of Economics, Rajiv Gandhi University

Photo Courtesy: IPR and Printing Department, Government of Arunachal Pradesh; Rajiv Gandhi University, Department of Botany; Nani Sala Foundation, Naharlagun; Centre for Cultural Research & Documentation, Naharlagun; UNICEF India Country Office; and Sanjay Kak, Nalong Mize, Vinay Oberoi, Oken Tayeng

Design and Produced by
Roots Advertising Services Pvt. Ltd., New Delhi - 110029
roots@del2.vsnl.net.in

Arunachal Pradesh

Human Development Report 2005

Prepared for the
Government of Arunachal Pradesh

by
Rajiv Gandhi University

S. K. SINGH
GOVERNOR
ARUNACHAL PRADESH

RAJ BHAWAN
ITANAGAR 791111
TEL : +91 360 2212432
FAX : +91 360 2212442
amb.sks@gmail.com

January 19, 2006

MESSAGE

We are delighted that this first Human Development Report (HDR) of Arunachal Pradesh, is being published. This State can rejoice in its many unique features. One of these is the large numbers of indigenous groups and tribes that have inhabited the area and have managed to live together in peace and harmony for millennia and centuries. These tribal ethnicities of this State have gradually emerged into the present era of technology and globalization recently, but have embraced the strange, and for them, novel elements of the present era with ease and flexibility. We can congratulate ourselves for this remarkable transition smoothened by the palpable progress our Arunachalee people have made in adapting to the modern idiom of life with such ease and speed.

This HDR indicates how in 1947, when India emerged into Independence, entire State of Arunachal could boast of just three Primary Schools, with a total enrolment of 30 students. We can, therefore, rejoice today at the rise in our State's literacy rate with amazing speed. In the last 58 years Arunachal has managed to attain literacy percentage higher than that in Jammu & Kashmir, Jharkhand or Bihar. In respect of female literacy, it can boast of having left Uttar Pradesh, a State with a literary tradition of many thousand years, far behind it. The results achieved by us could have been significantly higher, had we not been denied connectivity though roads, rail, and airports due to our Himalayan and mountainous geography; 82% forest cover of our area, and our generally unsatisfactory record in road building. These factors have prevented our moving rapidly in several areas of human development. The growth of income achieved by our State has also been higher than the national average. The ST sex ratio here stands at 1003 and is significantly higher than that which exists in the country as a whole. When one realizes the low base from which the State commenced its journey in development, one can see how remarkable our over-all development has been.

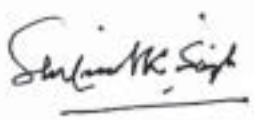
Certain areas of concern do, however, remain, and the community itself needs to attend to these. The natural resources of the State are abundant; its hydel potential spectacular. Until now this potential, however, has remained un-exploited.

Our air is clean, atmosphere pollution-free, the year round climate salubrious. The attractions of this verdant, colourful and beauteous State have created conditions in which it can, should, perhaps must, develop its hospitality industry and tourism including building and providing health resorts. This State has failed to move in this direction partly as we have failed to structure adequate infrastructure for transport, roads and communications and partly by refusing to abolish the Inner Line Permit system which the colonial rulers had built to meet their own compulsions of security and requirements of economy and exclusivity of the last quarter of the 19th century.

Today this State has the potential to become the orchard for the entire North-East, producing and providing flowers, fruits, and vegetables to the region. Our lack of connectivity and communications facilities has also created poor marketing conditions, and acted as a brake on our horticultural expansion. Nature has provided us with abundant resources which are not being exploited due to our geography, topography and the inability to produce for ourselves the infrastructure required for growth.

All these, and several other points and aspects are reflected in this Report, making it a good Guide Book for policy makers, and a valuable document for Administrators in this area. I express our appreciation and gratitude to the Rajiv Gandhi University particularly its Department of Economics for having prepared this comprehensive and objective Report.

The UNDP New Delhi and the Planning Commission, Govt. of India deserve our appreciation and gratitude having provided financial resources that we needed to produce it. We also thank the officials of the Govt. of Arunachal Pradesh, who have helped coordinate this project.



(S. K. SINGH)

GEGONG APANG
CHIEF MINISTER

ARUNACHAL PRADESH
ITANAGAR - 791111
PH.: (O) 0360 - 2212456
2212173
(R) 0360 - 2212341

18. 1. 2006

MESSAGE

I am glad to learn that the first Human Development Report on Arunachal Pradesh is being published. The report prepared by Rajiv Gandhi University, an academic institution of repute, will, undoubtedly, be a an objective analysis of the state of human development in Arunachal Pradesh.

What gives me immense pleasure is the remarkable progress made by the State on human development front. As the report states, the income of the people has gone up, education spread widely and the general health of the people has considerably improved. And the credit for all these achievements goes as much to the proactive policy of the State Government as to the whole-hearted cooperation of the people.

In keeping with its objectivity, the report has listed the downsides also. Arunachal Pradesh is yet to reach the desired level in the areas of life expectancy, literacy and infrastructure.

Another point noted in the report is the rise in the unequal distribution of resources and income. This is indeed a cause for worries. Arunachal Pradesh has traditionally been an egalitarian society where class distinctions did not exist. Now there is a need to revive the traditional values that emphasise the sense of equality among our people.

Arunachal Pradesh is endowed with extraordinary wealth of natural resources. And the State government is trying hard to explore and exploit the abundant resources scientifically and systematically in a planned manner to improve the quality of life of the people. Once the resources are fully tapped, the State will not only be able to remove backwardness, illiteracy and low life expectancy but the evils of inequality also.

I am confident that the wealth of information contained in the report will prove a useful guide to experts, planners, policy-makers and the ordinary citizens. Rajiv Gandhi University, especially the Department of Economics, deserves kudos for taking up this challenging task of preparing such a comprehensive report.

My heartfelt thanks go to the United Nations Development Programme (UNDP) and the Planning Commission, Government of India, for extending financial support and guidance in the preparation of the report. My sincere appreciation also goes to the members of the Steering Committee, the Directorate of Planning, Government of Arunachal Pradesh and members of the Technical Committee for their valuable contribution to the project.

(Gegong Apang)

Chief Minister,
Arunachal Pradesh

TABOM BAM
CHIEF SECRETARY

0360 : 2212595 (Off)
0360 : 2212446 (Fax)
0360 : 2212444 (Res)

GOVERNMENT OF
ARUNACHAL PRADESH
ITANAGAR -791 111

Dated 18th January '06

MESSAGE

It is a matter of great joy and satisfaction to see the publication of first **'Human Development Report of Arunachal Pradesh'.** The Government of Arunachal Pradesh had entered into a Memorandum of Understanding with the UNDP, New Delhi and the Planning Commission, Government of India to prepare the HDR of this State. But in the absence of secondary information on some important variables, it was difficult to go ahead with the task.

The Rajiv Gandhi University was entrusted with the responsibility of preparing the report in November 2000 keeping in view the expertise available with them.

The University conducted large-scale survey to generate the highly valuable data.

The Report contains analysis of the profiles of human development and problems encountered for its promotion in the State.

I am grateful to the Rajiv Gandhi University, particularly the Department of Economics for undertaking such a huge research work which contributed to the preparation of the Report. The University deserves high appreciation from us.

I am also grateful to the Members of the Steering Committee who provided active guidance and also to the Members of the Technical Committee who prepared the Report.

It was the Directorate of Planning, Govt of Arunachal Pradesh which coordinated the Project with competence. My thanks are also due to the UNDP, New Delhi and Planning Commission of India for providing funds as well as guidance and advice in preparation of this HDR.

(TABOM BAM)
Chief Secretary
Govt. of Arunachal Pradesh
Itanagar

Planning Commission

United Nations Development Programme

India

Message

We congratulate the Government of Arunachal Pradesh for preparing the first Human Development Report for the State.

There is a dearth of development discourse pertaining to Arunachal Pradesh. We are confident that the Arunachal Pradesh Human Development Report would go a long way in filling this void as it comprehensively analyses human development status within the State.

Given that infrastructure development and human development compete for limited financial resources, it is often believed that the two are at cross purposes. The Arunachal Pradesh Human Development Report establishes linkages between the two and emphasizes the fact that the two complement each other.

It highlights the fact that any developmental gain cannot be sustained at the cost of environmental degradation affecting the rich biodiversity. The developmental strategy adopted by the State has to be in harmony with the fragile ecosystem.

We once again felicitate the Government of Arunachal Pradesh for the preparation of its Human Development Report and are confident that this Report would go a long way in improving the quality of life for the people of Arunachal Pradesh.

R. Bandyopadhyay
Adviser (RD), Planning Commission
Government of India

Maxine Olson
UNDP Resident Representative &
UN Resident Coordinator

RAJIV GANDHI UNIVERSITY
(Former Arunachal University)
RONO HILLS, ITANAGAR - 791 111, India
Recognized by the UGC as 'University with Potential for Excellence'

Prof. ATUL SARMA
VICE-CHANCELLOR

January 19, 2006

FOREWORD

I am very happy that Rajiv Gandhi University has prepared the first Human Development Report (HDR) of Arunachal Pradesh and thus has earned the distinction of being the first ever University in India to prepare the HDR for a State.

Initially, the Government of Arunachal Pradesh undertook the responsibility of preparing the HDR for the State after signing a Memorandum of Understanding (MOU) with UNDP, New Delhi in September 1998. Two years later, the Arunachal Pradesh government requested Rajiv Gandhi University to consider taking over the project. The University accepted formally the challenge of preparing the HDR for Arunachal Pradesh on 16th November 2000.

The preparation of HDR for Arunachal Pradesh is truly a challenging task particularly because of non-availability of data on several crucially important variables such as life expectancy and human poverty. Life tables are, however, available only for 15 major States of the country and no small State in the country has been able to construct one for its population. Despite the non-availability of some basic data, Rajiv Gandhi University was motivated to undertake the responsibility for three prime considerations as follows:

- Research in Social Sciences in Arunachal Pradesh is seriously handicapped by non-availability of data on a number of very important socio-economic variables. Generation of data for some variables requires conducting a large-scale survey, which is beyond the capacity of individual researchers. The exercise on HDR has given the University an opportunity to undertake such a survey to generate data on some of the important variables that would serve as a benchmark.

- The conduct of surveys is difficult in Arunachal Pradesh because of its hilly terrain and sparsely settled population. Even so, participant-observation is necessary for collecting household level information – a task that is possible on a big-scale only when a good number of experts are involved in the project. Rajiv Gandhi University has faculty members with extensive research experience. Additionally, the survey conducted for the HDR could engage a good number of researchers, mainly ex-students of Rajiv Gandhi University, who got extensive experience in survey and research. Thus, it could build a database in the University as a by-product of the preparation of HDR.

- This has also facilitated Rajiv Gandhi University to establish and maintain a liaison as well as close interactions with the Government and the society that help in providing research output useful for policy-making.

Contd….P/2

Telephone: +91 360 2277252 (O), 2277261 (R), Fax: +91 360 2277317
Email : sarmaatul@yahoo.com

RAJIV GANDHI UNIVERSITY

(Former Arunachal University)

RONO HILLS, ITANAGAR - 791 111, India

Recognized by the UGC as 'University with Potential for Excellence'

As a first step, Rajiv Gandhi University organised a workshop on 19th February 2001 in Itanagar. Scholars from Arunachal Pradesh and other parts of the country attended the workshop that yielded suggestions and recommendations for preparing the Report. Operationally, the University in consultation with the Government of Arunachal Pradesh set up a Technical Committee of sixteen members – eleven from the former and five from the latter and NGOs.

Since the Report had to be prepared partly on the basis of primary data, a large-scale survey was planned. Suitable survey frame and instruments were designed. Research assistants were recruited and then oriented to survey objectives and design so to ensure efficient conduct of the survey and the quality of data, of course, under the active guidance of technical committee members.

The survey that began in August 2001 and was completed by April 2002 covered 5257 households and a total population of 30,762. The data compilation and processing that began in May 2002, took a year to complete. It has indeed been both exciting and arduous to generate data on a number of very important variables for preparing the first HDR of Arunachal Pradesh. The draft HDR was thoroughly discussed in a Workshop held on 2nd April 2004. All comments and suggestions made in the Workshop were taken into consideration to modify the draft HDR and give it the present shape.

I sincerely congratulate the technical committee members especially, the faculty members of the Department of Economics, Rajiv Gandhi University, research assistants and staff engaged in the project. I am highly thankful to Dr. K. K. Dwivedi, the then Vice-Chancellor of this University, who accepted, on behalf of the University, the responsibility of preparing the HDR for Arunachal Pradesh and also provided support and guidance. Subsequently, Prof. Tamo Mibang who took over the charge of Vice-Chancellor on 16th November 2002 showed absorbing interest in the project and guided the researchers. I express my sincere thanks to him. I sincerely thank Mr. Joram Begi, the then Registrar of this University who played an important role at the initial stage of the project. I also sincerely thank Dr. Tai Nyori, Registrar, Rajiv Gandhi University for being very supportive of the endeavour. My sincere thanks are due to all the Steering Committee members of the HDR Project, the faculty members and staff of Rajiv Gandhi University, concerned Government officials and the public, more particularly the respondent households who extended whole-hearted co-operation during the survey. I am especially thankful to all those experts who participated in the Workshop held on 2nd April 2004, and provided invaluable suggestions for the modification of the draft HDR.

The Planning Commission was a source of continuous support during the preparation of the Report. I am grateful to Dr. Rohini Nayyar, former Adviser (RD), Planning Commission, for the special interest that she took in the Report during its preparation.

I am thankful to UNDP India, particularly Dr. Maxine Olson, the Resident Representative, UNDP, India, for the support provided for the preparation of the HDR. The Human Development Resource Centre (HDRC), UNDP, India provided guidance during its preparation. Dr. K. Seeta Prabhu, Dr. Suraj Kumar and Mrs. Ritu Mathur helped us refine the drafts of HDR. We are thankful to Mrs. Nandini Oberoi for adding interesting insights and meticulously editing the HDR. Mr. Bhaskar Khulbe provided valuable comments to strengthen this Report.

Atul Sarma
Vice-Chancellor

Steering Committee

1.	Chief Secretary, Government of Arunachal Pradesh	Chairperson
2.	Vice-Chancellor, Rajiv Gandhi University	Member
3.	Secretary (Education), Government of Arunachal Pradesh	Member
4.	Secretary (Health), Government of Arunachal Pradesh	Member
5.	Dean, Faculty of Environmental Sciences, Rajiv Gandhi University	Member
6.	Dean, Faculty of Education, Rajiv Gandhi University	Member
7.	Head, Department of Economics, Rajiv Gandhi University	Member
8.	Head, Department of Geography, Rajiv Gandhi University	Member
9.	Secretary (Planning), Government of Arunachal Pradesh	Convenor

Technical Committee of the State Human Development Report Project

1.	N. C. Roy, Dept. of Economics, Rajiv Gandhi University	Convenor
2.	A. Mitra, Dept. of Economics, Rajiv Gandhi University	Member
3.	P. K. Kuri, Dept. of Economics, Rajiv Gandhi University (Presently at Burdwan University)	Member
4.	S. Das, Dept. of Economics, Rajiv Gandhi University (Presently at Sambalpur University)	Member
5.	S. K. Nayak, Dept. of Economics, Rajiv Gandhi University	Member
6.	D. K. Mishra, Dept. of Economics, Rajiv Gandhi University (Presently at JNU, New Delhi)	Member
7.	V. Upadhyay, Dept. of Economics, Rajiv Gandhi University	Member
8.	A. K. Das, Dept. of Botany, Rajiv Gandhi University	Member
9.	R. C. Joshi, Dept. of Geography, Rajiv Gandhi University	Member
10.	S. K. Patnaik, Dept. of Geography, Rajiv Gandhi University	Member
11.	M. C. Behera, Dept. of Tribal Studies, Rajiv Gandhi University	Member
12.	A. K. Singh, Department of Education, Rajiv Gandhi University (Presently at TISS, Mumbai)	Member
13.	Director, Planning, Govt. of Arunachal Pradesh, Itanagar	Member
14.	S. Kumar, Indian Forest Service	Member
15.	J. Ete, President, Arunachal Pradesh Women's Welfare Society, Itanagar	Member Member
16.	J. Basar, Representing the NGO, CEDGE	Member
17.	Late T. Sharma, Representing NGO, *PRAYAS*	Member

Research Assistants

Jawan Singh Rawat, Noto Ado, Heemanshu Sarkar, Yapa Gyati, Nandita Chakraborty, Brajen Das, Chandan Kumar Pandey, Joram Rina, Marto Dirchi, Opet Padung, Pradeep Debnath, Priyanka Priyadarshini, Rajnish Pandey, Susmita Sahoo, Sompha Wangphan, Amit Kumar Giri, Basanta Mangal Dutta.

Office Staff

1. Karma Tsering, Computer Programmer
2. Gautam Bhattacharjee, Stenographer
3. Tomal Bhattacharjee, Stenographer
4. Vijay Kumar Prasad, Office Assistant
5. Neelam Uma, Peon

The background papers for this Report were written by the following authors:

Topics	Authors
Health and Income	N. C. Roy
Education	S. K. Nayak
Gender Issues	D. K. Mishra, V. Upadhyay
Poverty	S. Das
Infrastructure	A. Mitra
Biodiversity	A. K. Das

S. K. Patnaik contributed to the preparation and presentation of GIS Maps and Graphics. Data processing was done by Jawan Singh Rawat and Karma Tsering. Based on the models constructed by the faculty members of the Department of Economics, Rajiv Gandhi University, the statistical estimation was done mainly by Jawan Singh Rawat, assisted by Karma Tsering.

All background papers were reviewed and modified by a committee consisting of the following members: N. C. Roy, A. Mitra, S. Das, S. K. Nayak, D. K. Mishra, and V. Upadhyay. The committee worked under the active and inspiring guidance of Prof. Atul Sarma, Vice-Chancellor, Rajiv Gandhi University.

Acknowledgements

It was a good opportunity as well as a big challenge to be assigned the responsibility of preparing the first Human Development Report of Arunachal Pradesh. We whole-heartedly took the responsibility and invested our all-out efforts in the preparation of the Report. In doing so, we received help from many people. We received guidance and advice from Dr. K.K. Dwivedi, former Vice-Chancellor of Rajiv Gandhi University. We are deeply indebted to him. Prof. Atul Sarma, Vice-Chancellor, Rajiv Gandhi University, has been kind enough to provide valuable suggestions in the final stage of the project. We express our sincere gratitude to him. We are highly grateful to Prof. Tamo Mibang, Pro-Vice Chancellor, Rajiv Gandhi University, from whom we have received advice and guidance in different stages of the project. Our indebtedness to Mr. Joram Begi, former Registrar, Rajiv Gandhi University, remains high in view of his invaluable help, especially at the initial stage of the project. Generous help and administrative support came from Dr. Tai Nyori, Registrar, Rajiv Gandhi University, to whom go our sincere thanks.

The faculty members of Rajiv Gandhi University have been a constant source of inspiration and encouragement. We gratefully acknowledge their cooperation and suggestions. We are particularly indebted to Prof. J.L. Dawar, and Prof. N. Nagaraju, who checked parts of the draft HDR. We acknowledge having received help from Prof. A. C. Talukdar, Prof. S. Dutta, Prof. R.S. Yadava, Prof. J. C. Soni, Prof. K. C. Kapoor, Dr. Pura Tado, Dr. B. K. Tripathi, Mr. R. Taba, Mr. Tana Showren, Dr. Ashan Riddi, Mr. Tashi Kaye, Mr. S. Gopinath, Mr. M. Maltesh, Mr. Bedabrat Saikia, Mr. Rituparna Datta, Mr. S. K. Sur, Mr. K.K. Thomas, Mr. P. T. Pradeep, Mr. S. D. Pradeep, Ms. Sreeja Satheesan, Mr. Rajesh Puthoor, Mr. D. K. Roy, Mr. Sanjay Roy, Mr. Balaram Saha, Mr. D. K. Ram, Ms. Omi Debia, and other officials and staff members of Rajiv Gandhi University. Thanks are especially due to Mr. R. K. Bhattacharya, former Director of Planning, Government of Arunachal Pradesh, Mr. C. L. Thungkon, Joint Director of Planning, Government of Arunachal Pradesh, Dr. S. N. Hegde, Director, State Forest Research Institute, Itanagar, and other Government officials for their cooperation and advice. The district and circle level officials extended help to our survey team. We are grateful to them. Spontaneous cooperation was extended to the survey team by the *Gaon Buras* (village heads) and respondents to whom we remain grateful.

We received chapter-wise help from many scholars. In the chapter on Health, valuable suggestions were received from Dr. Sarit Choudhary and Dr. Sucheta Choudhary. Suggestions from Dr. P. K. Panigrahi, Dr. Nani Bath, and Dr. Nishamani Kar were received in respect of the Chapter on Deprivation and inequality. We express our sincere thanks to all of them. In the HDR Review Workshop held on 2nd April 2004, an animated discussion took place which immensely benefited us. A number of experts and scholars who participated in the Workshop made suggestions which led to modification, and improvement of the Report. Among the experts whose suggestions and advice helped us are Dr. Rohini Nayyar, Dr. Suraj Kumar, Prof. M. P. Bezbaruah, Prof. Nirankar Srivastav, Ms. Nandini Oberoi, Mr. Ramesh Bhattacharya, Prof. S. R. Mishra, Dr. Alakh N. Sharma, Prof. Amar Yumnam, Prof. Bijoy Kumar Singh, and many others whose names are not mentioned here. We remain grateful to all of them.

In the finalisation stage of the Report, contributions came from Dr. Seeta Prabhu. Dr. Suraj Kumar and Ms. Ritu Mathur of UNDP, and Ms. Nandini Oberoi. We express our sincere thanks to them.

Technical Committee

Table of Contents

Abbreviations

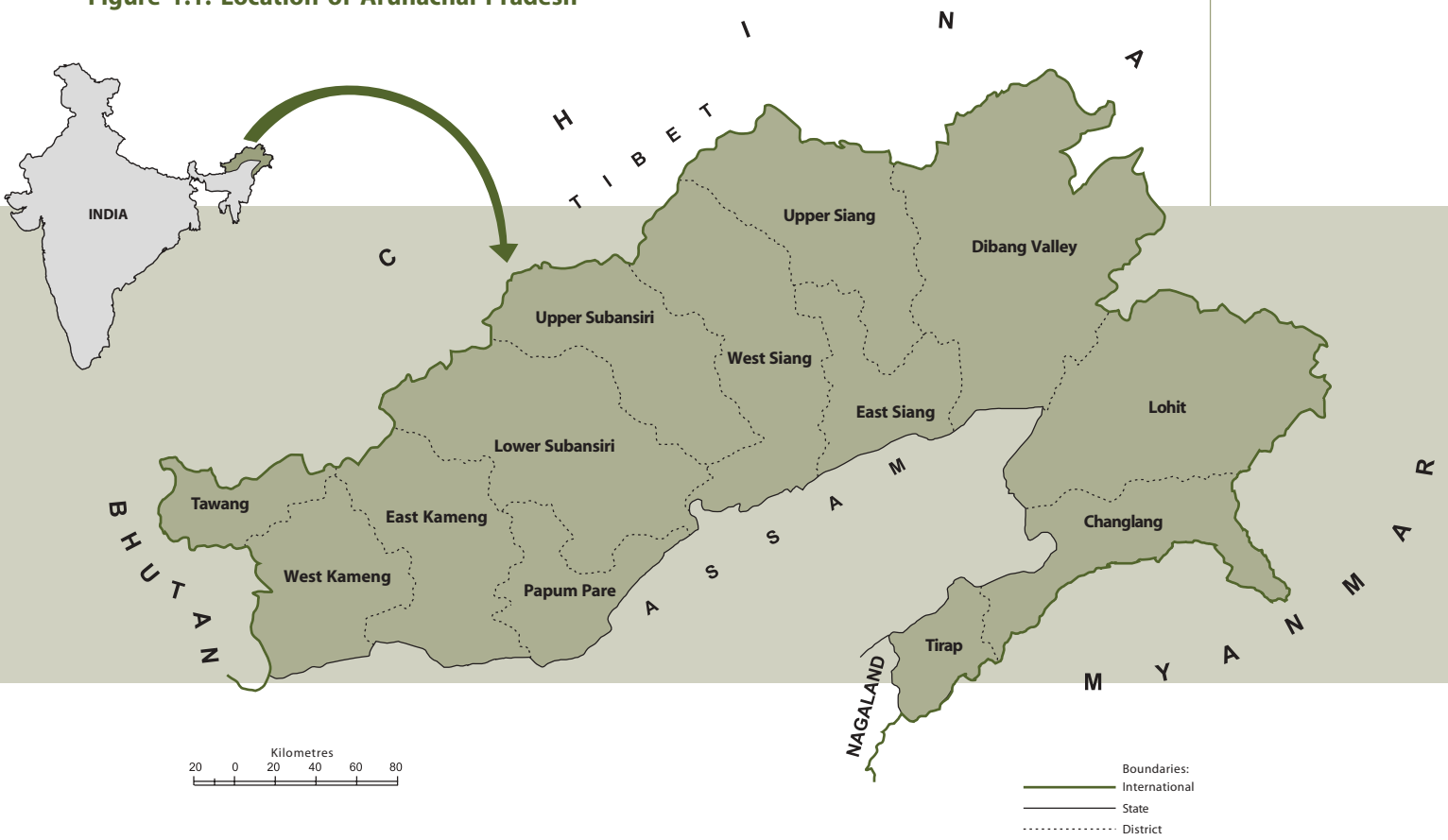
BCG	Bacillus Calmette-Guerin
CPR	Common Pool Resources
CSR	Child Sex Ratio
DPT	Diphtheria, Pertussis and Tetanus
FWPR	Female Work Participation Rate
GDDP	Gross District Domestic Product
GDI	Gender-related Development Index
GDP	Gross Domestic Product
GEM	Gender Empowerment Measure
GER	Gross Enrolment Ratio
GER (PR)	Gross Enrolment Ratio at Primary Level
GER (UP)	Gross Enrolment Ratio at Upper Primary Level
GSDP	Gross State Domestic Product
HDI	Human Development Index
HDR	Human Development Report
HPI	Human Poverty Index
ICMR	Indian Council of Medical Research
IKS	Indigenous Knowledge System
IPR	Intellectual Property Rights
IMR	Infant Mortality Rate
LEB	Life Expectancy at Birth
LFPR	Labour Force Participation Rate
NDDP	Net District Domestic Product
NNP	Net National Product
MP	Madhya Pradesh
NEFA	North-East Frontier Agency
NFHS	National Family Health Survey
NGO	Non-Government Organisation
NHDR	National Human Development Report
NSDP	Net State Domestic Product
NSS	National Sample Survey
PHC	Primary Health Centre
PPP	Purchasing Power Parity
SHDR	State Human Development Report
SRS	Sample Registration System
ST	Scheduled Tribes
UFMR	Under Five Mortality Rate
UNDP	United Nations Development Programme
UP	Uttar Pradesh
WPR	Work Participation Rate

Chapter 1

Arunachal: the land and its people

A. Arunachal Pradesh – the land and its people

Figure 1.1: Location of Arunachal Pradesh



Arunachal Pradesh map based on Survey of India map with due permission from the Surveyor General of India

The interstate boundaries between Arunachal Pradesh and Assam shown on the map are as interpreted from the North-Eastern Areas (Reorganisation) Act 1971, but have yet to be verified.

Arunachal (the Land of Dawn) is located in the extreme north-eastern corner of India. It is bordered by Bhutan on the west, China (Tibet) on the north and north-east, Myanmar on the east and south-east and the States of Assam and Nagaland to its south. Situated at the eastern end of the Himalayas, it is here that the Himalayan range changes its east-west orientation to a north-south one.

Much of the southern border follows the foothills bordering the northern fringes of the Brahmaputra valley. Known in Tibet as the Tsang-po, the great river curves around the Himalayas, to enter Arunachal as the Siang. It meets the Lohit, another great river that originates in China, shortly after it moves into the plains; and from this union is born the Brahmaputra, the 'Son of God'. Other big rivers — Kameng, Subansiri and Dibang — flow into the Brahmaputra; carving out distinctive valleys that form the natural divisions that make up the State. From the east flow the Noa-Dihing and several other rivers that

originate in the Tirap and Changlang districts of the State.

The State has a territory of 83,743 square kilometre, which is about 2.55 per cent of India's land area and a third of the area of North-East India (32.83 per cent excluding Sikkim). The largest State in North-East India, Arunachal's area is slightly more than that of Assam, but, its population is 0.11 per cent of India's population and only 2.85 per cent of the population of North-East India. All the States of North-East India, except Mizoram, have larger populations than that of Arunachal Pradesh. The population density in Arunachal is 13 people per square kilometre (2001 Census). This stands in sharp contrast to the population density of 324 people per square kilometre in the country.

Arunachal has a 'highly precipitous and varied terrain' (Fleming 1995). Elevations range from 300 metres on the edge of Assam to above 7,000 metres on its northern borders. 'The land is unparalleled in the world, for the concentration, isolation and diversity of tribal cultures it contains. Nowhere else can one find such a patchwork of discrete types of pre-industrial political economies in such a small area, including semi-nomadic swidden agriculture, terraced wet agriculture, high montane pastrolism and traditional trade and barter. Traditionally, the political organisation ranged from aristocratic ranking or stratified chiefdoms to egalitarian clan or lineage-based societies and highly corporate villages run by democratic debate in traditional councils' (Taylor, 1998).

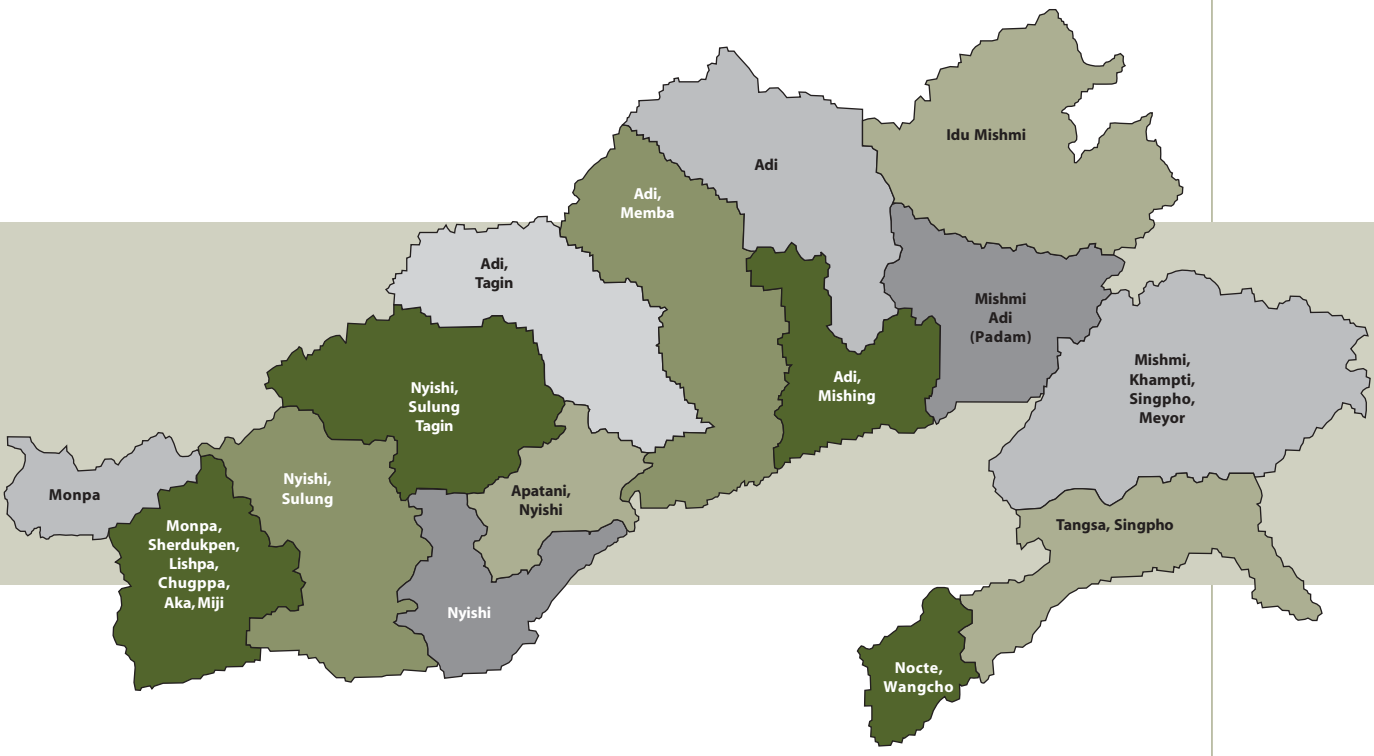
The south-west monsoon makes Arunachal one of the wettest States in the country, with an average annual rainfall of 350 cms. The rainy season extends from the pre-monsoon months of March and April, through the extremely wet months of June and July and continues till September-October. The foothills are hot and humid for a major part of the year but, the other areas are quite cool, even during spring.

Arunachal Pradesh is 96 per cent hill terrain and, it is the hills which have acted as the natural boundaries for the different communities that inhabit Arunachal. Much of the land is forested and the landscape and forests vary from the western end of the State to the east and with changing altitude. There are alpine forests, temperate and sub-tropical forests, and semi-evergreen forests. The temperate forests are mainly conifer, larch, juniper and spruce. Temperate bamboos form shrubby undergrowth in many places and the broad- leaved forests include magnolia, oak, rhododendron, chestnut, sal, teak, and poplar. There are wetlands, where the rivers meet the Brahmaputra, and grasslands in the mountains as well as riverine grasslands (Sumi Krishna, 1997, and T C Upreti, 2002).

Rich in a variety of flora and fauna, Arunachal Pradesh has nourished in its hilly terrains different people, cultures and institutional configurations. Home to 26 major tribes[1] and 110 sub-tribes and minor tribes, Arunachal has received waves of migration from different directions, over centuries. The early waves were probably from Bhutan, Tibet, Burma, and Yunnan. The more recent migrants are largely from Burma (Myanmar) and Bangladesh (Box 1.1). For eons, the mountains kept the various tribal clans isolated from each other, and there was not much homogenisation (Sumi Krishna, 1997). In fact, each group maintained their own distinct language (and often even a different dialect), belief systems and culture. Though there are more than 125 tribes, according to the 1991 Census, only 15 of them had a population of more than 5,000 people.

[1] A tribe refers to a socio-political organisation of people consisting of a number of families/clans/groups who share common ancestry and culture. The word tribal means 'of the tribe'.

Figure 1.2: Geographical distribution of major tribes in Arunachal Pradesh



Of the many communities, the more prominent ones (due to their numerical strength) are the Nyishi, Adi, Tagin, Apatani, Mishmi, Khampti, Tangsa, Nocte, Wangcho, Monpa, Aka, and Miji. Most of the larger tribes are conglomerates of many groups; the Adis, for example, are made up of the Gallong Adi, the Padam Adi, the Minyongs and other groups. There are so many different groups of people in Arunachal that any categorisation is difficult and incomplete. Table 1.1 indicates the main tribes in a particular district, but, it is not an exhaustive list.

According to the 2001 Census, the Scheduled Tribes (ST) population constitutes

Table 1.1

Districts[2] of Arunachal and the main tribes that inhabit them

Districts	Headquarters	The Main Tribes that Inhabit the Districts
Tawang	Tawang	Monpa
West Kameng	Bomdila	Monpa, Sherdukpen, Lishpa, Chugppa, Aka, Miji
East Kameng	Seppa	Nyishi, Sulung
Papum Pare	Yupia	Nyishi
Lower Subansiri	Ziro	Apatani, Nyishi
Upper Subansiri	Daporijo	Adi, Tagin
West Siang	Along	Adi, Memba
East Siang	Pasighat	Adi, Mishing
Upper Siang	Yingkiong	Adi
Dibang Valley (New)	Anini	Idu Mishmi
Lohit	Tezu	Mishmi, Khampti, Singpho, Meyor
Changlang	Changlang	Tangsa, Singpho
Tirap	Khonsa	Nocte, Wangcho
Kurung Kumey	Koloriang	Nyishi, Sulung, Tagin
Lower Dibang Valley	Roing	Mishmi, Adi (Padam)
Anjaw	Hawai	Mishmi

Source: Compiled from different sources.

[2] There are 16 districts in Arunachal Pradesh. However, the analysis in this report is confined to 15 districts and, sometimes refers to the 13 'old' districts because data for the newer districts is not available. Kurung Kumey, Dibang Valley (New), and Anjaw are the three new districts which were constituted after June 2000. Anjaw is the newest district, created in December 2003, from the Lohit district.

Box 1.1

A brief history of Arunachal Pradesh: its origin in legends and myths

The history of Arunachal Pradesh has been constructed largely from oral histories passed down from generation to generation, in verse and song. The Ahom *buranjis* (chronicles of the Ahom kings of Assam) and some archaeological finds that have been unearthed in the area have helped to reconstruct the history of Arunachal.

While the land has been inhabited since pre-historic times, it never came under the direct rule of the British nor indeed under the rule of any king in Delhi. The Ahoms did not rule over the hills of present-day Arunachal Pradesh, but, they did maintain contact with the people who lived there. Their primary motivation was to protect their empire from depredation by the hill tribes, and to exercise control over the trade between the regions. Few trade routes passed through the hilly tracts to Tibet and, on to China. Occasionally, they undertook a 'show of force' exercise, much as the British did, hundreds of years later. The Ahoms introduced a system of paying *'posa'* (literally money) to some tribes, to buy peace.

Archaeological finds in Dibang Valley (at Rukmaninagar and Bhishmaknagar), the copper temples at Tamreswari and Parashuramkund in Lohit district, the ruins of the Bhalukpung Fort, and the Ita Fort in Papum Pare, suggest some contact between the rulers in Assam and the people of Arunachal Pradesh.

By the 1830s, the British were firmly in control of the Brahmaputra Valley. Their approach to the hill people of present-day Arunachal Pradesh was remarkably similar to the policies followed by the Ahoms. By and large, the British Empire left the tribes alone, resorting to forays in the form of punitive expeditions only when their commercial and revenue interests were affected.

In 1954, the North East Frontier Agency came into existence with five frontier divisons: the Kameng and Subansiri Frontier Division, the Tirap Frontier Division, the Siang Frontier Division, the Lohit Frontier Division, and the Tuensang Frontier Division (which later became a part of Nagaland).

Legends and myths of origin

Oral history says that the Monpas came from Bhutan and Tibet, the Sherdukpens claim that they are descendants of a local prince and a princess from the South

(possibly an Ahom princess). The Akas say that they migrated from Upper Assam. The Adis believe that they migrated from across the Himalayas. The Tagins are believed to have migrated from Penji, a village in Tibet. The Khamptis migrated to this region from Burma (now Myanmar). Like the Ahoms of Assam, they are a Shan tribe and moved to Arunachal sometime in the 18th century. Being a Shan people, they enjoyed certain privileges and were allowed to settle along the Tengapani River.

The Singphos made their way across the Patkai Pass and, after some confrontation with the Khamptis, settled on the land between the Buri Dihing, the Noa-Dihing and the Tengapani rivers. They often raided the Assamese areas and the 19th century saw a great deal of conflict between the Singphos and the Ahoms, as well as the British and the Burmese.

Every group in Arunachal has a story about their migration to this land. The rich mythological heritage of Arunachal, transmitted orally from generation to generation, tells us about the origin of Man and describes his relationship with the environment. While there are different myths among the tribes, they all speak of Man's relationship with nature and animals. Among the myths of origin, the Akas of West Kameng speak of their coming to earth from heaven on ladders. According to them, each race had a different ladder, the Ahoms and the Aka kings came on golden ladders, other Akas by silver ladders. The Monpas came by iron ladders, the Nyishis and the Adis came by bamboo ladders, and the Cacharis and Khowas came by grass ladders.

The Mishmis, who inhabit the eastern corner of Arunachal, believe that God penetrated the womb of the first woman and the child born of this union is the father of the first Idu Mishmi. The Mishmis trace the strength of their tribe to the only man and woman to survive devastating tempests and catastrophes. A similar legend traces the origin of the Mukhlom Tsangas to the seven primeval fathers of man who came from the only woman to survive the great snowstorm that once befell earth. Animals also figure in many of the early myths of origin. The Dirrang Monpas, for example, believe that they descended from a monkey and were transformed into human beings by a lama.

References: People of India, Arunachal Pradesh, Volume XIV, 1995, Editor K. S. Singh, Arunachal Panorama, J. N. Chowdhury, 1966.

Table 1.2

Population composition of Arunachal Pradesh

Districts	Total	ST	General	Percentage ST	Percentage General
Tawang	38,924	29,191	9,733	74.99	25.01
West Kameng	74,599	36,951	37,648	49.53	50.47
East Kameng	57,179	49,585	7,594	86.72	13.28
Papum Pare	1,22,003	69,007	52,996	56.56	43.44
Kurung Kumey	42,518	41,619	899	97.89	2.11
Lower Subansiri	55,726	46,893	8,833	84.15	15.85
Upper Subansiri	55,346	49,552	5,794	89.53	10.47
West Siang	1,03,918	84,922	18,996	81.72	18.28
East Siang	87,397	60,420	26,977	69.13	30.87
Upper Siang	33,363	26,094	7,269	78.21	21.79
Lower Dibang Valley	50,378	22,005	28,373	43.68	56.32
Dibang Valley (New)	7,342	4,827	2,515	65.75	34.25
Lohit	1,25,086	40,552	84,534	32.42	67.58
Anjaw	18,441	14,249	4,192	77.27	22.73
Changlang	1,25,422	45,351	80,071	36.16	63.84
Tirap	1,00,326	83,940	16,386	83.67	16.33
Arunachal Pradesh	**1,097,968**	**705,158**	**392,810**	**64.22**	**35.78**

Data Source: Census of India 2001, Series 13 Arunachal Pradesh, Final Population Totals.

Note: ST means Scheduled Tribes.

64.22 per cent of the total population of 1,098,000 people, and the rest belongs to the General category. As is evident in Table 1.2, some districts like Kurung Kumey have an extremely high concentration of the Scheduled Tribe population (97.89 per cent) while in Lohit district, the Scheduled Tribes account for only a third of the population (32.42 per cent).

Among the smaller tribes are the Apatanis, a people confined largely to seven original villages located in the Apatani plateau of the Lower Subansiri area. The way of life of the Apatani people and their sustainable agricultural practices have been acclaimed for long. (Box 1.2)

Arunachal is marked by linguistic heterogeneity and as many as 42 languages are spoken here. All the languages, except Assamese and Nepali, belong to the Tibeto-Chinese family. Khampti-Shan belong to the Siamese-Chinese subgroup while the rest are Tibeto-Burman in origin. Most languages do not have a script of their own and use either the Roman script or the Assamese script. Six different scripts are in use – Assamese, Devanagri, Hingna, Mon, Roman, and Tibetan (KS Singh, 1995).

The people have an innate knowledge of the environment and the cultural practices passed down from generation to generation have helped to protect the rich biodiversity of the region. Local medicine relies on a variety of plants and insects, each armed with its own specific medicinal properties. Traditional architecture and construction also require detailed knowledge of the flora and fauna. The suspension bridges of the Siang and other regions are well known for their ingenious use of bamboo and cane. However, indigenous knowledge systems, vital to the sustainability of the rich biodiversity of the State, are in danger of disappearing, in the absence of adequate recognition and documentation.

B. Development in Arunachal Pradesh, pre-1947

The initiation of the process of development in Arunachal Pradesh is relatively recent, having begun in the years following Independence in 1947. Before Independence, the area that forms Arunachal Pradesh was not under the direct administration of the Government; it was administered indirectly, so that the area remained largely cut-off from the mainstream. The people enjoyed a fair measure of autonomy in their villages and localities. The autonomy of the village or a group of villages bound by kinship/clanship/ community was so high in some places that they were like village republics (Talukdar, 1997) or confederations of adjacent villages. However, the local administrative structure varied widely across the communities. In some communities, it was the village councils which acted as the centre of administration and were responsible for the arbitration of all disputes arising in the village. In other communities, chieftainship prevailed.

With the administration being highly localised within a village or a group of villages, there was very little communication between the Government administration located outside the State and the villages and isolated hamlets.

policy pursued by the British Government kept the people away from much of what was happening in the rest of India. Inroads by outsiders, including the British, were resisted. The British made some expeditions to the Adi areas, but, they were unable to establish a trading post there as they had planned. However, they did manage to negotiate some agreement regarding both trade and the frequent raids made to the plains and a fragile peace prevailed in the region until 1911, when the Adis killed a British official on a foray into the Siang Valley. Skirmishes with the British were not uncommon. While surveyors, botanists, and even the odd missionary did manage to make their way into Arunachal, it remained for the most part 'untouched'. And the people were able to continue living as they had for generations; preserving their local culture and indigenous way of life. In 1914, the hill areas of the northern districts of Assam were separated to form the North East Frontier Tracts, which, 40 years later, became the North East Frontier Agency (NEFA).

In 1914, the hill areas of the northern districts of Assam were separated to form the North East Frontier Tracts, which, 40 years later, became the North East Frontier Agency (NEFA).

Inner line regulation

The operation of the Inner Line Permit (ILP), which restricts the entry of outsiders into Arunachal, has meant limited interaction with the rest of India. There has, however, always been some interaction and trade between the hill tribes and the people inhabiting the plains of Assam. According to the provisions of the Inner Line Act, enacted by the British in 1873, people from other parts of the country cannot enter the State without the permission of the Government. The isolationist

The Inner Line Act continues to be operational even today and people who do not belong to Arunachal need an ILP to enter the State. They cannot own any land nor any fixed assets in this State.

Box 1.2

The Apatanis – a model for conservation and sustainable development

The Apatani Valley lies at an elevation of 1,754 metres and is surrounded by ridges that rise to over 2,377 metres. The Apatanis and other Tani groups are thought to have migrated across the Himalayas, after the decline of the late Neolithic civilisations in China and Mongolia. These groups practise a form of advanced wetland rice cultivation developed by those early civilisations.

There are seven historic villages within the Apatani Valley. Each village is an independent political unit. Villages are compact with the individual houses grouped by clans. The Apatani social structure is organised around clan membership. Clans are patriarchal, and unique to a given village. Male members of each clan construct a raised wooden platform known as a *buliang*, which is used for clan meetings. Clan members share religious ceremonies and assist each other in the construction of houses and granaries. Historically, tribal laws were upheld and the village administration was run by clan representatives or the *buliang*.

According to Haimendorf, 'the economy of the Apatani is without parallel among the tribes of India's border land, secluded from the outside world by natural barriers and war-like neighbours, they have developed the resources of their small homeland in a way that would be credible to any advanced community.' The Apatanis practised terraced cultivation when everyone around them practised 'slash-and-burn' agriculture. They generated a surplus, which enabled them to trade with their Nyishi neighbours.

Compared to other regions of Arunachal Pradesh, the Apatani Valley is well-suited for terraced wetland rice cultivation. The valley is a broad flat expanse, stretching over 26 square kilometres, and is drained by the Kale River and its tributaries. Over the years, an extensive irrigation system has been built to move water from the Kale River to the fields. The land is rich, and the annual rice production is said to be enough to feed the local population. (The 1991 Census of India reports 22,526 people belonging to the Apatani tribe).

Every Apatani family owns a small plot of land on which they live or they have plots in areas near the forests. On this they grow vegetables, fruits, pine trees and bamboos. In fact, the most striking features of the Apatani landscape are the many plantations of Blue pine (*Pinus wallichiana*) and a local bamboo species called Bije (*Phyllostachys bambusoides*).

The Apatanis have developed forestry practices that are quite unique in the Himalayan region. The foresight to grow pine trees and bamboos reveals a high degree of environmental consciousness. The Apatanis plant trees on private land, even though they live in the middle of a forest. They strictly control resource use on clan lands. They don't practise *jhum* agriculture, because they live in a rich valley that is much more suitable for advanced wetland and terraced rice cultivation.

There is always the threat of a fire breaking out in the closely packed Apatani villages but, with a ready source of pine and bamboo, an entire village can be rebuilt within three to four days.

The future of the Apatani private forestry plantations as well as the tightly controlled clan forests depends on whether the old traditions will continue. At present, the systems appear to be sustainable; planting follows cutting and new plantations are opened up for the expanding population. However, as concrete homes replace traditional ones, things are changing. The knowledge of hunting trails and indigenous plant use are passing away with the older generation. Yet, the Apatanis provide a unique glimpse into the indigenous conservation practices that have survived for centuries.

References: The Apatani and their neighbours, Furer-Haimendorf, 1962.
People of India, Arunachal Pradesh, Volume XIV, 1995, Editor KS Singh.
A Passion For Pine - Forest Conservation Practices of the Apatani People of Arunachal Pradesh - Michael A. Rechlin and Ritu Varuni (2001) (Unpublished).

C. The traditional economies of Arunachal Pradesh

Till not so long ago, an overwhelming majority of the people in Arunachal depended on agriculture, which was based mainly on swidden cultivation, the slash-and-burn method that is known in North-East India as *jhum*. A small minority of people (mainly the Apatanis, the Singpho and the Khamptis of Lohit district) who were settled in river valleys and plateaus practised permanent cultivation. Agriculture was basically limited to the production of paddy, the staple food of the people[3]. Crop production was supplemented by a number of activities: hunting, fishing, and the collection of forest produce. Industrial activities were interwoven with household level production; no separate professional class, fully distinguishable from the agrarian population, appeared. Directly or indirectly, all people depended on agriculture. Except for a few pockets where individual property rights — more accurately family property rights in land were well-established — agricultural land was communally held. The individual cultivator enjoyed the usufructuary rights during his operation of the land (Roy and Kuri, 2002). Agricultural land was not cadastrally surveyed; even today a cadastral survey has not been conducted on agricultural land. After the recent enactment of a Bill on Land Settlement and Revenue in 2001, preparations are being made for a cadastral survey.

Low-investible surplus

The productivity of *jhum*-based agriculture was low. Low productivity in agriculture, household-based industrial production and the virtual non-existence of specialisation kept the overall productivity of the economy low. The resulting low level of marketable surplus prevented the emergence of monetised transactions. Capital formation was insignificant.

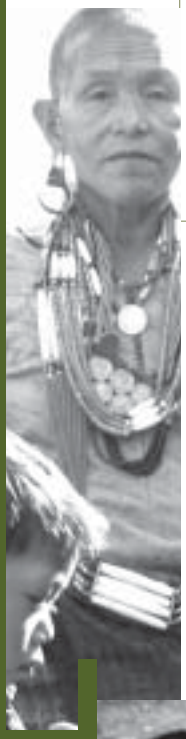
Barter and exchange

Barter was the usual form of exchange in the pre-Independence period and, it is only in the last few decades that the economy is getting monetised. Most people had no contact with the cash economy prevalent in other parts of the country. Initially, barter was also confined mainly to the members of a community; inter-tribal transactions were limited but not uncommon. The Apatanis had regular barter trade with the Nyishis and the Miris. In fact, the Nyishis used to provide cotton to the Apatanis, who wove it into cloth. Along the northern border, items such as salt, copper, woollen garments and semi-precious stones from Tibet were exchanged for forest and agricultural products such as animal hides and rice. Salt and *endi* (a type of silk) was procured from Assam in exchange for agricultural products. The people of Tirap and Changlang traded with Burma across the Patkai Range. *Daos*, fishing nets and pen knives were imported from Burma in exchange for tea leaves, salt and beads. Opium was another item of trade. The Noctes supplied raw coal and crude kerosene oil to Assam, the Singphos were active in the rubber trade. Thus, while the communities were largely insular, trade was an important part of the economy [KS Singh (1995) and Haimendorf (1944)].

Community spirit and mutual insurance

Before the transition to the cash economy in the post-Independence period, there were community-specific institutions in Arunachal which provided security to the people. One such institution was mutual insurance or reciprocity, which neutralised the effects of year-to-year fluctuations in agricultural production. The failure of the crop for a family did not result in starvation – other families would come to the aid of the family that suffered. The provision of aid was like payment of insurance premium, which obligated the recipient family to return the aid in future, when the giver was in need (Roy and Kuri, 2002). This process of meeting the reciprocal needs became formalised in what is called the mutual insurance or generalised reciprocity. This mutual insurance and other community institutions prevented the growth of large-scale inequalities in the distribution of economic resources.

[3] *Before 1947, agriculture in Arunachal Pradesh was not commercial and all production was aimed at meeting the immediate needs of the family and clan. Paddy was, and still, is the main crop, but, in the* jhum *field, usually mixed cropping – vegetables along with paddy – is practised.*



D. Initiation of the development process

In other parts of the country, especially in the plains, the process of modernisation, together with mechanised industrial production, began in the 19th century. In Arunachal Pradesh, modernisation is a largely post-Independence phenomenon, beginning in slow but assured steps, with the establishment of a direct administrative structure in the State (Luthra, 1993). Almost all Government offices, which were earlier located in what is now Assam, were gradually shifted to Arunachal Pradesh and direct contact was established between the people and the administration. The Government of India invested heavily in the construction of roads and the establishment of schools and hospitals.

The name Arunachal Pradesh was given to this area only in 1972. Earlier, in 1954, the appellation, North East Frontier Agency (NEFA), replaced the former name North East Frontier Tracts. Constitutionally a part of Assam, the NEFA administration was not fully integrated with that of Assam. It was administered directly by the Governor of Assam, as a representative of the President of India. The Legislative Assembly of Assam could not enact laws for NEFA. In order to intensify the developmental efforts, NEFA was made a Union Territory in 1972 and named Arunachal Pradesh. The Union Territory became the 24th State of India in 1987. Statehood has provided the administrative mechanism for achieving sustained development. The establishment of institutional infrastructure in a hilly and sparsely populated land is a monumental task. The differences in terrain, culture, language, and institutions among the different tribal communities make the task even more challenging. The administration and the politicians are conscious of the fact that development must be in consonance with the cultural ideology and aspirations of the people.

The induction of money that naturally followed with the launch of the development programmes brought far-reaching changes in the tribal economies. The insularity of these economies was attenuated but, the barter economies quickly began to integrate with the national economy. The cash economy brought with it its own dynamics; disturbing the way of life that many communities had followed for generations. The biggest changes came into the institution of ownership, especially the ownership of land. Community-owned land was individualised in many areas, which moved to permanent cultivation together with new inputs such as bullock-driven ploughs, new seed varieties, manure and fertilisers. With the shift in ownership from the community to individuals, community-level institutions such as mutual insurance and social mobilisation of labour became weak and tended to be replaced by market-based institutions. Relations based on contract began to replace clan relations.

Pace of development

At Independence, the North East Frontier Tracts had a primitive economy with a low level of development (when evaluated by conventional indicators like life expectancy and education). However, the people did have enormous traditional skills and learnings, which have been passed down through the generations; including life-skills and healing techniques. There was no modern hospital and the length of motorable roads was limited, and the vast expanses of land with thin and scattered population — population density was as low as 3 persons per square kilometre — lacked connectivity. The absence of modern health services, low literacy and a fluctuating low level of income, kept the mortality rate high. In spite of a high birth rate, the high mortality rate kept the rate of growth of population low in the pre-Independence period.

While the process of development in Arunachal Pradesh is recent; the rate of development has been encouraging. Income per head has increased in the State and the rate of growth of income is quite high compared to the national average. The literacy rate increased from 25.55 per cent in 1981 to 54.34 per cent in 2001[4]. Yet, in spite of a steady increase, the literacy rate remains low compared to the national average (64.80 per cent in 2001). Along with the growth of literacy and income, the health status of the people has improved

[4] *Primary Census Abstract, Arunachal Pradesh, Census of India, 2001.*

in the State. However the improvement in the health status has not been able to keep pace with the spread of education or the growth of income.

The growth of population: 1961-2001

The indigenous population of Arunachal Pradesh started growing rapidly soon after Independence because of the falling morbidity and mortality in a very slow-falling fertility regime. Two factors — among many others — that caused the decline of morbidity and mortality can be singled out: (i) the establishment of hospitals and a steady induction of modern health services; and (ii) the smoothening of consumption, through the provision of food supplies, operationalised by the rationing system or the public distribution system. The labour market in Arunachal Pradesh was absent among the local people, so, developmental activities, initiated by the Government of India, meant the in-migration of workers, both skilled and unskilled, from different parts of the country. This migration, which was only a trickle immediately after Independence, increased in the 1960s and 1970s, as the development process intensified.

Increasing in-migration added to the rising local population and led to an unprecedented growth of population, so that by 2001 the population of Arunachal was four times what it was in 1947.

Table 1.3 shows the growth rates of the tribal, non-tribal, and the total population of Arunachal Pradesh. In the 1960s, the growth rate of the general population was very high, 16.79 per cent per annum. In subsequent decades, while the growth rate of the general population declined, it was still high, indicating a positive inflow of population into the State. The tribal population grew faster in the 1960s than in the 1970s. There does not appear to be any plausible explanation for this, except perhaps an underenumeration of the tribal population in the 1961 Census[5]. The other reason may be the inclusion of some Scheduled Tribes migrants in the Scheduled Tribes population of Arunachal Pradesh in the 1971 Census and their exclusion in 1981 (people belonging to the Scheduled Tribes elsewhere in the country are not counted as Scheduled Tribes in Arunachal Pradesh). In the 1980s and 1990s, the growth rate of the Scheduled Tribe population increased and the growth of the Scheduled Tribe population surpassed the growth of the general population for the first time in the 1991-2001 decade. During the 1961-2001 period as a whole, the average annual exponential growth rate of the Scheduled Tribe population was 2.11 per cent while that of the general population was as high as 5.91 per cent.

The decadal growth of population in Arunachal Pradesh has been 27.00 per cent during the 1991-2001 period as against the all-India average of 21.34 per cent. This is a substantial improvement over the earlier decade, 1981-1991, when the decadal growth rate was 36.38 per cent against the all-India average of 23.86 per cent.

The rate of growth of population in Arunachal Pradesh has been much higher than that of the country as a whole. During the four decades (1961-2001), Arunachal's population grew, on an average, at the rate of 2.98 per cent per annum against a 2.13 per cent growth rate for the country.

Table 1.3

Population growth in Arunachal Pradesh

	Size of Population			Growth of Population (% per annum)		
Year	Total	ST	General	Total	ST	General
1961	3,36,558	2,99,944	36,614	–	–	–
1971	4,67,511	3,69,408	98,103	3.89	2.32	16.79
1981	6,31,839	4,41,167	1,90,672	3.51	1.94	9.44
1991	8,64,558	5,50,351	3,14,207	3.68	2.47	6.48
2001	10,97,968	7,05,158	3,92,810	2.7	2.81	2.5

Note: The first population Census in Arunachal Pradesh was conducted in 1961. Dash means data not available.

Source: Data from different population Censuses of India (Arunachal Pradesh).

[5] Before 1961, the administrative and physical infrastructure in Arunachal was very underdeveloped and, in fact, it was not possible to conduct the 1951 Census in this area. In the 1961 Census, two types of questionnaires were used – the all-India questionnaire, which was used largely in the newly-opened administrative centres and the truncated questionnaire, which was used in the rest of the area. In 1961, there were many areas that were more than 10 days foot march from the nearest road and, hence, may have been left out of the enumeration exercise.

E. The idea of human development: opportunities and challenges for Arunachal

Arunachal has the opportunity to bridge the development divide by 'leap-frogging' ahead. The role of the Government, and of the people, is crucial in this process. The Government needs the vision, the will and commitment, and the ability to carry the people with it.

The Human Development Report, 1990, explains that 'the purpose of development is to offer people more options. One of their options is access to income – not as an end in itself but as a means to acquiring human well-being. But, there are other options as well, including long life, knowledge, political freedom, personal security, community participation and guaranteed human rights. Human development is about enlarging people's choices. The most critical of these wide-ranging choices is to live a long and healthy life, to be educated, and to have access to resources needed for a decent standard of living. Additional choices include political freedom, guaranteed human rights and personal self-respect. Development enables people to make these choices. The process of development must create a conducive environment for the people, individually and collectively, to develop their full potential, and to have a reasonable chance of leading productive and creative lives in accord with their needs and interests'[6].

The process of development is to be driven by the people and what they consider most important; an approach that is participatory and inclusive, equitable and sustainable. As indicated in the Human Development Report, 1990, 'the first step in preparing a human development plan is to draw up an extensive inventory of existing human resources and skills, of people's health, education and nutrition, their absolute and relative poverty, their employment and underemployment, and their progress in demographic transition. That inventory should also describe the prevailing disparities between females and males and the distribution of social services between the urban and rural areas and, among different income groups. And, it should capture the cultural ethos, ideological aspirations and real motivations of the people.' This is to be followed by identifying priorities and setting out feasible objectives, given the resources available. The third step is to rank the priorities given people's preferences. This requires that the country or the State have effective mechanisms in place for ascertaining people's preferences. The effectiveness of these mechanisms depends on the democracy and decentralisation of the political and economic systems and the encouragement of participatory development. The fourth step is to translate these priorities into specific goals for the primary indicators such as life expectancy, literacy, and nutrition. This is a task for the planners, they should set out the goals, and, the policy-makers will need to designate the path to achieve these goals, keeping in mind the resource constraints. The development planner is tasked with the objective of achieving as much improvement as possible, at the lowest resource cost. The resource constraint has to be kept in mind while formulating the strategy. The Report also points out that the priorities must be clear and, that, within countries or States, specific targets and inequity issues may need to be addressed.

[6] *Human Development Report, 1990, UNDP, New York.*

In 1995, Madhya Pradesh became the first State to prepare and publish India's and indeed the world's first State Human Development Report. This Report provided an assessment of the status of key components of human development, including education, health, and income. By identifying deficiencies and disparities amongst districts, this Report, (and a subsequent Report, published in 1998) provided a useful basis for reorienting priorities and expenditures. Developed by the State Government through a broad process of consultation, the Reports laid the basis for the initiation of people-centric planning. In the last few years, a number of States have published State Human Development Reports, in India, and in other countries[7]. Each Report addresses the issues that are key to the development debate confronting it and each Report attempts an assessment of the prevailing situation, the requirements and priorities, and delineates the road ahead.

Today, Arunachal stands at a crossroads. The winds of change are blowing quickly, traditional economies and systems that have survived for generations are rapidly changing. As the world grows smaller, few places can remain resistant to change. Arunachal has seen more change in the last 25 years, than it has seen for centuries. Until now, the people have shown a remarkable absorptive capacity, they continue to be rooted in their culture, while adapting to the modern world, and recognising the exceptional situation that is before them. Arunachal is poised at a critical juncture and has to make a choice regarding the kind of development it wants. The development path needs to be sustainable and holistic in nature, in keeping with Arunachal's unique cultural ethos and the aspirations of the people.

Some areas in which Arunachal has substantial comparative advantage and development potential are hydroelectric power, horticulture, agro-forestry and floriculture, organic farming and food processing, eco-tourism, small-scale industries based on renewable non-timber forest produce, plantation crops like tea and coffee as well as medicinal plants and herbs. These areas can be developed strategically and cohesively, using appropriate technologies and methods, which are environmentally sound and people-friendly.

This Human Development Report for Arunachal will assist the State to evaluate the progress it has made and may help it to outline a model that is suitable for its special requirements.

Arunachal has the opportunity to bridge the development divide by 'leap-frogging' ahead. The role of the Government, and of the people, is crucial in this process. The Government needs the vision, the will and commitment, and the ability to carry the people with it.

Arunachal needs to plan its development in a considered and phased manner, ensuring that the development is people-centric yet decentralised; community-based but, with the Government as a facilitator; using its resources in a measured and sustainable manner, and in keeping with the aspirations of the people. The challenge is to evolve a development model that is truly sustainable and worthy of emulation.

[7] Fifteen State Human Development Reports have been published in India, and many more are at various stages of finalisation.

Chapter 2

Education and literacy

Education

new hopes, new horizons

The establishment and expansion of systems of modern and formal education is one of the most significant accomplishments during the last 50 years, one that has had a far-reaching impact on the people, and on the society. Education has brought a momentous change in the lives of the people, bringing with it new knowledge and ideas. It has empowered them, instilled confidence, and encouraged them to tread new roads. These changes have taken place in an extremely short span of time, at best over a couple of generations, and have made considerable impact on social relationships and society in an irreversible manner.

During the beginning of the 20th century, Arunachal had no schools at all. The first school was established in 1918, in Pasighat, and the second in 1922, in Dambuk. Not surprisingly, both locations bordered the more developed State of Assam, and the establishment of schools went hand in hand with the advancement of regular administration. Progress was slow and, at the time of Independence, there were only three schools in the entire State and, only up to the primary level.

Most people in the State were not familiar with the written word until recently; many did not have a script of their own. The exceptions were the Buddhist tribes of the Kameng region and the Lower Lohit Valley. The monasteries of the former provided religious instruction in the Tibetan language and, the Khamptis brought with them (from present-day Myanmar) the tradition of reading and writing in the Tai-Khampti language.

As a result and out of necessity, knowledge was passed on from generation to generation, through oral histories and learning by doing, and the responsibility of teaching and guiding fell on the older people. The ballads that people sing even today are not just expressions of music and creativity, but, are rooted in time, place, and culture, and have a context. They are an important means of transmitting knowledge.

There were community institutions where young men and women were initiated into their responsibilities and taught skills that were relevant to their needs. In these societies, there was a consequential premium on recall, on precedent and oratory, and on age and experience. The knowledge of farming, of hunting, of conservation, of herbs and medicinal plants, were all passed down from one generation to the next. Social skills and community responsibilities were learnt in the *kebangs* and community houses.

Newer systems of learning and knowledge have come to Arunachal Pradesh and the domain of knowledge that a person needs to encompass has broadened. The old systems, based on clan and community, have come under stress and have weakened but, they are still very important.

This chapter traces the growth of modern education in Arunachal Pradesh. Starting with a brief introduction to the school system in Arunachal, it provides a detailed analysis of the literacy rate, and a discussion on the gender gap and urban-rural gap in literacy. School education is examined in the next section, with specific attention on the gross enrolment ratio, the age- specific enrolment ratio, and the issue of access to school. This is followed by discussion on the availability of schools, out-of-school children and the performance of students in the Class X and Class XII examinations. An education index is constructed for the State and its districts. In the concluding section, areas that require urgent attention are detailed.

Education has brought a momentous change in the lives of the people, bringing with it new knowledge and ideas. It has empowered them, instilled confidence, and encouraged them to tread new roads.

A. Setting up the school system

In the 1950s, the old insularity of the State began to come to an end as administrative structures and institutions, akin to that of the rest of the country, were introduced. New towns and settlements began to spring up across the State. With these sweeping and unprecedented changes came the first phase of the expansion of a schooling system.

In 1951 itself, as many as 67 Lower Primary (LP) schools were set up in the State. From 67 LP schools and one middle school (ME) in 1951-52, the number of schools increased to 179 LP schools, 25 ME schools and seven high schools (HE) in little over a decade.

There were 120 teachers in the LP schools and 6 teachers in the ME schools. To begin with, the enrolment was small. There were 2,674 children in the LP schools and, only 34 children in the ME schools, but, this number grew extremely rapidly as the number of schools expanded.

As Table 2.2 shows, there has been a substantial increase in the number of schools and in school enrolment after Arunachal became a State in 1987. The big spurt in the expansion of schools (in all the three categories) was in the 1981-91 period, after which the growth has been more gradual. Between the years 1991 and 2001, the enrolment in middle and secondary schools doubled, and, in the primary schools, it went up by a little over 50 per cent. In terms of number of institutions, the pre-primary/ primary schools declined from 1,371 to 1,360 during the years 1991-2001, mainly because of the upgradation of many primary schools to middle schools.

Table 2.1

Growth of educational institutions in Arunachal Pradesh

	Schools			Teachers			Students		
Year	LP	ME	HE	LP	ME	HE	LP	ME	HE
1951-52	67	1	-	120	6	-	2,674	34	-
1955-56	152	16	3	359	88	26	7,105	310	87
1963-64	179	25	7	339	141	113	7,200	2,267	1,306

Note: LP: Lower Primary, ME: Middle School, HE: High School
Dash means data not available.

Source: Statistical outline of North-East Frontier Agency, April 1964.

Table 2.2

Number of schools

Year	Junior Basic Nursery Schools	Pre-Primary/ Upper Primary Schools	Middle/Senior Basic Schools	Secondary/ Higher Secondary Schools
1981	965	-	120	48
1991	-	1,371	254	114
2001	-	1,360	333	184

Number of students

1981	-	-	-	-
1991	-	1,25,071	26,089	15,696
2001	-	1,99,652	51,220	32,002

Note: Dash means data not available

Source: Statistical Abstract of Arunachal Pradesh, various issues.

B. Literacy in Arunachal

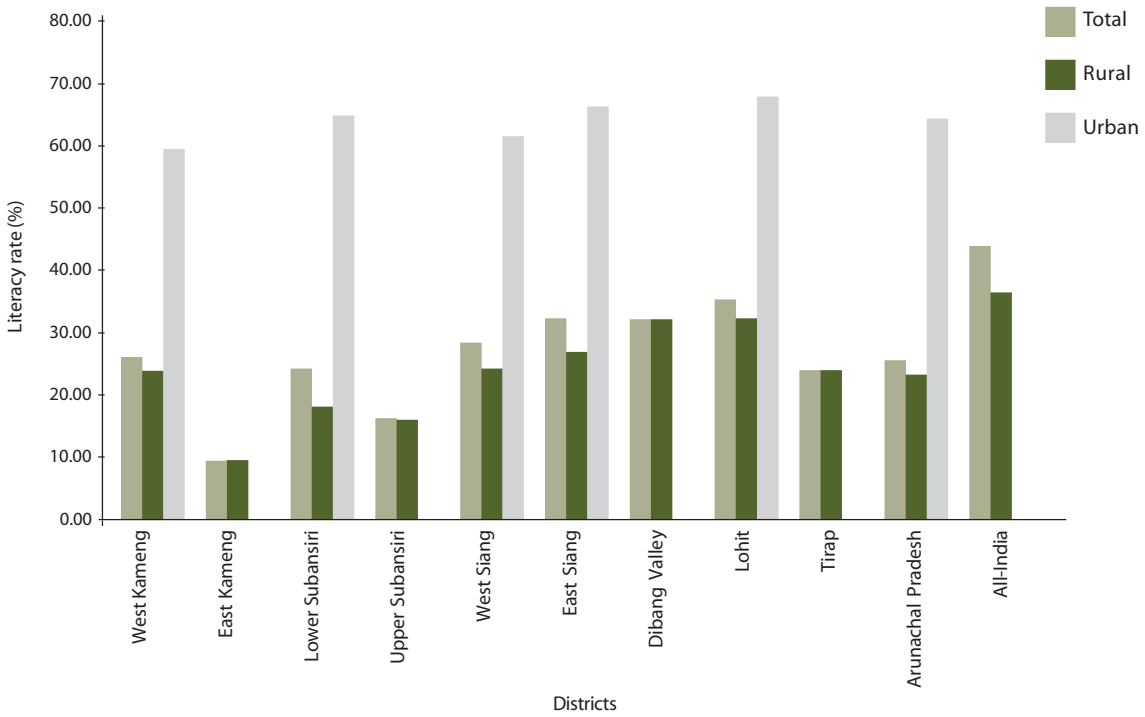
Given the fact that most languages in the region do not have a script of their own, it is not surprising that the literacy levels in the State were extremely low. However, for a people who have recently been introduced to the written word, the progress in the last few decades has been remarkable.

Along with formal education, the literacy rate in Arunachal has also increased considerably. As late as 1981, the literacy rate in Arunachal Pradesh was 25.55 per cent, which means that only one in four people was literate. The literacy rate for men was 35.12 per cent (one in three men was literate) while for women it was only 14.02 per cent (one in seven women was literate). All these rates were substantially below the national average. The literacy rate varied from a high of 34.94 per cent in Lohit district to as low as 9.39 per cent in East Kameng and 15.75 per cent in the Upper Subansiri district. In these two districts (East Kameng and Upper Subansiri) the female literacy rates were as low as 3.52 and 6.48 per cent respectively[8]. The districts of West Kameng, West Siang, East Siang, Dibang Valley, and Lohit enjoyed literacy rates above the State average but, everywhere the literacy levels were low. (Tables A 2.1 (a) and A 2.2 (a) in the Appendix show the literacy rates for the 7+ population for the Census years 1981, 1991, and 2001).

Starting from this low literacy rate, the State has made rapid progress. The literacy rate in the State increased from 25.55 per cent in 1981 to 41.59 per cent in 1991 and further to 54.34 per cent in 2001.

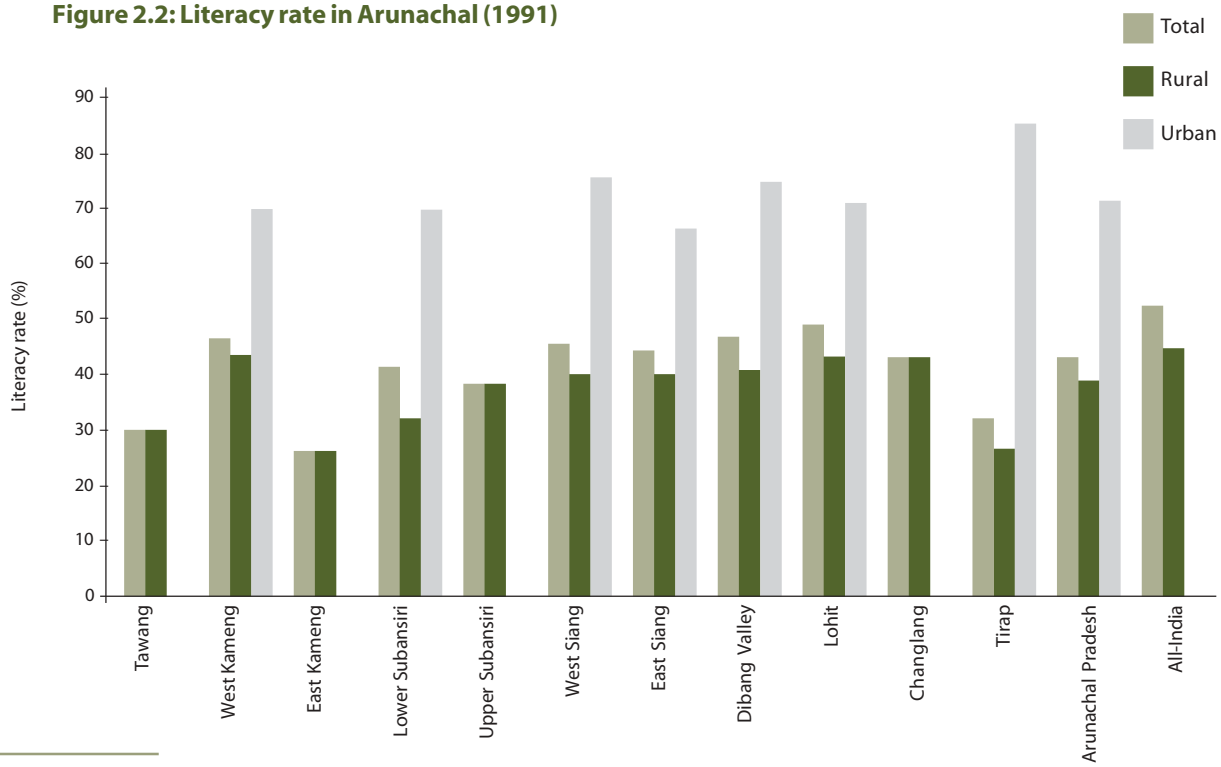
In the 1981-91 decade, the literacy rate for men went up to 51.45 per cent (an increase of 16.33 percentage points). During the same period, the male literacy rate in the country increased by 7.75 percentage points. Not

Figure 2.1: Literacy rate in Arunachal, (1981)



[8] *The definitions of population used in the estimation of the literacy rate vary across the different Census documents. The 1981 Census takes the 6+ population as the reference group; whereas the 1991 Census and 2001 Census both take the 7+ population as the reference group for the estimation of the literate population. To make the literacy figures comparable, the literacy rates for the districts for the year 1981 have been computed taking the literacy rate of the 7+ population.*

Figure 2.2: Literacy rate in Arunachal (1991)



The gap between the literacy rate for India and the State is now 11.40 percentage points for men, 10.20 percentage points for women and 10.50 percentage points for the total population.

surprisingly, the four districts with the highest literacy rates in 1981, continued to have literacy levels above the State average. West Siang, East Siang, Dibang Valley, Lohit, as well as West Kameng and Changlang had literacy rates above the State average. Tawang, East Kameng, Lower Subansiri, Upper Subansiri, and Tirap continued to have literacy rates below the State average. Women's literacy rate registered an increase of 15.67 percentage points in the same period. At the national level, the increase in women's literacy rate was 9.53 per cent points in the 1981-91 period. However, women's literacy continued to be low, with a rate of 29.69 per cent, only one in three women in Arunachal was literate. For India as a whole, the literacy rate for women in 1991 was 39.29 per cent. Women's literacy was extremely low in Tawang, East Kameng, and Tirap (all below 20 per cent).

By 2001, the literacy rate in Arunachal Pradesh climbed to 63.83 per cent for men, 43.53 per cent for women and 54.34 per cent for the entire population. Arunachal is ranked at number 32 amongst the 35 States and Union Territories of the country in terms of literacy, according to the 2001 Census. The literacy rate in Arunachal Pradesh is only 10.50 percentage points below the all-India literacy rate of 64.80 per cent.

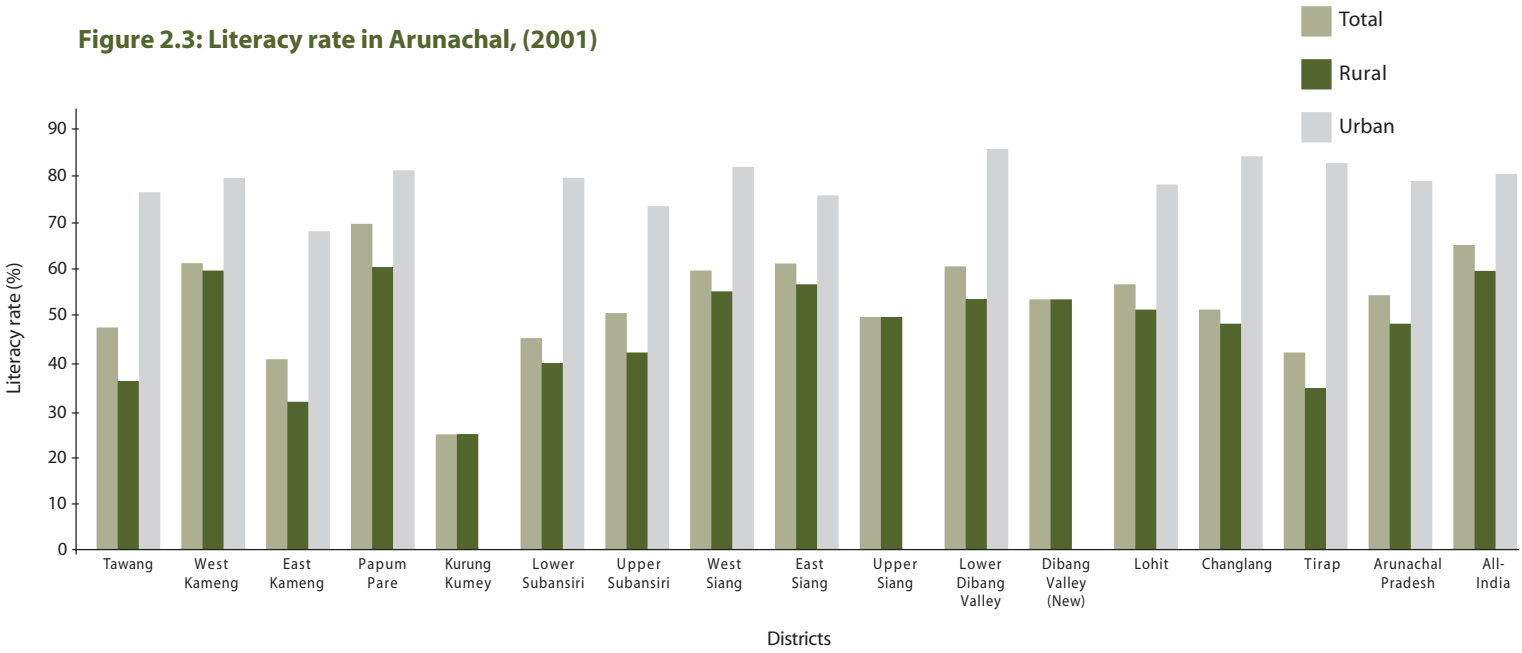
The gap between the literacy rate for India and the State is now 11.40 percentage points for men, 10.20 percentage points for women and 10.50 percentage points for the total population. Once again, districts like West Kameng, Papum Pare, West Siang, East Siang, Dibang Valley, Lower Subansiri, and Lohit have literacy rates higher than the State average. However, in eight districts — Tawang, East Kameng, Kurung Kumey, Upper Subansiri, Upper Siang, Dibang Valley (New), Changlang, and Tirap — the literacy rate is below the State average. (Changlang and Upper Subansiri have a literacy rate just above the 50 per cent mark). East Kameng is ranked second from the bottom with a literacy rate of 40.64 per cent, and less than one in three

women is literate (the male literacy rate is 52.36 per cent and the female literacy rate is 28.59). Kurung Kumey district is ranked at the bottom with a literacy rate of 25.74 per cent; only one in four people is literate, and only one in three men is literate (male literacy rate of 34.08 per cent).

have been made in women's literacy, and the difference in the literacy rates between men and women in Arunachal is smaller than that in the rest of the country.

Table 2.3 shows that the gender gap in Arunachal Pradesh is less than that at the

Figure 2.3: Literacy rate in Arunachal, (2001)



Gender gap in literacy

Across all the districts and the State, the gender gap in literacy is apparent. As late as the year 2001, there is a difference of more than 20 percentage points between male and female literacy rates. Seven districts (West Kameng, Papum Pare, Lower Subansiri, West Siang, East Siang, Lower Dibang Valley, and Lohit) have higher literacy rates for women than the State average. However, in Kurung Kumey district, only one out of six women is literate (female literacy is at 17.45 per cent). Women's literacy in Tawang, East Kameng, Kurung Kumey, Lower Subansiri, Upper Subansiri, Upper Siang, Dibang Valley (New), Changlang, and Tirap are all below the State average (43.53 per cent).

Notwithstanding the low literacy rates for women in many parts of the State, rapid gains

national level, and also shows that the gains in literacy are higher for women than for men, both in Arunachal, and in India, as a whole.

Urban-rural gap in the literacy rate

As in the rest of India, there is a wide gap between the urban-rural literacy rates in Arunachal too. In 1981, only five districts, West Kameng, Lower Subansiri, West Siang, East Siang, and Lohit had any urban population. The urban-rural gap in the literacy rate for men was 38.30 percentage points, for women the gap was 40.05 percentage points, and for the entire population it was 40.94 percentage points. The urban-rural gap in women's literacy is a little higher than that for men. Of these five districts, with minimal urban area in 1981, the gap was most noticeable in Lower Subansiri and East Siang,

Table 2.3

Gender gap in literacy

	Literacy Rate -1991		Gender Gap in Literacy Rate	Literacy Rate - 2001		Gender Gap in Literacy Rate	Decadal Improvement in Literacy Rate (1981-1991)	
	Males	Females		Males	Females		Males	Females
India	64.13	39.28	24.85	75.20	53.70	21.50	11.10	14.50
Arunachal Pradesh	51.45	29.69	21.76	63.83	43.53	20.30	12.38	13.84

Source: Census of India, 1991, 2001

Figure 2.4: Gender gap in literacy rates, Arunachal and India

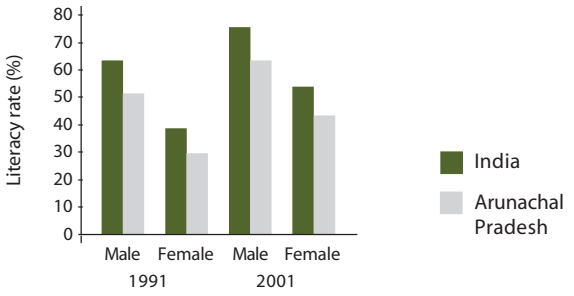
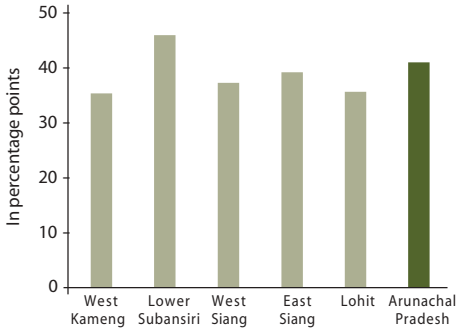


Figure 2.5: Urban-rural gap in literacy rates, Arunachal (1981)



The literacy rate data over the 1981-2001 period shows that the urban-rural gap continues to be large, reinforcing the view that India's development is concentrated in the urban areas.

although everywhere the urban- rural literacy gaps were high.

By 1991, the urban-rural gap in literacy fell to 30.99 points for men, 36.92 points for women, and 34.57 points for the entire population. The reduction was greater for men (7.31 percentage points) than for women (3.13 percentage points). For the entire population, the urban-rural gap in the literacy rate continued to be quite high, 34.57 per cent (a fall of 6.37 percentage points during 1981-1991). The highest urban-rural gaps in men's literacy were observed in districts like Tirap, West Kameng, Lower Subansiri, and West Siang. Similarly, in women's literacy too, the urban-rural gap was highest in these districts. The smallest gap was observed in East Siang, where, in fact, the gains in literacy seem to be greater in the rural areas than in the urban areas.

An analysis of the urban-rural gap in literacy shows that while the gap is closing, it is as much as 30.5 per cent in 2001, which is of concern. The district-wise data for the year 2001 (Table 2.4) shows that the gap continues to be particularly large in the districts of Tawang, Lower Subansiri (Old), East Kameng, Tirap, and Changlang.

The literacy rate data over the 1981-2001 period shows that the urban-rural gap continues to be large, reinforcing the view that India's development is concentrated in the urban areas. What is of even greater concern is the fact that the urban-rural gap

Figure 2.6: Urban-rural gap in literacy rates, Arunachal (1991)

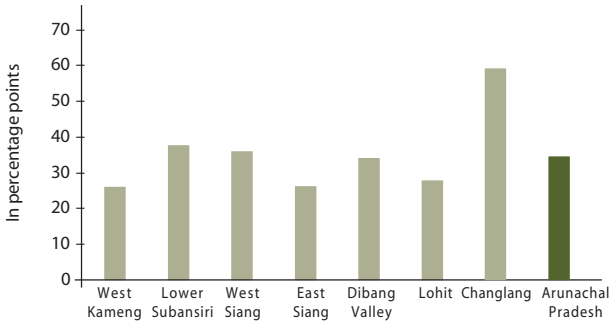
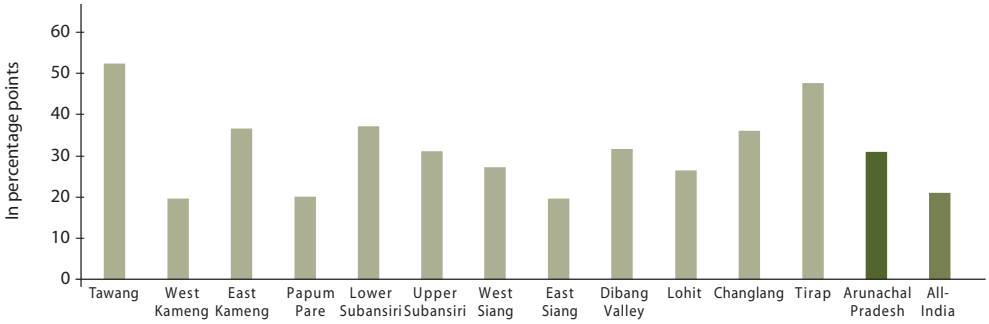


Table 2.4

Urban-rural gap in literacy, Arunachal 2001

District	Urban Literacy Rate (%)	Rural Literacy Rate (%)	Urban-rural Gap (In Percentage Points)
Tawang	87.2	35.1	52.1
West Kameng	78.3	58.9	19.4
East Kameng	67.4	31.3	36.1
Papum Pare	78.9	59	19.9
Lower Subansiri (Old)	77.1	40.1	37
Upper Subansiri	72.5	41.5	31
West Siang	80.9	53.9	27
East Siang	75.1	55.7	19.4
Upper Siang	-	49.8	-
Dibang Valley (Old)	84.5	53.1	31.4
Lohit	77.2	51	26.2
Changlang	83.2	47.6	35.6
Tirap	81.4	34.2	47.2
Arunachal Pradesh	**78.3**	**47.8**	**30.5**
All-India	80.06	59.21	20.85

Figure 2.7: Urban-rural gap in literacy rates, Arunachal (2001)



for women is closing slower than that for men. This reflects the fact that education opportunities for women and the girl child in the rural areas continue to be limited.

Literacy in the 7-14 year age group

The literacy rate for children gives us an indication of recent developments and helps us to see the future. The data for children's literacy shows that Arunachal Pradesh is quickly bridging the gap that exists in the literacy rate between the State and the rest of the country. The difference between the literacy rate for children in Arunachal and the national average in 1981 was about 20 percentage points (it was 21.69 for boys, 18.51 for girls, and 20.18 for all children). By 1991, the gap reduced to less than 10 percentage points (it was 10.60 for boys, 8.63 for girls, and 9.69 for all children).

The literacy rate for children in the 7-14 year age group in 1981 was 31.31 per cent, while the all-India average was 51.49. In the districts of East Kameng, West Kameng, Lower Subansiri, Upper Subansiri, and Tirap, the literacy rate for children was below the State average. The four districts that had literacy rates higher than the State average were West Siang, East Siang, Dibang Valley, and Lohit. The literacy rate for boys in East Kameng was 20.28 per cent and that for girls was 6.11 per cent.

Between 1981 and 1991, there was substantial improvement in the literacy levels of children. In 1991, the literacy rate for boys was as much as 60.84 per cent in Arunachal Pradesh (see Table A 2.3 (a) in the Appendix). East Kameng made rapid progress and even though it continued to have the lowest literacy rate for girls in the State, the literacy rate for all children increased from 13.41 per cent to 47.01 per cent.

Table 2.5

Urban-rural gap in literacy rates in Arunachal, 1981-2001

	1981	1991	2001
Urban-rural gap in male literacy rate (% age points)	38.30	30.99	27.5
Urban-rural gap in female literacy rate (%age points)	40.05	36.92	32.60
Urban-rural gap in total literacy rate (% age points)	41.94	34.57	30.5

Figure 2.8: 7-14 Literacy rate (1981)

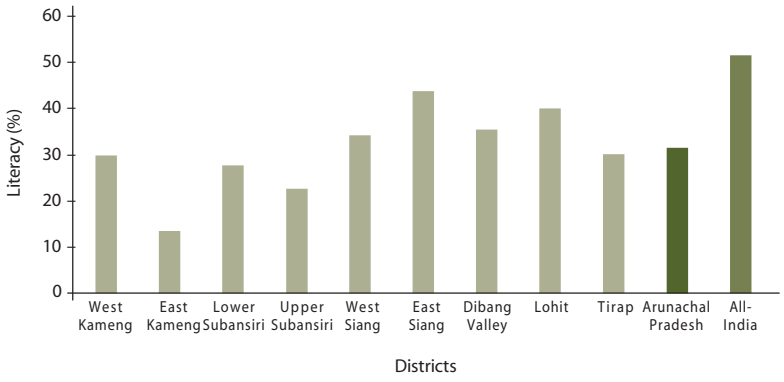


Figure 2.9: 7-14 Literacy rate (1991)

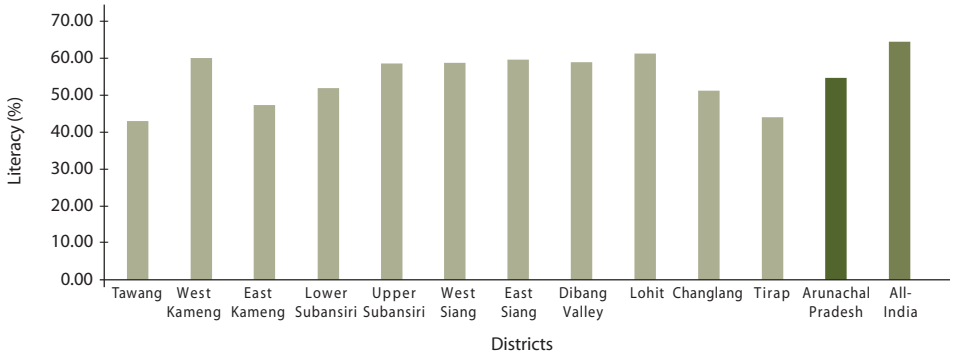


Figure 2.10: Rural-urban gap in 7-14 literacy rate (1981)

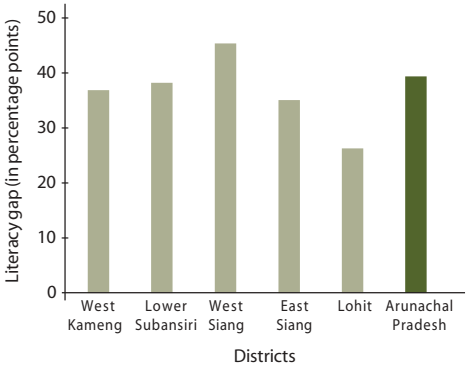
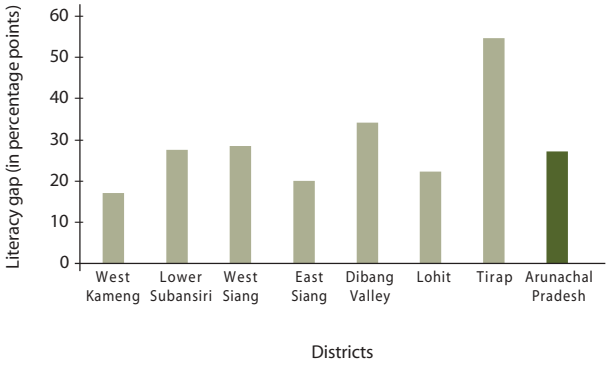


Figure 2.11: Rural-urban gap in 7-14 literacy rate (1991)



The literacy rate for boys in East Kameng rose from 20.28 per cent in 1981 to 60.77 per cent in 1991. Tawang had the lowest literacy rate for boys, which was 51.49 per cent in 1991. Apart from Tawang, other districts with low literacy levels for boys were East Kameng, Lower Subansiri, Changlang, and Tirap. West Kameng and Upper Subansiri made swift progress and moved from being below the State average to above it.

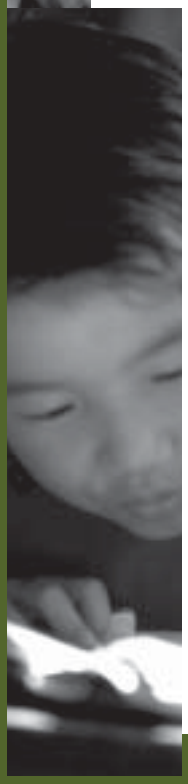
The literacy rate for girls, in the 7-14 year age group, in 1991, increased to 47.60 per cent from 23.06 per cent. It continued to be the lowest in East Kameng (31.03 per cent) even though it had gone up five times in the 10-year period. Tawang, Changlang, and Tirap were the other districts with literacy rates for girls below the State average.

In West Kameng, Lower Subansiri, Upper Subansiri, West Siang, East Siang, Dibang Valley, and Lohit, literacy rate for girls was above the State average of 47.60 per cent. Children's literacy was relatively high in West Kameng, Upper Subansiri, West Siang, East Siang, Dibang Valley, and Lohit.

Five districts — Tawang, East Kameng, Lower Subansiri, Changlang and, Tirap had children's literacy rates lower than the State average.

There are substantial urban-rural differentials in children's literacy although the data suggests that the gap is closing rapidly. The differentials declined in the 1981-1991 period from 37.69 to 23.79 for boys, from 40.35 to 30.90 for girls, and from 39.12 to 27.31 for all children. The largest urban-rural gap was observed in West Siang. Here, the gap for boys was as much as 42.83 percentage points in 1981 but, it declined significantly to 30.52 percentage points in 1991. For girls across the State, the urban-rural gap in literacy was 40.35 points in 1981 and fell to 30.90 points in 1991. For all children, the urban-rural gap decreased from 39.12 points to 27.31 percentage points during the 1981-91 period, which is an encouraging development.

In West Kameng, Lower Subansiri, Upper Subansiri, West Siang, East Siang, Dibang Valley, and Lohit, literacy rate for girls was above the State average of 47.60 per cent. Children's literacy was relatively high in West Kameng, Upper Subansiri, West Siang, East Siang, Dibang Valley, and Lohit.



C. Education: enrolment, access, and performance

While the spread of the school system and the growth of literacy in Arunachal is encouraging, the high inter-district variation can be better understood by looking at the enrolment and availability of schools. The enrolment of children in schools shows the spread of education. Different measures can be used to analyse the enrolment of children in schools. Among the commonly used measures are the Gross Enrolment Ratio (GER), the age-specific enrolment ratio, the dropout rates and school attendance records. An analysis of some of these indicators is attempted in this section.

Gross Enrolment Ratio

The Gross Enrolment Ratio (GER) is computed as the ratio of total enrolment at a particular level, irrespective of the age of the children, to the total population in the age group expected to be at that level of schooling. Thus, the GER at the primary school level would be a percentage of the total number of children enrolled to the total population in the age group 6 to 11 years. This ratio sometimes exceeds 100 per cent due to the inclusion of over-aged and under aged children. The district-wise Gross Enrolment Ratio for the primary and upper primary levels has been computed for the year 2001.

Gross Enrolment Ratio at the primary level

In 2001, the GER at the primary level in Arunachal Pradesh was 104.66 per cent. East Kameng, Papum Pare, Lower Subansiri, Upper Subansiri, West Siang, East Siang, and Upper Siang districts reported more than 100 per cent GER at the primary level. The GER exceeded 100 per cent in these districts due

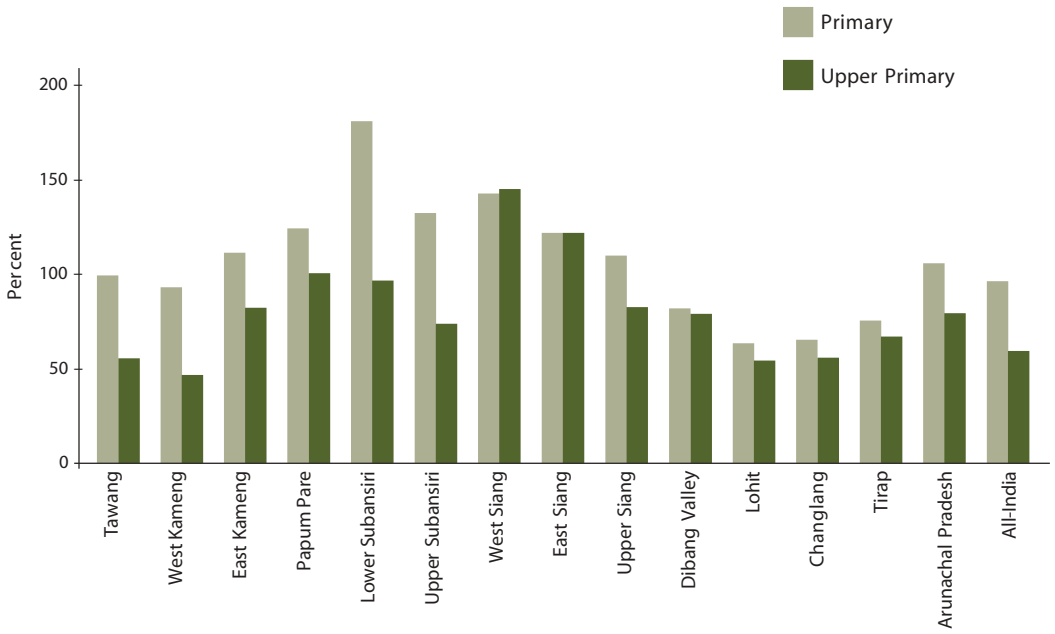
Table 2.6

Gross Enrolment Ratio, (2000-2001)

Districts	Primary (I-V)	Upper Primary (VI-VIII)
Tawang	98.50	54.38
West Kameng	92.62	46.14
East Kameng	110.58	81.64
Papum Pare	123.07	100.01
Lower Subansiri	180.11	95.48
Upper Subansiri	131.53	73.20
West Siang	141.67	143.85
East Siang	120.64	120.54
Upper Siang	109.13	82.07
Dibang Valley	80.72	78.15
Lohit	62.41	53.62
Changlang	64.88	54.92
Tirap	74.47	66.50
Arunachal Pradesh	**104.66**	**79.05**
All-India	95.66	58.64

Source: For Arunachal Pradesh, the ratios are estimated.
All-India figures are from Economic Survey 2001-2002, Government of India.

Figure 2.12: Gross Enrolment Ratio (2000-2001)



to the enrolment of over-aged and under aged children at the primary level. In Lower Subansiri, the GER was as high as 180 per cent, and in West Siang, and in Upper Subansiri also it was very high. The low GER in Lohit (62.41 per cent), Changlang (64.88 per cent), Tirap (74.47 per cent), and Dibang Valley (80.72 per cent) is of concern.

Gross Enrolment Ratio at upper primary level

The GER at the upper primary level in 2001 was 79.05 per cent in Arunachal Pradesh, which is higher than the national average (58.64 per cent). This is however substantially lower than the GER at the primary level. There are some districts like Tawang, West Kameng, Lohit, and Changlang, which have a lower GER at the upper primary level than the national average. The low GER at the upper primary level (in the age group 11-13) in these four districts as well as in Tirap and Upper Subansiri, could be due to either large-scale dropouts or never-enrolled children or both. It may also be due to there being a large number of children in the age group other than 6-10 years in classes I-V, and there being a greater proportion of students of the specified age, in the classes VI-VIII.

Age-Specific Enrolment Ratio

The Age-Specific Enrolment Ratio (ASER) is another indicator of the level of participation of children in school. This ratio is defined as the number of children enrolled in the school in a particular age group (irrespective of the grade in which they are enrolled) to the total number of children in that age group. The limitation of this indicator is that it does not take into account the level/ class in which the child is enrolled. An examination of the data for the age-specific enrolment shows that Arunachal's performance in both 1981 and 1991 is lower than the average for the country, but, the enrolment figures have improved over the period.

The GER at the upper primary level in 2001 was 79.05 per cent in Arunachal Pradesh, which is higher than the national average (58.64 per cent).

Age-Specific Enrolment Ratio for the 6-10 year age group

Tables A 2.6 (a) and A 2.6 (b) in the Appendix show the Age-Specific Enrolment Ratios for different age groups in 1981 and 1991. In 1981 and 1991, Age-Specific Enrolment Ratio of Arunachal Pradesh for the age group 6-10 years was much below the national average. In 1981, East Kameng, Upper Subansiri, and Lower Subansiri districts showed poor enrolments for both boys and girls. The districts, which had relatively better enrolment in 1981, were West Kameng, West Siang, East Siang, Dibang Valley, and Lohit. Not surprisingly, these are also the districts with the best literacy profiles in the State. There has been considerable improvement between 1981 and 1991 for children in the 6-10 year age group, for boys the ratio increased from 39.20 per cent to 42.60 per cent, for girls it increased from 24.10 to 33.40 per cent, and from 31.90 per cent to 38.10 per cent for all children.

In 1991, the enrolment ratio improved in all the districts. The enrolment ratios for boys in Tawang, Lower Subansiri, West Siang, Changlang, and Tirap continued to be below the State average. For girls, districts with the lowest enrolments were Tirap, East Kameng, and Tawang. In addition to the five districts, which had better enrolment ratios in 1981, the enrolment improved substantially in Upper Subansiri and Lower Subansiri.

Age-Specific Enrolment Ratio for 11-13 year age group

In 1981, the age-specific enrolment in the age group 11-13 years was substantially higher than in the 6-10 year age group. It was 42.80 per cent compared to 31.90 per cent. This is a trend that is common to many States in India and to the country average figures as well. In both 1981 and 1991, the Age-Specific Enrolment Ratio of the State for the age group 11-13 was less than the national average. Once again, the gap between the State and the national average declined considerably in 1991. The gap for boys in 1981, which was 7.8 per cent points, declined to 2.4 per cent points in 1991. For girls and all children put together, the gaps which were 6.7 and 7.2 percentage points in 1981 declined to 1.5 and 0.6 percentage

Figure 2.13: Age-Specific Enrolment Ratio (1981)

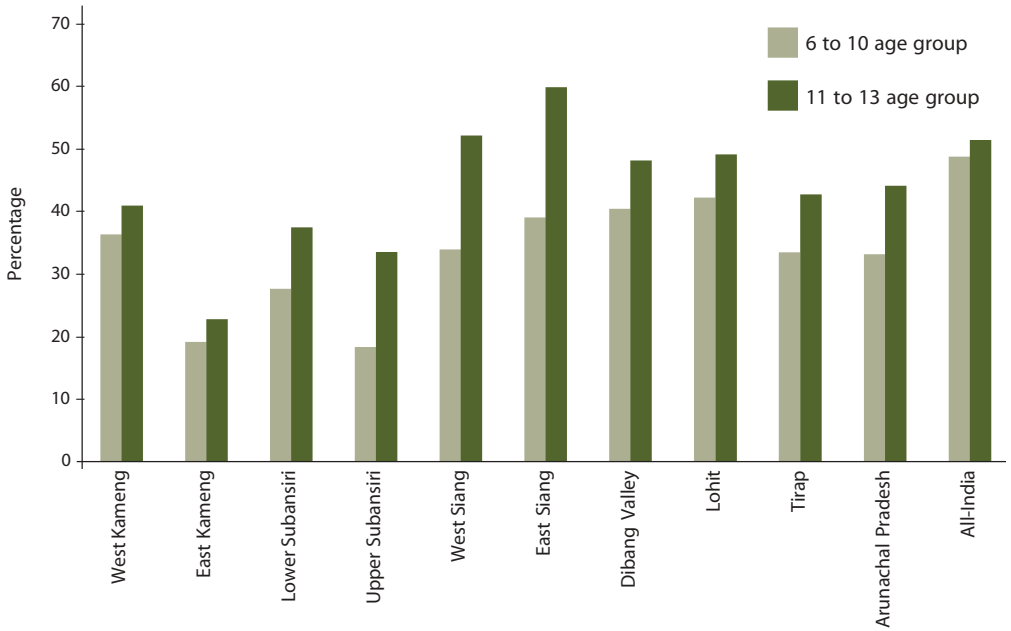
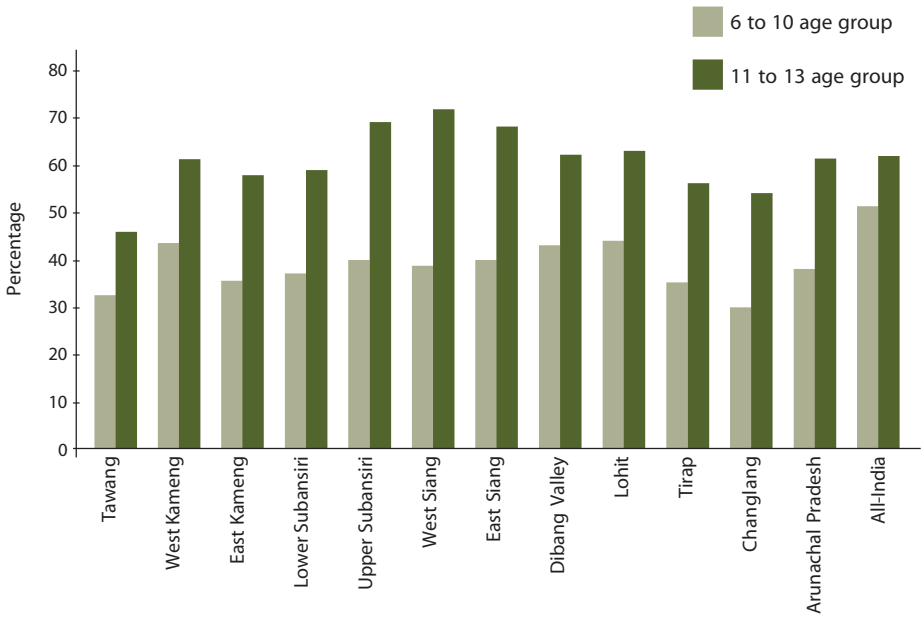


Figure 2.14: Age-Specific Enrolment Ratio (1991)



points in 1991 respectively. Thus, the Age-Specific Enrolment Ratio for girls in 1991 was 1.5 per cent higher in Arunachal Pradesh than the national average (53.70 for Arunachal and 52.20 for all-India).

In 1981, West Kameng, East Kameng, Lower Subansiri, Upper Subansiri, and Tirap districts had enrolment ratios below the State average and districts like West Siang, East Siang, Dibang Valley, and Lohit had ratios above the State average. These districts recorded rates lower than the State average of 54.20 per cent for the Age-Specific Enrolment Ratio for boys as well. Districts like West Siang, East Siang, Dibang Valley, and Lohit all reported ratios above the average for the State. For girls, East Kameng had the lowest Age-Specific Enrolment Ratio of 9.18 per cent in 1981. The gender gap was most prominent in the districts of East Kameng and Upper Subansiri. (See Table A 2.6 (b) in the Appendix for details).

In 1991, the Age-Specific Enrolment Ratio for Arunachal was 61.50, while the figure for India was 62.10. The heartening statistics is that in many districts, the Age-Specific Enrolment Ratio was above the national average. These districts were Upper Subansiri, West Siang, East Siang, Lohit, and Dibang Valley (which were just above the national average). Tawang, West Kameng, East Kameng, Lower Subansiri, Changlang, and Tirap had enrolment ratios which were below the State average. The Age-Specific Enrolment Ratio for girls in the districts of West Kameng, Lower Subansiri, Upper Subansiri, West Siang, East Siang, Dibang Valley, and Lohit was higher than the national average. Tawang, East Kameng, and Tirap had very low enrolment ratios for girls, reflected in the low literacy levels for girls in these districts. The Age-Specific Enrolment Ratio for all children was the lowest in Tawang in 1991. Other districts with low enrolment were East Kameng, Lower Subansiri, and Changlang. The Age-Specific Enrolment Ratios were higher in districts like West Kameng, Upper Subansiri, West Siang, East Siang, Dibang Valley, and Lohit.

However, both GER and ASER are indicators of enrolment, and both are fallible in assessing the progress towards universal attendance.

Out-of-school children

The preceding analysis shows that the Age-Specific Enrolment Ratio in the 11-13 year age group is higher than that of the 6-10 age group. This suggests that the proportion of out-of-school children in the 6-10 age group is higher than that in the 11-13 age group. It is, therefore, important to analyse the working status of out-of-school children in both age groups.

Tables A 2.7 (a) and A 2.7 (b) in the Appendix show the working status of out-of-school children in both the age groups in 1981 and 1991. In the year 1981, 4.45 per cent of boys and 5.4 per cent of girls in the age group 6-10 were working in Arunachal. In 1991, this was down to 3.05 per cent and 3.24 per cent respectively. The incidence of male and female child workers was highest in the district of Lower Subansiri (8.34 per cent for boys and 8.71 per cent for girls) in 1981. In 1991, the incidence was highest in the district of Tawang with 8.36 per cent of the boys and 7.34 per cent of the girls being out of school. Tawang also reported the lowest literacy levels in the 7-14 year age group. The incidence of child workers was lowest in West Siang — the percentages being only 1.27 and 1.81 for girls and boys respectively.

The incidence of child workers among the out-of-school children in the age group 11-13 years is substantially higher than in the age group 6-10 years. In 1981, close to 45 per cent of children in this age group were working and this figure declined to about 30 per cent in 1991. In 1981, the incidence was highest in Lower Subansiri, for both girls and boys. The incidence was lowest in Upper Subansiri for boys and in Lohit for girls. In 1991, the highest incidence was in Tawang, for boys, and, in East Kameng, for girls.

In 1991, the worst-affected districts in terms of male child workers (and, therefore, out-of-school children) were Tawang, East Kameng, Lower Subansiri, Dibang Valley, and Changlang. In case of the girl child, too, four of these five districts have the highest incidence and Tirap district also has a high incidence. The incidence of child workers (in the 11-13 age group) was more among girls than boys, in the districts of Tawang, East Kameng, Lower Subansiri, Upper Subansiri,

Figure 2.15: Out-of-school children, working (6-10 age group), 1981

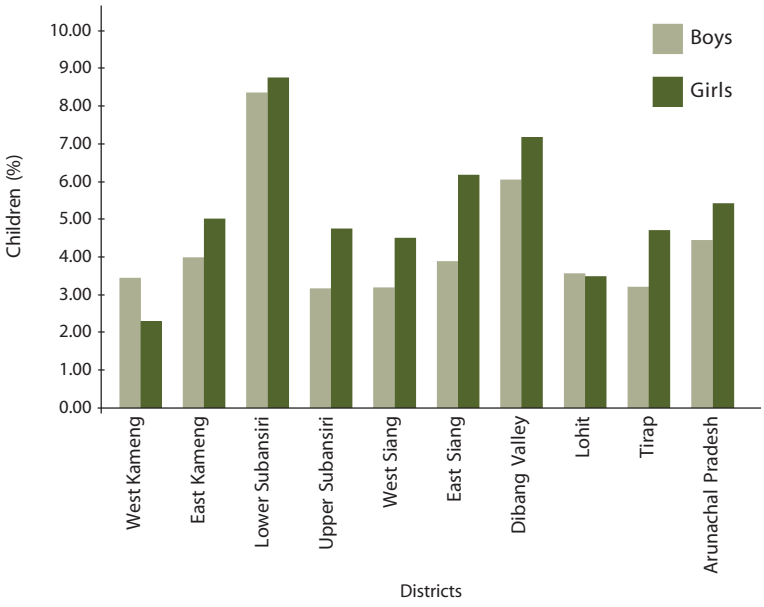
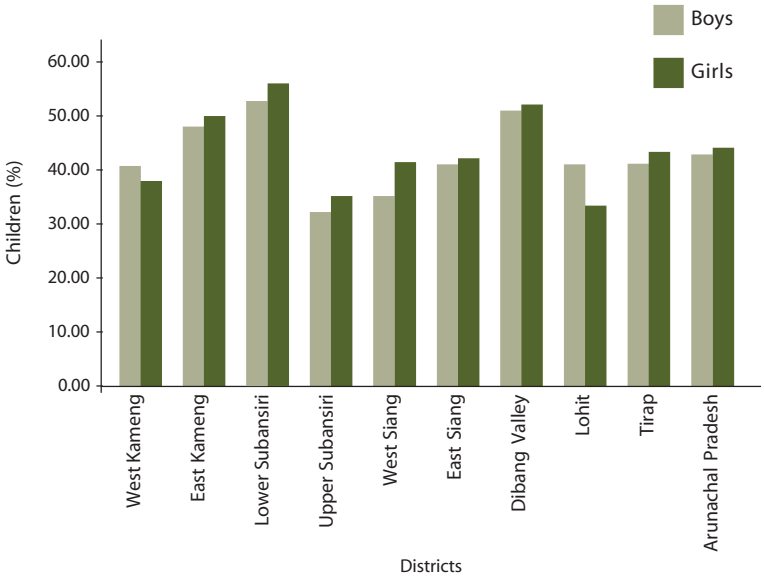


Figure 2.16: Out-of-school children, working (11-13 age group), 1981



West Siang, Changlang, and Tirap. The gender difference in the incidence of working children among the out-of-school children was most significant in the district of Tirap, where the percentage of girl child workers was nearly double than that of the boys.

Pupil-teacher ratio

The pupil-teacher ratio is an important indicator of the quality of education provided by the State. In 1991, the pupil-teacher ratios in Arunachal Pradesh were 50:1 at the pre-primary, 29:1 at the primary, 20:1 at the middle, 15:1 at the secondary, and 10:1 at the higher secondary levels. In 2001, the ratios were 34:1 at pre-primary/primary, 27:1 at middle, 24:1 at the secondary and 30:1 at the higher secondary levels. These average figures, however, only tell us a part of the story. There are significant inter-district variations in the pupil-teacher ratio. For example, in 1991, at the pre-primary school level, the number of students per teacher in Dibang Valley was 66.1 while in Tawang it was 34.1. At the primary school stage, the ratio was lowest in Lower Subansiri (24:1) and highest in Changlang (46:1). At the middle level, the ratio was the lowest in Tawang (11:1) and highest in Upper Subansiri and East Siang (25:1). At the secondary level, the ratio was lowest in Tawang (9:1) and highest in Upper Subansiri and East Siang (19:1). At the higher secondary level, the ratio was lowest in West Kameng (1:1) and highest in Upper Subansiri (14:1).

Between 1991 and 2001, the pupil-teacher ratio improved in Arunachal Pradesh at the pre-primary/primary level from 50:1 to 34:1. At the middle school level, the ratio of pupils per teacher rose marginally from 20:1 in 1991 to 27:1 in 2001. At the secondary level, too, the ratio rose from 15:1 to 24:1 and, at the higher secondary level, the ratio rose from 10:1 to 30:1. The highest and lowest pupil-teacher ratios were observed in East Kameng (61:1), and West Kameng (19:1) at the pre-primary/primary level; Papum Pare (41:1), and West Kameng (19:1) at the middle level, East

Figure 2.17: Out-of-school children, working (6-10 age group), 1991

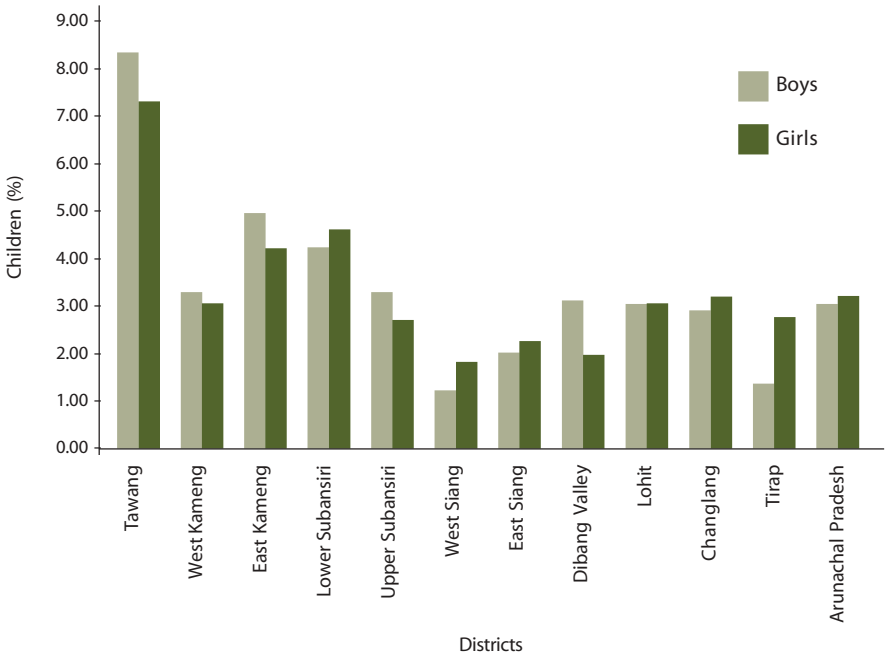
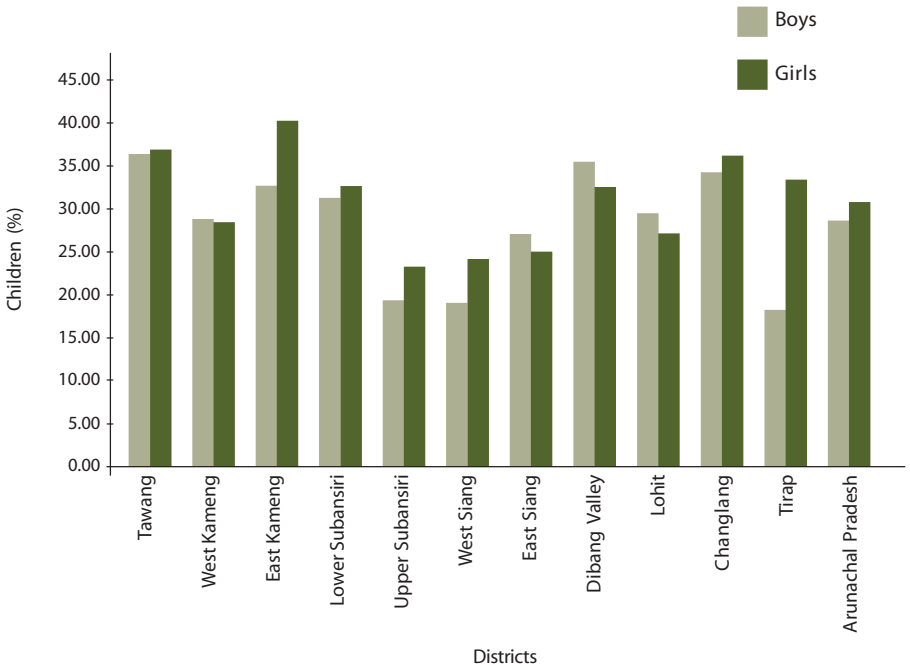


Figure 2.18: Out-of-school children, working (11-13 age group), 1991



Kameng (38:1), and Lohit (16:1) at the secondary level, and Upper Subansiri (44:1) and Tawang (19:1) at the higher secondary level (See Table A 2.8 (a) and Table A 2.8 (b) in the Appendix). For India, the pupil-teacher ratio at the national level in 1997, was 42:1 at the primary school level, 37:1 for the upper primary level and 29:1 at the secondary level[9].

Thus, there is considerable inequality in the pupil-teacher ratio across the State and at different stages of education, reflecting the changing access and enrolment of students, especially at the high school level.

Infrastructure

The percentage of single teacher primary schools is much higher (45.46 per cent) in Arunachal Pradesh, than the national average of 20.12 per cent. And the percentage of total schools having drinking water facilities and toilets in rural areas is lower than the national average of 47.98 per cent and 12.76 per cent respectively. In Arunachal Pradesh, only 5.57 per cent of the total schools have separate toilets for girls, which is lower than the national average of 6.43 per cent[10].

Availability of schools, attendance, and performance

While four districts have achieved a gross enrolment ratio of 100 per cent at the primary level and one district at the upper primary level, there continue to be many areas in Arunachal where access to schooling remains an issue. The Tenth Plan document for Arunachal Pradesh clearly says that 85 per cent of the population has primary schooling facilities within a distance of 2 km and the remaining 15 per cent of the population lives in far-flung areas of the State with no road connectivity. Since the population of Arunachal is scattered, the standard norms of population followed elsewhere in the country for the establishment of schools are not relevant in Arunachal Pradesh.

The Seventh All-India Educational Survey, 2002, also provides information regarding the availability of school facilities in the habitations/villages. (See Table 2.7 for details).

At the State level, 51.62 per cent of the habitations have primary school facilities within a one kilometre distance (39.64 per cent have a primary school within them and another 11.98 per cent have a primary school within a one kilometre distance but not within them). About 32 per cent (10.64 per cent plus 20.52 per cent) of habitations have schooling facilities at the upper primary level, within a distance of three kilometres[11]. The worst-affected districts in the provisioning of primary schooling, where more than 50 per cent of the habitations do not have school facilities within a one kilometre distance, are Tawang, Papum Pare, Kurung Kumey, Lower Subansiri, Upper Subansiri, Dibang Valley and Lohit. The problem is most acute in the districts of Kurung Kumey and Dibang Valley, where 75.11 and 84.82 per cent of the habitations, respectively do not have primary schools within a radius of one kilometre. (This is probably the single-most important reason for the extremely low literacy rates in Kurung Kumey, especially for girls.)

As high as 68.83 per cent of all habitations in Arunachal do not have school facilities within a three- kilometre distance at the upper primary level. In West Kameng, East Kameng, Kurung Kumey, Upper Subansiri, Dibang Valley, Upper Siang, and Lohit, more

[9] Refer to National HDR – 2001, Planning Commission of India.
[10] Reference: Annual Report of the Department of Education, 1999-2000, Ministry of Education, http://www.education.nic.in/htmlweb/ar_99-00.
[11] According to the Sixth All-India Educational Survey, 1993, 77 per cent of the population had facilities for primary. education within the nationally accepted norm of 1 kilometre. There appears to have been a decline in access.

Table 2.7

Schooling facilities in habitations at primary and upper primary stages

Districts	Total Number of Habitations	Percentage of Habitations with Schooling Facility at PRIMARY STAGE: Within Them	Within 1 km, but not Within Them	Beyond 1 km	UPPER PRIMARY STAGE: Within Them	Within 3 km, but not Within Them	Beyond 3 km
Tawang	231	31.17	15.58	53.25	8.66	38.53	52.81
West Kameng	273	46.52	11.36	42.12	9.52	13.55	76.92
East Kameng	340	40.29	10.88	48.82	8.82	12.65	78.53
Papum Pare	305	25.57	20.98	53.44	8.85	23.28	67.87
Kurung Kumey	462	17.53	7.36	75.11	4.33	10.17	85.50
Lower Subansiri	238	33.61	10.50	55.88	13.03	22.69	64.29
Upper Subansiri	418	31.34	7.42	61.24	8.13	10.29	81.58
West Siang	411	55.96	13.14	30.90	16.30	26.28	57.42
East Siang	144	80.56	8.33	11.11	23.61	25.00	51.39
Dibang Valley	112	12.50	2.68	84.82	4.46	19.64	75.89
Lower Dibang Valley	141	31.91	20.57	47.52	15.60	34.75	49.65
Upper Siang	95	66.32	6.32	27.37	16.84	11.58	71.58
Lohit	506	33.20	9.88	56.92	8.30	16.01	75.69
Changlang	326	56.44	21.78	21.78	14.42	41.10	44.48
Tirap	198	70.20	10.10	19.70	13.13	18.69	68.18
Arunachal Pradesh	**4,200**	**39.64**	**11.98**	**48.38**	**10.64**	**20.52**	**68.83**

Source: Seventh all-India Educational Survey, NCERT.

than 70 per cent of the habitations do not have upper primary school facilities within a distance of three kilometres.

The absence of adequate schooling facilities both at the primary and upper primary levels results in large-scale prevalence of dropouts and non-enrolment. Dropout rates at the primary and upper primary level in Arunachal in 2003 were 20 per cent and 36 per cent respectively. The main reasons for the non-enrolment and dropout of the children in the age group 6-17 years, as given by NFHS-2, are that the school is too far away (more boys than girls gave this reason), or that the children are required for house work (both boys and girls cited this as a reason), and not interested in studies (more boys than girls gave this as a reason). Cost was also an issue and between 10 to 15 per cent of the children said that this was the main reason for them not attending school.

The percentage of children citing that 'the school is too far away' as the main reason for not attending school is the highest in Arunachal Pradesh among the north-eastern States. Therefore, adequate provisioning of schooling facilities is imperative. The establishment of inter-village boarding schools is a solution to the problem of setting up schools in small and remote habitations, and to the issue of provisioning of primary schools for children.

Table 2.8

Reasons for not attending school

	Main Reasons for not Attending School		Main Reasons for Currently not Attending School	
	Boys	Girls	Boys	Girls
School too Far Away	23.00	16.10	9.0	2.0
Transport not Available	0.0	0.5	0.0	0.0
Education not Considered Necessary	0.7	5.6	0.0	2.8
Required for Household Work	14.2	30.8	27.6	22.2
Required for Farm/Family Business	3.8	0.9	2.0	0.0
Required for Outside Work For Payment in Cash or Kind	2.1	9.1	4.0	2.3
Cost Too Much	12.1	10.5	10.0	15.5
No Proper Schooling Facilities For Girls	0.0	0.5	0.0	0.0
Required to Take Care for Siblings	4.5	6.0	0.0	0.0
Not Interested in Studies	18.4	9.1	28.7	19.4
Other Reasons	16.7	8.9	8.4	26.6
Don't Know	4.4	1.8	10.0	9.2
Total	100.0	100.0	100.0	100.0

Source: NFHS-2, 1998-99.

Performance of students

While gross enrolment and attendance at school give an idea about the participation in the school system, the final performance of students at the examination level indicates the success of the education process.

The performance of children at the Class X and Class XII board examinations shows that of the children that are able to go to school, only a handful actually pass. The pass percentage in the year 2003 was 43.58 in Class XII and only 27.43 in Class X. The low success rate, especially at the Class X level, points to the inefficient use of resources and poor teaching in the schools. A pass percentage of 27 means that roughly one in four students passed the examination. Table 2.9 shows that in a district like Upper Subansiri, the percentage of students who cleared the Class X examination, was only 14.2 in 2003. In contrast, the pass percentage in West Siang is the highest, 35.73 per cent (2003). In many other districts, too, the performance is extremely low. In the whole of Arunachal, more than two-third of the students failed. Although the data relates to only two years, it shows that the pass percentage has actually declined in the Class X examinations. For Class XII, however, the 2003 results were slightly better than those in 2002 — the pass percentage improved from 40.59 per cent to 43.58 per cent. Here, the lowest pass percentage was in Upper Subansiri (22.37 per cent) and the best performance was in Tawang (67.03 per cent). A high overall failure rate for the State (34.74 per cent for XII and 33.52 per cent for Class X respectively, excluding students who had a compartment) calls for dramatic improvement in the quality of education imparted.

The relatively better performance at the Higher Secondary level shows that many disinterested students have been sifted out at the Class X stage. Poor performance in the examinations leads to a host of psychological and social problems. Students who perform badly suffer from low self-esteem, they usually have to repeat the year, and if they do not go back to school to clear the exam, they see themselves as educated and do not want to engage in agriculture or other traditional tasks.

An analysis of the performance serves to highlight the fact that while educational facilities have increased substantially in Arunachal, the teaching itself needs strengthening so that the quality of education and the performance of students improves. It also suggests the need to set up vocational training and technical institutes to provide employment-based training.

An analysis of the performance serves to highlight the fact that while educational facilities have increased substantially in Arunachal, the teaching itself needs strengthening so that the quality of education and the performance of students improves.

Table 2.9

Performance of students in Class X and XII

(As a percentage of students who appeared in the examination)

Districts	CLASS XII						CLASS X					
	2002			2003			2002			2003		
	Pass	Compart-ment	Fail	Pass	Compart-ment	Fail	Pass	Compart-ment	Fail	Pass	Compart-ment	Fail
Tawang	56.84	15.79	27.37	67.03	24.18	8.79	39.89	43.17	16.94	21.3	42.17	36.53
West Kameng	49.60	23.20	27.2	53.41	16.85	29.74	31.68	40	28.32	30.18	33.17	36.65
East Kameng	48.15	22.22	29.63	42.45	17.45	40.1	22.44	39.76	37.8	29.3	34.65	36.05
Papum Pare	33.24	23.33	43.43	43.73	21.05	35.22	33.31	42.4	24.29	29.91	37.17	32.92
Lower Subansiri	38.86	19.33	41.81	37.23	20.20	42.57	20.88	45.03	34.09	19.85	37.46	42.69
Upper Subansiri	30.07	25.34	44.59	22.37	25.99	51.64	21.8	64.24	13.96	14.2	42.22	43.58
West Siang	42.86	22.34	34.8	43.06	19.58	37.36	39.35	48.37	12.28	35.73	45.17	19.1
East Siang	43.31	24.82	31.87	46.43	22.53	31.04	31.76	54.44	13.8	31.18	47.38	21.44
Upper Siang	34.91	25.44	39.65	41.67	26.79	31.54	14.69	37.76	47.55	13.05	36.81	50.14
Dibang Valley (Old)	40.80	27.94	31.26	40.76	29.08	30.16	34.94	38.04	27.02	23.74	40.5	35.76
Lohit	38.21	21.79	40	49.22	20.53	30.25	29.28	35.36	35.36	32.95	40.27	26.78
Changlang	50.80	18.57	30.63	42.11	16.07	41.82	27.43	39.45	33.12	25.74	29.37	44.89
Tirap	55.05	22.99	21.96	51.07	26.77	22.16	30.09	49.78	20.13	29.68	38.31	32.01
Arunachal Pradesh	**40.59**	**23.02**	**36.39**	**43.58**	**21.68**	**34.74**	**29.97**	**44.77**	**25.26**	**27.43**	**39.05**	**33.52**

Note: A student who has failed in one subject is said to have a compartment He/she is allowed to take the examination in the subject, conducted within 60 days of the publication of the result.

Source: Directorate of School Education, Arunachal Pradesh.

D. Higher education

The first college for undergraduate study in Arunachal was started in 1964, at Pasighat. Now there are seven Government colleges. They are at Pasighat, Itanagar, Bomdila, Tezu, Along, Khonsa and Changlang. Three new colleges have started at Itanagar, Pasighat and Ziro, with private initiative.

Arunachal University (now Rajiv Gandhi University) is the only University in the State. It was established in 1984, with three departments; History, Political Science and Education. Today, it has 14 departments: History, Political Science, Education, English, Tribal Studies, Economics, Botany, Zoology, Geography, Commerce, Hindi, Computer Sciences, Management, and Mathematics.

The North Eastern Regional Institute of Science and Technology (NERIST) was also started in 1984 to provide technical education to the people of North-East India. Some students from Arunachal are enrolled in NERIST. A polytechnic was set up in 2003 with financial assistance from the World Bank. However, the State does not have a medical college or an engineering college, and students who wish to pursue higher education in these areas have to go outside the State for their studies.

There are two Industrial Training Institutes, one Gramsevak Training Centre, one Auxiliary Nurse Cum-Mid-Wife Training Centre and one College of Horticulture and Forestry, which is under the Central Agricultural University, Manipur.

E. Education index for Arunachal and its districts

Table 2.10

Education index for Arunachal Pradesh and its districts, 2001

Districts	Index	Rank
Tawang	0.472	12
West Kameng	0.566	6
East Kameng	0.489	10
Papum Pare	0.729	1
Lower Subansiri	0.626	4
Upper Subansiri	0.552	7
West Siang	0.701	2
East Siang	0.666	3
Upper Siang	0.532	8
Dibang Valley	0.572	5
Lohit	0.503	9
Changlang	0.473	11
Tirap	0.428	13
Arunachal Pradesh	**0.566**	

The education index constructed as a component of the Human Development Index for the 13 'old' districts of Arunachal Pradesh is given in Table 2.10. The education index for the State is 0.566 (for details see technical note).

The districts of Papum Pare, West Siang, and East Siang are ranked in the first three places and enjoy better school infrastructure as well as overall development. Lower Subansiri and Dibang Valley also have indices higher than the State average.

The education indices for Upper Subansiri, Upper Siang, Lohit, and East Kameng are low. Changlang, Tawang, and Tirap have the lowest indices in the State. All these districts have low literacy levels and low enrolment ratios.

Figure 2.19: Education index of Arunachal

The education indices for Upper Subansiri, Upper Siang, Lohit, and East Kameng are low. Changlang, Tawang, and Tirap have the lowest indices in the State. All these districts have low literacy levels and low enrolment ratios.

F. The way forward

- Access to education continues to be an issue in some parts of Arunachal. Districts with relatively low education indices like Tirap, Tawang and Changlang as well as East Kameng, Upper Siang, Upper Subansiri, and Lohit, require intensive efforts to improve literacy rates and school education.

- Specific strategies need to be devised to engage with the local communities to ensure that education becomes universal, especially at the primary and elementary levels. The problems that have been encountered vary from the construction of school buildings, to the non-availability of educated persons (in some localities) to work as teachers, the unwillingness of teachers from other areas to serve in remote areas, and the difficulties of retention of children in hostels. Though the Sarva Shiksha Abhiyan, launched by the Government of India, is expected to ease the situation to some extent. However the impact of the scheme may be rather limited, owing to the lack of significant economic activity in the State, and the limited scope for taxation. (The State's tax and non-tax revenues are less than 10 per cent of the Budget). Thus, the State's contribution of 25 per cent towards this Centrally- sponsored scheme is likely to be a problem.

- The State may consider taking external assistance under the District Primary Education Programme (aided by the World Bank and the European Union) aimed at operationalising strategies for achieving Universal Primary Education and Universal Elementary Education, through district-specific planning and disaggregated target- setting, specially for districts with low literacy rates for women.

- Simultaneously, the State will require to tackle the issues of retention and efficiency, by imposing minimum instructional parameters at various stages of the education process and making significant investments in inputs that enhance learning at the primary level.

- Crucial to the success of State policies for universal education for out-of-school children of the poorest families will be the introduction of measures to mitigate the costs of school attendance. This, in spite of the fact that such policies may still prove insufficient to overcome problems of low demand for primary schooling, where the opportunity costs of sending children (especially girls) to school are judged to be too high. The practice of supplementing the nutrition needs of poor children through meals, provided in school, requires careful monitoring. All nutrition programmes should compulsorily consist of locally available food items, preferably fresh fruit and vegetables. Reliance on biscuits, peas, and soya should be discouraged.

- The school curriculum should have a component on innovative, economic, and sustainable use of local bio-resources combined with field/ practical learning so as to make education more relevant.

- After primary school, vocational streams could be made available to train boys and girls in modern agriculture, horticulture, poultry, dairy farming and handicrafts, in the local context so that education becomes employment-oriented. Higher education can then be pursued only by those who have the capacity and interest to do so.

The school curriculum should have a component on innovative, economic, and sustainable use of local bio-resources, combined with field/ practical learning so as to make education more relevant.

- The quality of teaching is an issue all across the State. Teacher training is an important element in the provision of quality education. There are very few trained teachers in the State. Of the 469 para-teachers in Arunachal (March 2004) not a single teacher is trained. The percentage of untrained teachers at the primary level is 59 per cent. The districts where the incidence of untrained teachers is high are Kurung Kumey (93.3 per cent), Upper Siang (92.1 per cent), and Lower Subansiri (88.2 per cent). Similarly, at the upper primary level, untrained teachers constitute 57 per cent of the total. In Kurung Kumey, West Siang, Upper Siang, Dibang Valley and Lohit, untrained teachers account for more than 70 per cent of the total[12]. Six institutes of educational training exist in the State and these are supposed to provide training to undergraduate untrained teachers. However, the reach continues to be limited. The Government should make it mandatory for teachers to be trained. Apart from the training imparted at the initial stage, in-service training should also be encouraged so that the teachers update their skills and teaching methods. Some steps are being taken in this direction. Rajiv Gandhi University (formerly Arunachal University) imparts training to 20 in-service teachers per year. The Indira Gandhi National Open University has recently started training programmes for in-service teachers of the State. Since the number of untrained teachers in the State in 2003-2004 was 4,545, it will be long time before all the teachers are trained, unless a major initiative is undertaken by the Education Department.

- Absenteeism among teachers is a serious concern. This was observed by the SHDR survey team, which found that teachers tend to remain absent on a more or less 'rotational basis'. This is especially true in remote areas. In the multi-teacher schools, one or two teachers are always absent in a cyclical manner through the year. The main reason for this absenteeism, according to the villagers, is the absence of proper residential accommodation and the non-availability of food that the teachers (who are usually from outside the State) are used to. Many teachers are not used to living in the temporary thatched houses provided to them. The recruitment of teachers from the villages or surrounding areas, especially in the more remote areas, is an option but, this will only be possible once education reaches these remote areas and local people are available for employment. This is an issue that requires urgent intervention, especially when quality education is being stressed.

- Another area that needs attention is the education of physically challenged children. There are 1,338 physically challenged children, of which only 186 are enrolled in schools. The concentration of such children is high in the districts of East Kameng (258), Papum Pare (313) and West Siang[13] (257). Ironically, there is not a single special school for these children[14]. This problem needs to be addressed either by providing special facilities in the existing schools or by setting up special schools for physically and mentally challenged children.

[12] Government of Arunachal Pradesh, 2004-05, Sarva Shiksha Abhiyan: annual Work Plan, Arunachal Pradesh, Directorate of School Education, Itanagar.
[13] Government of Arunachal Pradesh, 2004-05, ibid.
[14] A report in the Echo *of Arunachal, 19 May, 2005, says that a special school for physically challenged children has been set up by an NGO, in Itanagar.*

Chapter 3

Health and well-being

The importance of

good health

Tribal societies in Arunachal Pradesh have long known that it is important to be healthy. In the primarily agrarian societies of Arunachal Pradesh, good health is the key to a happy and productive life. Health is important for the well- being of the individual, the family, clan and tribe.

Good health has always, therefore, been valued, even as the lack of good health has been understood, and accepted. When the health of a person fails, because of infirmity or disease, old age or an accident, traditionally evolved systems of social insurance come into play, and the individual and the family is cared for.

The people appreciate good health and seek to achieve it by sticking to a strict diet and lifestyle. A healthy, vigorous individual can perform arduous and demanding tasks, defend his village and his rights, and work well and hard in the fields and at home.

While the health status of the people of Arunachal Pradesh is not admirable measured by conventional indicators, in absolute terms, and in comparison with other States and regions of India, yet, given the very limited reach of health services, the resilience and inherent hardiness that the people have, has held them in good stead. As they are exposed to a new way of life and new influences (including new illnesses and diseases), their old traditional ways and cures are likely to prove increasingly inadequate, and they will need improved access and provisioning of medical care.

In the last few decades, the State has made significant progress. At Independence, there was no health infrastructure in the State — no dispensaries, no hospitals, no diagnostic facilities. Modern healthcare systems and diagnostics were limited to the facilities and care extended by doctors accompanying civil and military expeditions on their forays into the hills from Assam, or to the medical staff based with the few and scattered administrative outposts that had been established.

With the expansion of medical facilities and infrastructure in the plains of neighbouring Assam, in the first half of the 20th century, the people from Arunachal did occasionally seek out medical treatment, in Government hospitals, and in the tea gardens that bordered the hills. This often necessitated long and difficult journeys and was, by and large, the exception, resorted to in emergencies only.

When the health of a person fails, because of infirmity or disease, old age or an accident, traditionally evolved systems of social insurance come into play, and the individual and the family is cared for.

Box 3.1

Food and indigenous cure

Food and health are intrinsically connected. Much of the food consumed in traditional societies have medicinal properties. The people of Arunachal consume a number of herbs and leaves, which protect them from illness or possess curative properties. The food is rich in carbohydrates and dietary fibre. Along with hand milled cereals, meat, fish, and eggs, bamboo shoots and green leafy vegetables are also a part of the diet. Bamboo shoots are rich in a host of vitamins and minerals. They are reported to have anti-carcinogenic properties and are good for asthma patients. Besides bamboo shoots, the people consume a number of leaves and plants, which are believed to cure hypertension and blood pressure.

Many of the communities in Arunachal consume locally fermented brews, which are said to aid digestion. *Apong,* a popular fermented beverage, is prepared by using a number of herbs and, when consumed in moderation, is good for the system. *Tapyo* (black salt made by the Apatanis) is like the *Khar* made by the Assamese, from the roots and stems of banana leaves, and helps restore the appetite. It is used as a substitute for salt and helps to counter goitre, which has a high incidence in the Himalayan belt. Another spiny herb used by some of the tribes (especially the Nyishis and Wanchos) is the *Kopii* or *Byako* plant. The botanical name for the plant is *Solanum indicum,* and the plant helps cure ailments like indigestion and blood pressure. The fruit of this plant is used in the preparation of steroids.

Traditional medicines use a variety of plants and herbs to cure common ailments. Nearly 450 different plants, which have medicinal properties, have been identified in Arunachal. In addition to plants, a number of insects are used in traditional medicines and, as a source of protein, minerals and fat. Thus, food is an essential component of the health regime of the people of Arunachal.

In the first two decades after Independence, a network of healthcare facilities gradually came into existence; these facilities were, however, invariably sited in the administrative centres that had begun to spring up across the State. Their coverage, and impact, was correspondingly weighted in favour of Government employees and their families. Further afield, the provision of healthcare depended on the existence of a military or civil outpost in the vicinity of the village; the doctors of the Army and the Assam Rifles provided excellent and sought-after services.

Since then, and particularly after the attainment of Statehood, the health infrastructure has expanded manifold. For many reasons, however, the increase in health cover and services has been less and at a slower pace than the expansion of educational facilities, and the growth of the economy. This is reflected in the indicators of health status, which show that in most areas, Arunachal's performance is less than satisfactory.

This chapter makes an assessment of the health status of the people of the State, using indicators like Life Expectancy at Birth (LEB) and the Infant Mortality Rate (IMR), and analyses the reasons for the high inter-district variation. It details the growth and expansion of the health services in the State and identifies some of the main areas that require attention.

A. Health indicators

At Independence, the health status of the people of Arunachal Pradesh was undoubtedly poor. Although there is little statistical data to bear out this assertion, it is reflected in administrative records, anecdotal evidence and the collective memory of the people.

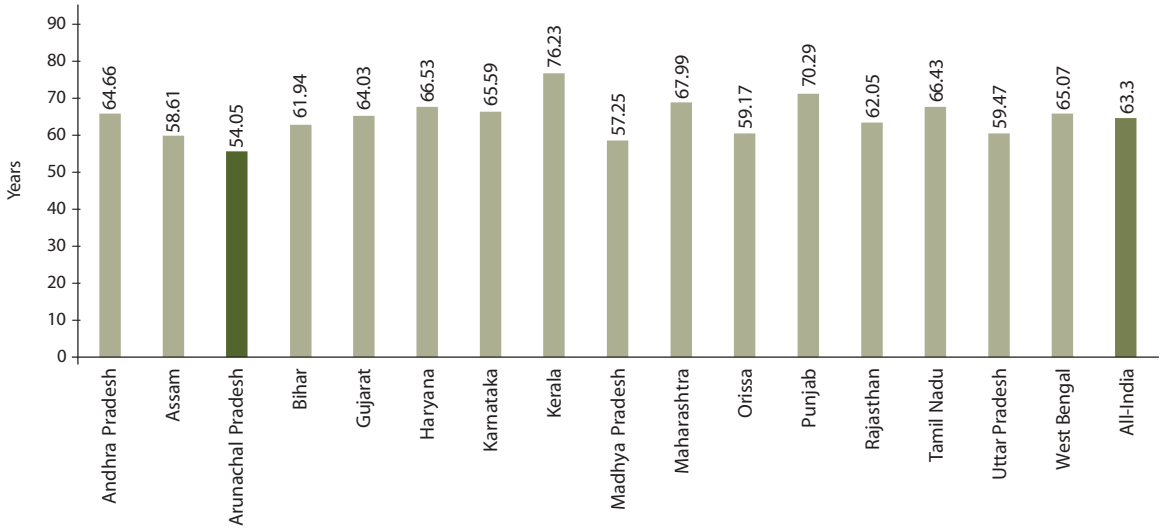
The health of Arunachal's people has improved gradually — the incidence of morbidity and mortality has declined — and the life expectancy of the people has increased. Since 1961, the tribal population has been growing in the State. Assuming that there has been no increase in the fertility rate, this is indicative of improved health and longevity. However, while the health status of the people of Arunachal Pradesh has improved, the pace of improvement has been rather slow.

There is a wide range of indicators that are utilised to measure and ascertain the health status of a people or a community. Two important measures are Life Expectancy at Birth[15] (LEB) and Infant Mortality Rate[16] (IMR). Life Expectancy at Birth is a summary measure of the health conditions of the entire population, prevailing at that time. As a measure of health, it provides a basis for a comparison of the health status of people living in different societies. It can also measure the change in the health status over time. The Infant Mortality Rate is not a general measure of health but reflects a host of factors, which condition life in a society.

Life Expectancy at Birth

In 1947, independent India inherited a sparse and inadequate health infrastructure, limited in its impact and outreach. The health status of the country was correspondingly poor. In 1950-51, Life Expectancy at Birth in the country was 32.1 years. This figure has almost doubled in less than five decades — life expectancy was 63.3 years at the end of the century.

Figure 3.1: Life Expectancy at Birth in the States of India, (2000)



[15] Life Expectancy at Birth is defined as the number of years a person can expect to live, when he or she is born, given the prevailing conditions of mortality.

[16] The Infant Mortality Rate is defined as the number of children per 1,000 live births, who will not live to see their first birthday.

There are no estimates for life expectancy in Arunachal for the year 1950-51. Life Expectancy at Birth in Arunachal Pradesh is 54.05 years, (2000) which is 9.25 years less than the national average. If we assume that this difference existed in the same absolute form, then life expectancy in Arunachal Pradesh would have been 22.75 years in 1950-51, which seems rather improbable. In all probability, the difference between the average life expectancy for India and for Arunachal was less than 9.25 years, in 1950-51.

Life Expectancy at Birth does not tell us anything about the health status of different age groups of the population. Age-specific mortality rates, which serve as a database for the construction of life tables, provide such information.

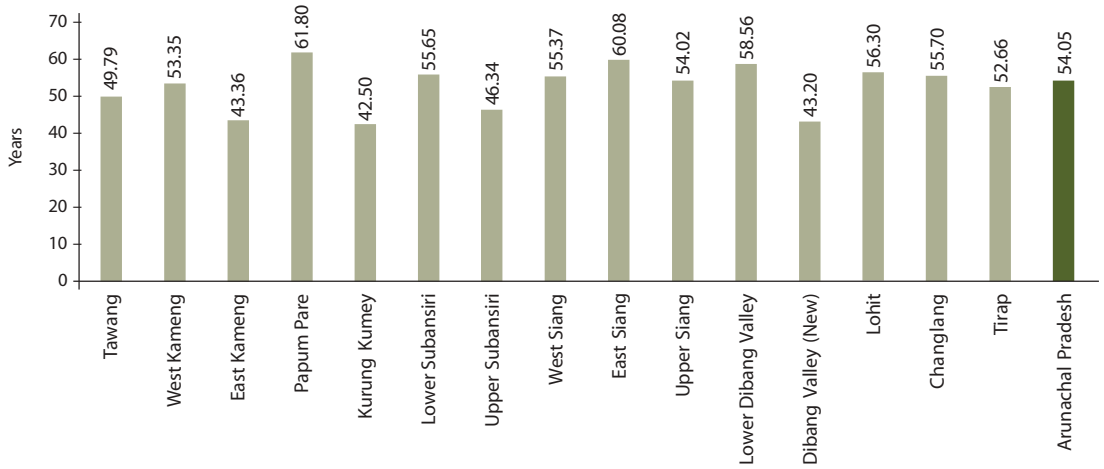
Life Expectancy at Birth in Arunachal is one of the lowest in the country. In Kerala, life expectancy is 76.23 years (data from NHDR, 2001 adjusted), which is not only much higher than the life expectancy in the other major States in the country, but is also comparable with the life expectancy in developed countries[17]. The difference between the life expectancies in Kerala and Arunachal Pradesh is very high, a difference of 22.18 years[18]. Life expectancy in neighbouring Assam is also higher than that in Arunachal Pradesh (higher by 4.56 years). With life expectancy of 57.25 years, Madhya Pradesh is the State closest to Arunachal Pradesh in life expectancy; the difference between the life expectancies in these two States is 3.20 years.

Life Expectancy at Birth in the districts

Among the 15 districts of the State, Papum Pare has the highest Life Expectancy at Birth, reflecting the better health status of the people. East Siang is next to Papum Pare, with a life expectancy of 60.08 years compared with 61.80 years in Papum Pare. At the other extreme is Kurung Kumey, which has a life expectancy of only 42.50 years. Dibang Valley (New) and East Kameng are close to Kurung Kumey with life expectancy of 43.20 years and 43.36 years respectively (refer technical note for details).

Table 3.1 classifies the districts of Arunachal Pradesh on the basis of life expectancy. Five districts have an expectation of life below 50 years. Upper Subansiri with a life expectancy of 46.34 years and Tawang with 49.79 years belong to this class along with the three districts already mentioned. The classification shows that the people who live in districts situated in the upper hill ranges, have lower

Figure 3.2: Life Expectancy at Birth in Arunachal, (2000-2001)



[17] *Among the developing countries, both Sri Lanka and China have a LEB which is comparable to that in developed countries.*

[18] *For details, please refer to Table A 3.1 in the Appendix.*

life expectancies than those who live in districts located in the plains and plateaus. Life expectancy in Lower Dibang Valley and Lohit, two districts with extensive plains area, for example, are substantially higher life expectancy in Dibang Valley (New).

An international comparison of the Life Expectancy at Birth in Arunachal Pradesh, shows that the life expectancy in the districts belonging to the lowest class in the State is close to the lowest life expectancy in the world. Life expectancy in Kurung Kumey (42.50 years) is not very different from that in Sierra Leone (38.9 years) – the lowest life expectancy in the world.

Determinants of inter-district variation in life expectancy

Life Expectancy at Birth measures the overall health status of the people over a particular period of time. As Table 3.1 shows, there is a high degree of inter-district variation in life expectancy. Among the 15 districts of the State, life expectancy varies from 42.50 years in Kurung Kumey to 61.80 years, in Papum Pare, the range being 19.30 years.

An analysis of the factors responsible for this large variation shows that the extent of access to medical facilities enjoyed by the rural population is the prime determinant of life expectancy[19]. The other important variable is the literacy rate[20]. A regression analysis of life expectancy on various explanatory factors shows that variables that measure the provisioning of health services in the district are not strongly related to life expectancy. Thus, the availability of hospital beds per 10,000 people is not as important as the access[21]. Income and consumption also have a statistically insignificant relationship with life expectancy. Papum Pare and East Siang are relatively well connected and enjoy better access to medical care. These districts also have high literacy levels and higher life expectancies.

Life Expectancy at Birth does not tell us anything about the health status of different age groups of the population. Age-specific mortality rates, which serve as a database for the construction of life tables, provide such information. A comparative study of the age-specific death rates of Arunachal Pradesh and other States is not possible because of non-availability of data; the analysis is limited to the Infant Mortality Rate only, data for which is available for all the States and Union Territories of the country.

Table 3.1

Classification of districts on the basis of life expectancy, 2000-2001

Class (In Years)		Districts
40.0-44.9	1.	Kurung Kumey
	2.	Dibang Valley (New)
	3.	East Kameng
45.0-49.9	4.	Upper Subansiri
	5.	Tawang
50.0-54.9	6.	Tirap
	7.	West Kameng
	8.	West Siang
	9.	Upper Siang
55.0-59.9	10.	Lower Subansiri
	11.	Changlang
	12.	Lohit
	13.	Lower Dibang Valley
60.0-64.9	14.	East Siang
	15.	Papum Pare

[19] A regression analysis has been carried out for the 13 'old' districts for which data was available. In simple correlation estimation, the variable most strongly related to life expectancy is the extent of access enjoyed by its rural population. Measured by the inverse of accessibility, the percentage of rural population not connected by road, carries a correlation coefficient of -0.84 with life expectancy. This high negative correlation is statistically significant at 0.10 per cent level. (Refer to Annexure for regression details).

[20] Literacy has a correlation coefficient of 0.74 with life expectancy (Refer to Annexure for details).

[21] The availability of hospital beds in a district and the life expectancy in the district have a correlation coefficient of 0.22 only, which is insignificant statistically.

Infant Mortality Rate

Literally speaking, the Infant Mortality Rate (IMR) measures the health conditions in infancy. However, the IMR is so intricately enmeshed with socio-economic and cultural variables that it reflects the overall development of a society. In general, a high IMR obtains in a high fertility society, characterised by illiteracy, low level of technology in production, and poverty. The IMR reflects the health of the mother, the environment in which the infant is born and, in which his/her infancy is spent.

Arunachal Pradesh has an IMR of 77 per 1,000 live births[22]. This implies that out of 1,000 children born, 77 will not see their next birthday. Among the 15 big States, Orissa has the highest IMR of 95 and Kerala has the lowest IMR (14) in the country[23]. Assam's IMR of 75 is close to that of Arunachal. The IMRs in MP, UP, Rajasthan, and Chhattisgarh are higher than that of Arunachal Pradesh. While all the 15 large States have higher life expectancies than Arunachal Pradesh, yet, five of them have IMRs that are higher than the IMR in Arunachal[24].

Arunachal Pradesh is relatively free from the bane of discrimination against the girl child. While the people of the State have some son preference, it is not as deep-rooted as in other parts of India. This is partly responsible for the relatively lower IMR in Arunachal, than in many other parts of the country. Caring for children is mainly the mother's responsibility elsewhere in the country but, in Arunachal Pradesh, both parents share this responsibility. Though there is inter-community variation in taking up this responsibility, yet, most communities consider the care of children to be the joint responsibility of both parents.

Infant Mortality Rates in the districts

The IMR in Arunachal Pradesh varies from 113 per 1,000 live births in Kurung Kumey to 53 per 1,000 live births in Lower Dibang Valley. Thus, the IMR in Kurung Kumey is more than twice of that in Dibang Valley. There are five districts in Arunachal Pradesh with an IMR higher than that of Orissa (95 per 1,000 live births). The lowest IMR in Arunachal is recorded in Lower Dibang Valley (53 per 1,000), which is almost four times that of Kerala, the State with the lowest IMR in the country[25].

Not unexpectedly, the IMR in Arunachal Pradesh varies significantly with access. It is highest in areas like Kurung Kumey, Dibang Valley (New), Tawang, and East Kameng, where access is difficult, and relatively low in areas like Lohit, Changlang, Lower Subansiri, East Siang and Lower Dibang Valley, which have easier access. In general, the districts in the hill regions of the State have higher IMRs than the districts in the plains.

Reasons for the variation in IMR among districts

Among the 13 old districts, IMR varies from 57 per 1,000 live births in East Siang district to 98 (per 1,000 live births) in Tawang. The immunisation of children is the singlemost important determinant of the IMR[26]. Two other

[22] Estimated from the survey data collected for the SHDR. The SRS data puts the IMR in Arunachal as 39, but, for various reasons, this figure does not appear to reflect the real situation. While a comparison of data collected for the SHDR for Arunachal with SRS data for the rest of the country is not appropriate, it has been undertaken as an indicative exercise.

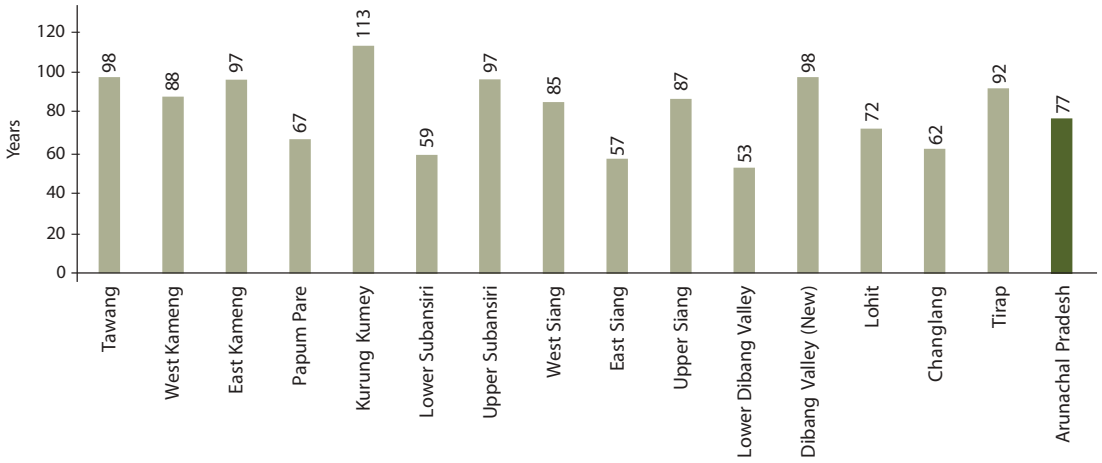
[23] Refer to the section 'Mortality Data' in the Technical Notes dealing with the problems of data comparability.

[24] Except for Orissa, the other four States are located in North India. A high IMR in North India is partly due to the discrimination against the girl child: a high female IMR results in a high IMR.

[25] The lowest IMR in the world is 3 (per 1,000 live births) in Sweden and Switzerland, and the highest IMR is 180 (per 1,000 live births), in Sierra Leone. The world's average IMR is 56, not much higher than that in Lower Dibang Valley, the district with the lowest IMR in Arunachal Pradesh. The average IMR in developing countries is 98, and in Sub-Saharan Africa it is 107.

[26] In a bivariate correlation, the variable which carries the strongest relation with IMR is the percentage of children immunised, the two having a correlation coefficient of – 0.77. (See Annexure for regression details).

Figure 3.3: Infant Mortality Rate (IMR) in Arunachal and its districts, (2000)



variables, which have a high correlation with IMR, are the literacy rate and road connectivity.[27] Per capita income has a very low correlation[28]. Hospital beds (per 10,000 population) has no statistical relation with the IMR.

A regression analysis reveals the relative importance of different factors in inter-district variation in IMR. In a regression of IMR on income, literacy rate and percentage of children immunised, the only variable, which is significant, is the immunisation of children. If the percentage of rural population not connected by road is added, the coefficients of all the variables become insignificant.

Immunisation coverage

Immunisation protects children against disease, both in childhood and adulthood. In 1986, the Government of India made the immunisation programme 'universal' to eradicate some of the communicable diseases that afflict children in the country. In spite of the programme being universal, a number of States in the country, including Arunachal Pradesh, have failed to really 'universalise' it.

An examination of the immunisation status of children reveals that the coverage in Arunachal is less than half the immunisation coverage at the national level. The National Family Health Survey-2 (NFHS-2) found that in Arunachal only 20.5 per cent of the children (in the 12-23 month age group) were vaccinated fully against BCG, Polio, DPT, and Measles during 1998-99. The figure for the country, as a whole, was 42 per cent.

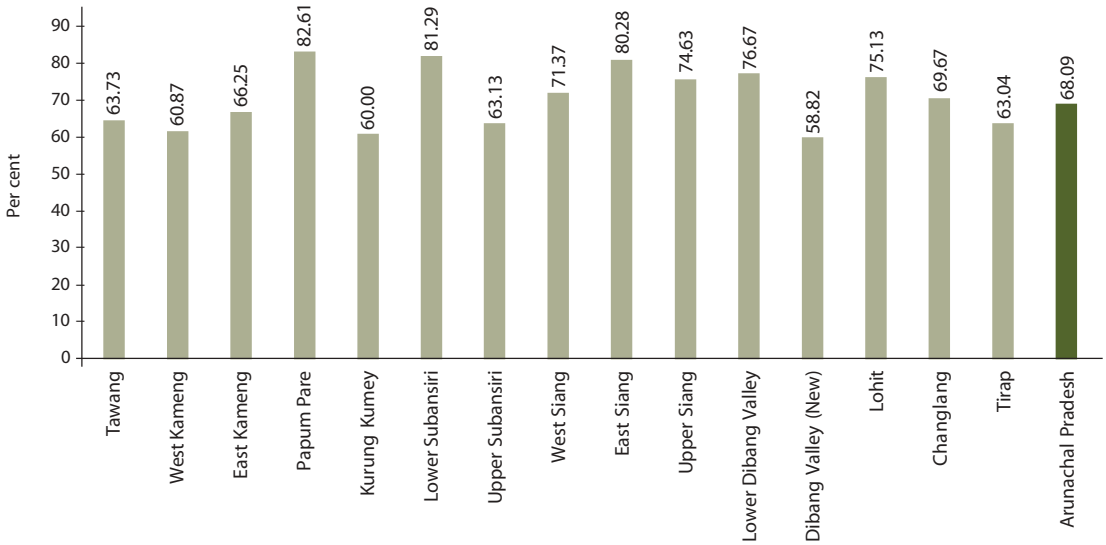
According to the SHDR survey, the overall achievement in immunisation against polio and DPT is only 68.09 per cent in the State. Some districts like Papum Pare, East Siang, and Lower Subansiri have more than 80 per cent coverage, while districts like Dibang Valley (New), West Kameng and Kurung Kumey have only about 60 per cent coverage. Not unexpectedly, the IMR in the districts with high immunisation coverage is lower than the State average.

Arunachal Pradesh has an IMR of 77 per 1,000 live births. This implies that out of 1,000 children born, 77 will not see their next birthday. Among the 15 big States, Orissa has the highest IMR of 95 and Kerala has the lowest IMR (14) in the country.

[27] The literacy rate and IMR have a correlation coefficient of – 0.66, significant at 5 per cent level and the percentage of rural people not connected by road has a correlation of 0.58 with IMR, which is also significant at 5 per cent level. (See Annexure for regression details).

[28] The correlation coefficient is 0.22, which is insignificant statistically.

Figure 3.4: Percentage of children immunised against Polio and DPT in Arunachal



B. Morbidity and mortality

Arunachal Pradesh is yet to experience what is referred to as 'epidemiological transition' – a situation of a steadily improving health regime experiencing substantial changes in the cause-composition of death. The transitional process entails a fall in the relative importance of infectious diseases as a cause of death and a rise in the relative importance of chronic degenerative diseases as the main causes of health problems and mortality (Omran 1971). While this hypothesis cannot explain the epidemiological conditions in all contexts, the cause-composition of mortality in the developed and developing countries apparently lends support to the validity of the hypothesis of epidemiological transition. In general, vector[29]-borne diseases are less common in developed than in developing countries. Epidemics seldom occur in developed countries; but, their occurrence is not uncommon in many developing countries.

In Arunachal Pradesh, malaria, a disease that has been successfully controlled in many parts of the world, is endemic and it appears menacingly during every rainy season, taking a high toll of lives, especially of people living in remote areas. In many areas, especially in inaccessible villages, the incidence of malaria is very high. However, the availability of health services in semi-urban and accessible settlements has drastically reduced the case fatality rate of this disease.

The SHDR survey team recorded a total of 1,221 deaths during the 1998-2001 period, in the sampled households. Data on the causes of death is given in Table A 3.4 in the Appendix. Of these deaths, malaria accounted for 12.20 per cent of deaths, the highest among all diseases. However, the data from the Civil Registration System reveals a different picture — only 3.97 per cent of 932 deaths have been recorded as being caused

[29] A vector refers to an insect, a rodent or an anthropod which harbours or transmits the causative agents of disease to humans. These may be parasitic, bacterial or viral in nature. Plague, malaria, encephalitis and dengue are all vector-borne diseases.

by malaria in 1991 (Registrar General of India, 1998). There is a high probability that there is considerable under-recording of deaths in the Civil Registration System. The extent of under-recording is likely to vary with the distance from urban areas. While under-recording is least in and around the urban areas, it is highest in the remote areas, the very areas that suffer most from malaria. In all probability, malaria deaths in the Civil Registration System are more under-recorded than any other deaths. In the country as a whole, only 1.60 per cent of deaths were due to malaria in 1991.

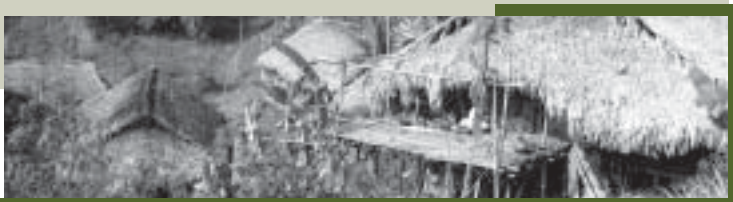
The second most frequent cause of death, according to the SHDR survey, is dysentery, diarrhoea and gastroenteritis, which together accounted for 11.22 per cent of all deaths during 1998-2001. According to the Civil Registration System, this group caused 6.65 per cent of all deaths in Arunachal Pradesh (and 2.41 per cent in the country as a whole) in 1991. These three diseases are water-borne and highlight the need for safe drinking water and improved sanitation facilities. Since the sanitation facilities are poor, the incidence of these diseases is high.

Influenza was responsible for 7.45 per cent of deaths and tuberculosis accounted for 5.41 per cent of deaths during the period. The relative percentage of tuberculosis deaths in both the survey data and the Civil Registration System is similar; the latter recorded 4.29 per cent of deaths from tuberculosis.

Box 3.2

Sanitation in the *chang ghar*

In the unwalled ground floor of the traditional house on stilts — *chang ghar* — which is grass-roofed and bamboo mat-walled, domestic animals, mainly pigs, are kept. Pigs act as scavengers, clearing things ranging from the rind of an orange to other waste. Traditionally, the lavatory is attached to the house. Almost 50 years ago, Verrier Elwin suggested the separation of the lavatory from the dwelling house on health grounds (Elwin, 1988). Many people in Arunachal Pradesh observe a taboo period during which they do not go out of the house. This rules out such a separation, but Elwin suggested that a corridor should be constructed, connecting the lavatory to the house, a step which would involve no violation of the taboo period and, at the same time, it would ensure better hygiene. Better sanitation can also be achieved by the shifting of the pigsty from the ground floor of the dwelling house, to a place which is at a comfortable distance from it. Once the pigsty shifts, the ground floor can be cleaned regularly. Better hygiene and sanitation are required in many of the villages and towns, and this can help reduce the incidence of many infectious diseases which often prove fatal.



C. Health services in Arunachal Pradesh

Like the growth of educational institutions, the expansion of health services in Arunachal Pradesh is a post-Independence development. Before Independence, there were only 13 medical units, located primarily in the areas that are now in Assam. Very few medical units were located in Arunachal Pradesh; even those established here were located in the plain areas or foothills. In the hill areas, especially in the upper regions where a majority of the population lives, there were no facilities for modern medicine. Since Independence, the Government has steadily increased the network of health services. The expansion of outreach services has also taken place but, it has lagged behind the development of health services in the State.

Table 3.2

Growth of health services in Arunachal Pradesh and in India

Year	Hospital Beds per 10,000 Persons		Doctors per 10,000 Persons	
	Arunachal Pradesh	India	Arunachal Pradesh	India
1950-51	-	3.2	1.6	1.7
1960-61	11.0	5.7	2.1	1.9
1970-71	25.4	6.4	3.3	2.8
1980-81	23.3	8.3	4.1	3.9
1990-91	26.4	9.5	3.1	4.7
1991-92	25.5	9.7	3.1	4.8
1995-96	-	9.4 p	-	5.1 p
1997-98	-	9.3 p	-	5.3 p
2000-01	20.3	-	4.3	-

Note: Dash means data not available. 'p' means the figure is provisional.

Sources: Economic Survey, 2002-03, Government of India.
Statistical Abstracts of Arunachal Pradesh, Government of Arunachal Pradesh.

In the initial decade after Independence, health service remained limited, in spite of the Government's efforts to expand it rapidly. In 1952-53, there were only 48 doctors in the whole of Arunachal, an area of 83,743 sq km. A doctor had to extend his services, on average, in an area of 1,745 sq km and to a population of more than 6,000 people. In 1952-53, the number of medical units, which included hospitals and dispensaries, were 52. A total of 101 health personnel — doctors, compounders and midwives — staffed the 52 medical units and provided health services in Arunachal Pradesh at that time. In the following year, more doctors were appointed and more health units were opened. In 1953-54, the number of doctors rose to 87 and 24 new medical units were added. Nurses and compounders were appointed, and the number of medical personnel increased to 139 in 1953-54.

The rate of growth of health services declined in the following years. By 1960-61, the number of doctors working in Arunachal Pradesh was 73, less than the number in 1953-54. The number of nurses, midwives and compounders increased gradually, so that the total number of personnel staffing the medical units increased to 205 in 1960-61.

The growth of health services in Arunachal Pradesh is impressive and compares well with that in the country (Table 3.2). In the country, the number of hospital beds per 10,000 persons increased from 3.2 in 1950-51 to 9.3 in 1997-98, while in Arunachal Pradesh, the number of beds per 10,000 persons has increased from 11.0 in 1960-61 to 20.3 in 2000-2001. In fact, the availability of hospital beds in Arunachal per 10,000 persons is double that of the rest of the country.

Table 3.2 shows that the number of beds per 10,000 persons, has actually declined in recent years. This is because, while the number of beds has remained more or less constant, the population has increased. While the availability of hospital beds is twice the average for the country, the same cannot be said about the availability of doctors. While the number of doctors per 10,000 people in the country increased from 1.7 in 1950-51 to 5.3 in 1997-98, in Arunachal Pradesh, the number of doctors per 10,000 people increased from

1.6 in 1950-51 to 4.3 in 2000-01. Thus, the number of doctors per 10,000 persons is less than the average for the country. However, in Arunachal Pradesh, the doctor-population ratio is not a very useful indicator, because of the scattered settlements.

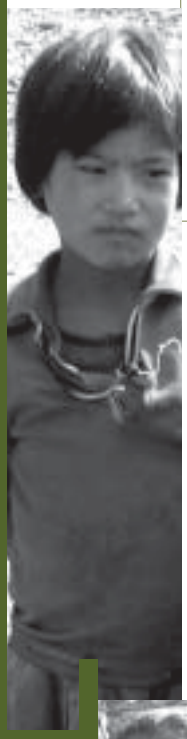
Expansion of health services in the districts

From total dependence on traditional medical practices, rural Arunachal Pradesh is gradually moving towards modern medical services provided mainly by the Government. During the last 50 years, the Government has established a structure of medical services in different districts of the State. In spite of its relative newness, rural people do depend on the health services provided in different hospitals, primary health centres and sub-centres. The number of doctors, compounders, and other medical practitioners has increased in both the Government and in the private sector, in all the districts. However, higher growth of medical practitioners, especially in the private sector, has been registered in the districts with high levels of urbanisation. In districts with no urban population, the growth of private medical practitioners has been virtually absent.

The number of doctors increased in all the districts during the 1990s, but, the rate of growth is higher in some districts than in others. The highest growth rate was in Papum Pare — the annual average growth rate was close to 10 per cent during the period 1996-97 to 2000-01. The lowest growth has been in Dibang Valley (Old), the annual growth rate during 1989-90 to 2000-2001 was only 0.21 per cent — that is, in a five-year period only one doctor was added to the medical service in this district. In a few districts, the growth of medical practitioners has not been able to keep pace with the growth of population, and the number of people served by a doctor has actually increased.

As evident from Table A 3.5 (in the Appendix), the district that witnessed the highest growth of the number of people per doctor is Lohit. The number of hospital beds per 10,000 people has declined in most districts during 1989-90 to 2000-01 and, the rate of decline is quite high in some districts. Except in East Kameng and Upper Siang, the number of beds, per 10,000 persons, has declined everywhere (The table lists number of people per hospital bed, which has increased everywhere except in these two districts.) As has been pointed out, the number of hospital beds has not increased very much in the last decade, while the population has grown substantially, and the number of beds per 10,000 persons has declined.

During the last 50 years, the Government has established a structure of medical services in different districts of the State. In spite of its relative newness, rural people do depend on the health services provided in different hospitals, primary health centres and sub-centres.



D. Fertility rate and contraception

Arunachal Pradesh has not yet reached the phase of demographic transition that is characterised by a low mortality rate combined with a sharply declining fertility rate. In Arunachal, while the mortality rate has fallen, it is still high and this high mortality rate is combined with a high fertility rate, leading to a high natural growth rate of population. From the SHDR survey, a Total Fertility Rate[30] (TFR) of 4.56 and a Crude Birth Rate[31] (CBR) of 34.62 have been estimated for the year, 2000-2001, for Arunachal Pradesh. The Crude Death Rate[32] (CDR) estimated by the SHDR survey is 11.57.

Both the fertility and mortality rates are much higher in Arunachal Pradesh than in the country. Arunachal's CBR of 34.62 is considerably higher than the country's CBR of 25.8, and its CDR of 11.57 is also higher than the country's CDR of 8.5. Since the rate of decline in mortality is higher than the decline in fertility, the natural growth rate of the population is as high as 2.30 per cent per annum.

Determinants of fertility

In the absence of time-series data for Arunachal Pradesh, it is not possible to trace the time-path of fertility and its determinants. The inter-district variation in fertility is used to identify the factors responsible for the reduction of fertility in the State. The Total Fertility Rate in the 15 districts varies from 3.81 in Papum Pare to 5.34 in Kurung Kumey. If the 13 'old' districts are considered, then the Total Fertility Rate varies from 3.81 in Papum Pare to 5.23 in Upper Siang, as shown in Figure 3.5. The range of variation in the Total Fertility Rate is quite significant. Fertility is determined by a complex interplay of a large number of factors originating from the socio-economic, cultural and political processes in society. Some of these factors are discussed here:

The variable most closely associated with fertility is the literacy rate[33]. The other variables significantly correlated with fertility are the use of contraceptives and the IMR.[34] The extent of inaccessibility in the district and its level of urbanisation are also correlated with the fertility levels, though these variables are not as significant as the first two variables[35]. The impact of literacy on fertility is greater than that of any other variable. Thus, Kurung Kumey district has the highest fertility (5.34) and the lowest literacy rate (25.74) per cent). The lowest fertility is recorded in Papum Pare (3.81) the district with the highest literacy rate (69.3 per cent).

The use of contraceptives

An important measure of a woman's freedom is her ability to exercise a choice in determining the size of the family. A woman's life, particularly in a low-technology society, is full of drudgery. Cooking, fetching of water, collection of fuel, and weaving take a considerable amount of her time. The beneficial effects of the regulation of fertility are not limited to womens' rights alone; controlled fertility brings other benefits: better education of children, better nutrition in the family and better social life and leisure.

In Arunachal Pradesh, fertility remains high in the remote areas. In the urban and semi-urban areas, the fertility rate is fast declining. Arunachal Pradesh has a higher fertility rate than the national average and, this is evidenced by the low use of contraceptives. According to NFHS-2, the prevalence rate of modern contraceptives is 42.8 per cent in the country

[30] The Total Fertility Rate (TFR) is the expected number of children to be borne by a woman if she passes through the current rates of age-specific fertility.

[31] Crude Birth Rate (CBR) is the number of live births during a year, measured per 1,000 population.

[32] Crude Death Rate (CDR) is defined as the number of people who die during a year, measured per 1,000 population.

[33] The correlation coefficient between the Total Fertility Rate and the literacy rate is -0.76.

[34] The percentage of women in the reproductive age using contraceptives has a correlation coefficient of -0.70 to the Total Fertility Rate (TFR), and the IMR has a correlation coefficient of 0.65.

[35] In a regression with the Total Fertility Rate (TFR) as the dependent variable and the literacy rate, percentage of women using contraceptives, percentage of rural people not connected by road and IMR, the coefficient of not a single independent variable appears to be significant. The estimated equations are given in the Annexure. If the number of explanatory variables is reduced, the result becomes more acceptable.

Figure 3.5: Total Fertility Rate (TFR) in Arunachal and its districts, (2000-2001)

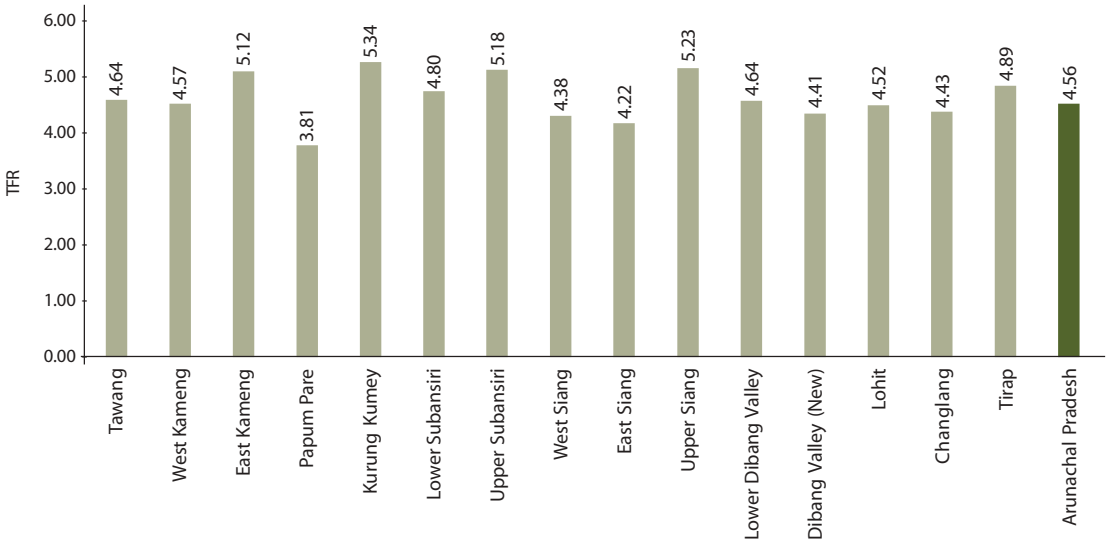
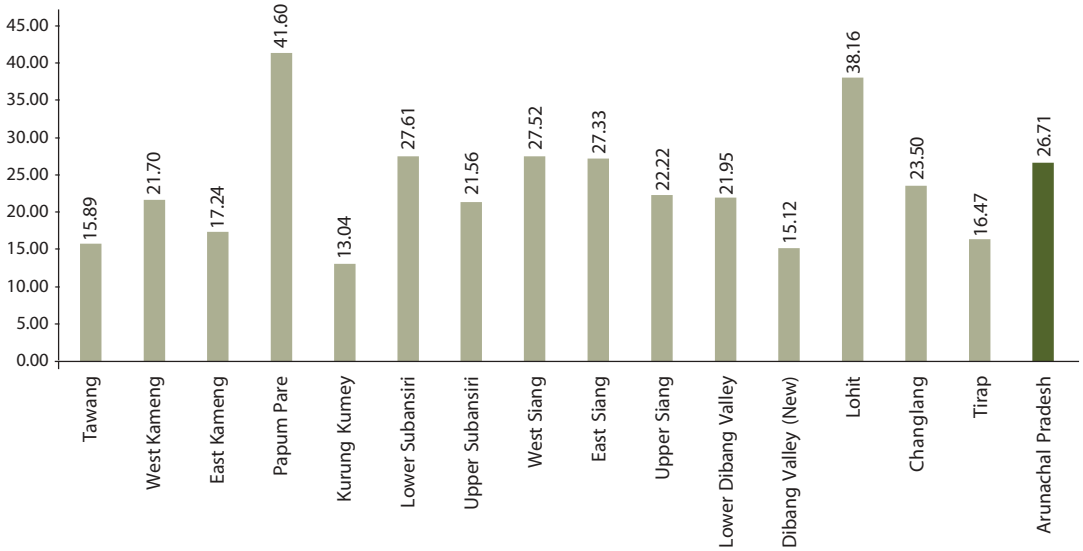


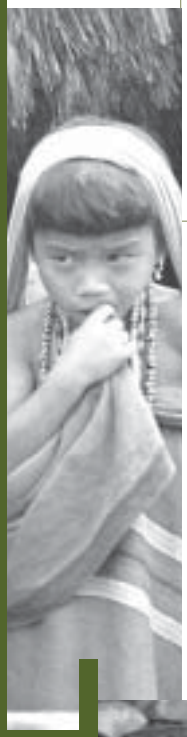
Figure 3.6: Contraceptive use in Arunachal and its districts, (2000-2001)



The beneficial effects of the regulation of fertility are not limited to womens' rights alone; controlled fertility brings other benefits: better education of children, better nutrition in the family and better social life and leisure.

as a whole and only 32.8 per cent in Arunachal Pradesh. The SHDR survey shows a lower rate of prevalence, 26.71 per cent. That is, 26.71 per cent of the married couples in the age group 15-49 use modern methods of family planning in the State.

There is considerable inter-district variation – the lowest prevalence rate is in Kurung Kumey (13.04 per cent) and the highest is in Papum Pare (41.60 per cent). The districts with a low rate of contraceptive prevalence have low literacy rates and low levels of development. Contraceptive use is least popular in the districts with no urban centres – like Kurung Kumey and Dibang Valley (New). Urbanisation is, however, only one factor among others, which determines the level of contraceptive prevalence. Lower Dibang Valley has an urban population while Upper Siang does not have any, yet, contraceptive use is more in Upper Siang than in Lower Dibang Valley. Another factor that is often overlooked is that many of the smaller tribes are not in favour of family planning at all. Given the small number of people in some of the tribes/ sub-tribes, and the low density of population in the State, this is understandable.



E. The way forward

Recognising the overriding importance of health in the well-being of the people, it is imperative that policy actions be taken to improve health services across the State. Eradication of disease, specially vector-borne diseases or those spread by infection, is a necessary first step but, this needs to be accompanied by initiatives to improve the health status of the people; especially the nutritional status of women and children. A holistic approach is called for – an attempt to reduce the incidence of disease, combined with health consciousness and awareness generation, an improvement in the nutritional levels of disadvantaged groups and improved access to healthcare.

Some of the important actionable issues that have been brought to the fore are highlighted below:

- Districts with low Life Expectancies at Birth and high Infant Mortality Rates require special attention. Resources need to be directed to addressing the specific requirements of disadvantaged areas and people, as reflected in the lower health indicators.

- The close link between the literacy rate, education, and health is well-established. Public sanitation and safe drinking water are two areas where intervention by the Government, together with village communities, can make a big difference. Vector-borne diseases are widespread in Arunachal. Steps should be taken to improve the public sanitation systems, especially in the urban areas. Development of proper drainage systems will improve hygiene levels and reduce the incidence of malaria as well as water-borne diseases.

- More specifically, the Government needs to tackle the issue of absenteeism and inefficiency in the delivery of services. Many Primary Health Centres (PHCs) in the remote areas of the State are non - functional due to absenteeism of doctors, compounders, and nurses. Another problem commonly referred to by people in remote areas is the distance to the nearest medical centre. Thus, access and quality of service are both issues in Arunachal. The Government should take steps to fill vacant posts of medical personnel in all the PHCs. The problem of overstaffing of PHCs in the more accessible areas, especially in semi-urban and sub-urban areas, and understaffing of PHCs in the inaccessible areas, needs to be addressed immediately.

- Non-availability of medicines is another common complaint, again voiced more in the remote areas. Some areas report that poor quality medicine is distributed to unsuspecting patients. Medical resources in the State are limited but, the Government must ensure that the available resources are distributed equitably. The concentration of Government medical services in urban areas, where people can afford private medical services, contributes to the growth of inequality — the richer, better-off sections of the society are being catered to while the less well-off people are neglected in both the rural and the remote areas. The inequitable delivery systems are biased in favour of accessible urban areas. An additional problem is the central procurement of medicines, which causes scarcity and often leads to the dispensing of expired medicines. Both these issues need to be tackled effectively.

- Food security is becoming an increasingly important issue with the monetisation of the economy and the shrinking of common pool resources. Some people suffer from an acute scarcity of food during the rainy season, from June to August,

when landslides due to heavy rains disrupt road communication. Certain areas get cut off and this often leads to food shortages. People resort to the collection of edible products from forests mainly roots, tubers, and fruits at such times, but, even that may not be possible due to bad weather. Air-dropping of food is sometimes undertaken to prevent a crisis situation. Improved public delivery of foodgrains in remote rural areas is an essential first step to address this problem.

- Awareness creation should be a major part of the Government's healthcare programme. Health education through mass media, health workers and through the school and college system will help to improve the health status of the population. Outreach services should be expanded in order to raise the immunisation coverage of children and special systems need to be put in place to act as a warning system in case of an outbreak of an infectious disease, especially in the remote areas.

- Strengthening the disease-surveillance system is necessary to control diseases like jaundice, malaria, dysentery and diarrhoea. Better surveillance and a prompt delivery of effective medical service is essential for reducing the case-fatality rate of vector-borne and infectious diseases.

- Given the limited resources of the Government, the private sector should be encouraged in the provisioning of health services in the State. The new policy of the Government seeks to create a healthy public-private partnership, which is likely to produce a synergistic effect. Hitherto, the provision of health services has been considered to lie in the public domain, a situation which rendered the private sector passive. The new policy encourages private as well as joint initiatives, which, by enlarging the private sector's role in health services, will improve the coverage as well as the quality of service. Apart from this, private medical care, with its higher presence in the urban areas, will enable the Government to devote its scarce resources to the villages and the more remote areas where even basic health care is not available.

- In the towns, the absence of investigation facilities, machines and specialists are the main issues. While primary health care is a priority, these services need to be built up simultaneously, at least in a few areas, so that patients are not forced to travel long distances usually to neighbouring Assam, Kolkata or even distant Delhi for treatment. The low doctor-to-population ratio is partly due to the fact that there are very few local doctors. Human capital needs to be built up. While the physical infrastructure exists, staffing and running these facilities is an issue. The State does not have a single medical college. If human capital is to be built up, then, it is necessary that the young people from the State take up medicine as a profession, and a pool of nurses, compounders and support staff receive the requisite training to be able to sustain quality healthcare in the State.

- Mobile clinics have been fairly successful in providing basic healthcare and pathological facilities in many villages of Uttaranchal. Mobile clinics can service some of the smaller habitations which are accessible by road and doctors can do routine check-ups, identify possible medical problems and prescribe medicines. For more extended rural health coverage, a chain of village health workers may be considered. These steps will mean primacy to the preventive aspect of health over curative practice as prevalent currently. This initiative alone can significantly improve the health status of the people of Arunachal.

Chapter 4

Income: command over resources

Income

an end and a means

In traditional development literature, income is taken to be a measure of economic well-being or welfare. The production of goods and services, therefore, makes income an end in itself. In human development literature, income retains its importance, but, it loses its singularity as an end. Income is one among many ends, and, it is one among many means by which the broad goals of society can be realised (UNDP, 1990; 1996). Given the binary role of income — both as an end and a means — a steady growth of income is essential for development, and critical to issues of nutrition, shelter, health and education, all key variables in human development.

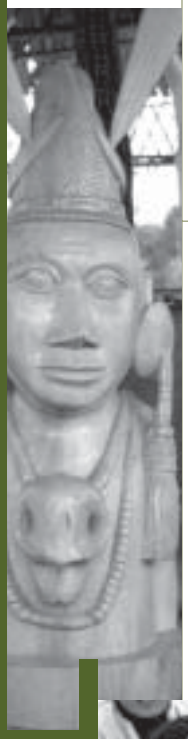
This chapter details Arunachal's relative position in the economic map of the country. This is followed by a description of the growth profile of the State economy and the main factors responsible for this growth. The structural transformation of the State economy, changes in the occupational structure, and the district domestic products are discussed in successive sections. The last section provides suggestions for intervention.

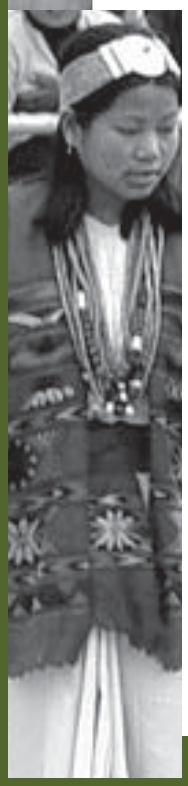
A. Per capita income in Arunachal and in the rest of India

In a ranking of the States of India on the basis of their per capita income, Arunachal Pradesh is ranked in the mid-range. In the absence of data, the level of income in Arunachal Pradesh in the 1950s and 1960s is unascertainable but, since Arunachal was then a primitive agricultural economy, the income level was probably low. Formal estimation of the domestic product of Arunachal Pradesh began only in 1970-71. Thus, a comparative analysis of income of Arunachal Pradesh is possible for the last three decades for which the data on income and its structure is available. The estimation of district income, however, is even more recent, having begun only in 1993-94, and this reduces the period of analysis of district income to an eight-year period (from 1993-94 to 2000-01).

Given the binary role of income — both as an end and a means — a steady growth of income is essential for development, and critical to issues of nutrition, shelter, health and education, all key variables in human development.

In 1970-71, per capita income in Arunachal — more appropriately the Net State Domestic Product (NSDP) per head — was a little over half (56.14 per cent) the per capita national income. In subsequent years, the per capita income in Arunachal increased at a rate significantly higher than





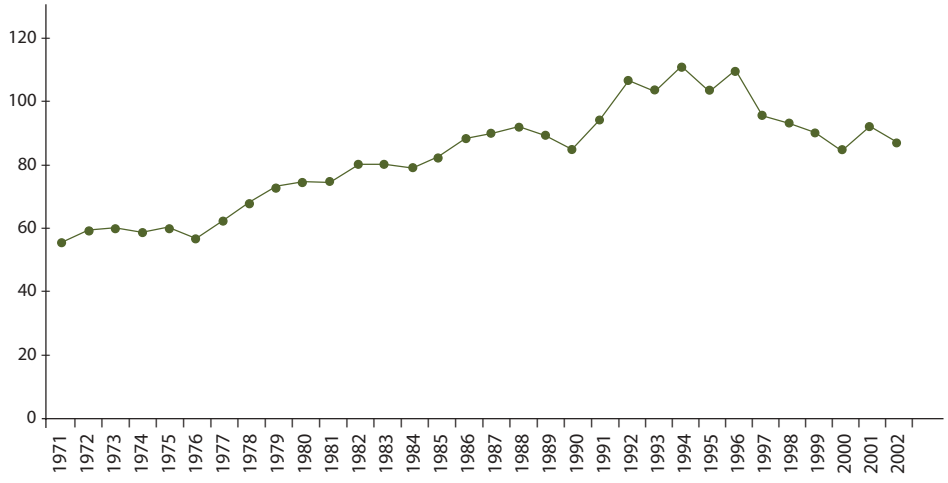
that of the per capita income of the country. The differential growth rate raised the ratio of per capita income in Arunachal to per capita national income. During the 1970s, the per capita income in Arunachal was 63.38 per cent of the per capita national income and, by the end of that decade, per capita income in Arunachal was around 75 per cent of the per capita national income. Through the 1980s, Arunachal Pradesh moved faster than the country on the per capita income scale, and this closed the gap between Arunachal's income per head and the national average. By the beginning of the 1990s, per capita income in Arunachal surpassed the national average. From 1991-92 to 1995-96, the per capita income in Arunachal Pradesh remained higher than that of the country. After 1995-96, however, the growth of income in Arunachal Pradesh has slowed down relative to that of the national income and, this is reflected in the falling ratio of Arunachal's per capita income to the average per capita income of the country. The last year of the 20th century, 1999-2000, ended with the per capita income of Arunachal at 84.64 per cent of the national average. Figure 4.1 shows the per capita income of Arunachal relative to that of the national per capita income.

The curve shows a rising trend for the first 20 years or so; reaches a maximum, and then declines.

Growth of income in Arunachal

The economy of Arunachal grew rapidly during the 1970s and 1980s but, in the 1990s, it lost some of the initial momentum. A comparison of the growth of the Arunachal economy with the national economy presents a mixed picture. While in the 1970s and 1980s, the economic growth in this State was markedly higher than the growth of the net national product, in the 1990s, the national economy performed better than the State economy. The policy of economic reforms, pursued by the Government of India in the 1990s, seems to have released forces propelling the national economy to a higher growth path, but, in the same decade, Arunachal's economy slid to a lower growth path. However, if the period from 1970-71 to 2002-03 — for which income data for Arunachal is available — is considered, the growth of income in Arunachal Pradesh is significantly higher than that of the national income.

Figure 4.1: Arunachal's per capita income as a percentage of per capita national income



Note: The Y-axis measures Arunachal's per capita income as a percentage of per capita national income, and the X-axis represents the fiscal years; 1971 indicates 1970-71, 1972 indicates 1971-72, and so on.

As evident from Table 4.1, India's net national product grew at an average rate of 4.78 per cent per annum during 1971-2003, compared to a 7.16 per cent growth in Arunachal's Net State Domestic Product (NSDP). During this period, the per capita Net State Domestic Product of Arunachal grew at 4.35 per cent per annum against the 2.68 per cent growth of the per capita net national product.

However, in the decade ending 2002-03, the per capita net national product in the country increased at the rate of 3.98 per cent per annum, while Arunachal's per capita Net Domestic Product declined by 0.04 per cent per annum.

Reasons for growth

In accounting for the growth in Arunachal, the relative contributions of different factors to the growth of income are estimated. In Arunachal Pradesh, there has been a high growth of labour, due largely to the in-migration of workers from other States of the country. Physical capital has grown, but, in the absence of data, it is not possible to say at what rate the physical capital has increased. The growth of human capital has been substantial as evident from the rising literacy rate in the State. More and more land has been brought under permanent cultivation. The rising income is associated with the growth of factors — capital, labour, and land — which are the immediate cause of economic growth in this State. However, the main reason for much of the growth in Arunachal Pradesh is the inflow of funds from the Central Government.

As a strategically located special category State, Arunachal Pradesh receives a steady flow of grants from the Centre. It is this inflow of funds which provided the initial impulse to growth in this State. Post-Independence, these Central funds were used to set up the administrative machinery and create infrastructural facilities. The spending of this money quickly began to monetise the erstwhile barter economies. The inflow of Central funds did not cease with the establishment of a narrow base for growth; it continued in the subsequent years to broaden the base, so that the growth could be sustained. In recent years, the importance of the inflow from the Centre has declined somewhat, yet, it forms about 70 per cent of the State's revenue and more than 50 per cent of the State's net domestic product. (See Table 4.2 for details).

As a proportion of the State income, the inflow from the Centre has been declining,

Table 4.1

Growth rate of national income (NNP) and Arunachal's income (NSDP)

Period	Growth Rate (% Per Annum) NNP (India)	NSDP (Arunachal)	Growth Rate Per Capita NNP (India)	(% Per Annum) Per Capita NSDP (Arunachal)
1971-80	3.36	7.07	1.10	4.03
1981-90	4.99	7.81	2.85	4.69
1991-00	5.93	4.81	3.95	2.31
1994-03	5.85	2.35	3.98	-0.04
1999-03	5.00	1.99	3.23	-0.40
1971-03	**4.78**	**7.16**	**2.68**	**4.35**

Note: The growth rate is the value of r in the estimated equation, log y = a + rt, t being time, in years.

Source: NNP data are from Economic Survey 2003-04, Government of India, NSDP data are from the State Domestic Product of Arunachal Pradesh for different years, published by the Directorate of Economics and Statistics, Government of Arunachal Pradesh.

Table 4.2

Inflow of funds from the Centre

Year	Inflow as Percentage of NSDP	State Revenue
1990-91	73.40	76.92
1994-95	58.84	74.79
1999-00	61.80	76.65
2000-01	55.76	88.81
2001-02	55.71	81.40
2002-03	50.70	68.15

Note: Inflow includes, apart from Central grants-in-aid, the State's share in Central taxes. State revenue includes State Government's loans, from the Centre and different institutions.

Source: Budget of the Government of Arunachal Pradesh for different years.

but, the absolute value of the inflow, in real terms, is not falling — in fact, it is increasing. During the 17 years from 1986-87 to 2002-03, the real inflow increased at the average annual rate of 2.55 per cent. However, the inflow as a percentage of the State income declined on average by 2.15 points per year. The relative importance of the inflow in the State budget has changed little since the mid-1980s. During the period 1986-87 to 2001-02, the inflow of funds from the Centre constituted about 80 per cent of the total revenue of the State. In 2002-2003, however, the proportion declined to about 68 per cent.

The inflow of funds has meant an inflow of labour and other inputs into the State, leading to the introduction of new technology in agriculture. In *jhum* agriculture, which is practised by the majority of the people in Arunachal Pradesh, bullock-driven ploughs are not usually used; spades, hoes, *dao*s (a kind of bill hook) and sickles are the only tools that are used. However, migrant workers brought with them the knowledge of wet rice cultivation, and this has meant the extension of permanent cultivation in many river valleys and plains of the State. (A case study of a migrant agricultural labourer and sharecropper is described in Box 4.1).

Box 4.1

Jamir Ali's wet rice cultivation

Jamir Ali is a sharecropper in Dikrong Valley, near Itanagar, the capital of Arunachal Pradesh. Three years ago, he, along with his family, migrated from the Lakhimpur district of Assam. His family of seven members — three sons, two daughters, and his wife — survives largely on five acres of share-cropped land, supplemented by pulling a hired rickshaw and the sale of labour services. His house is thatch-roofed, bamboo mat-walled, and mud-floored, and is constructed in the middle of the tenanted land. Houses like Jamir Ali's dot the entire Valley — houses of sharecroppers — migrants from other states of the country. People like Jamir Ali are becoming increasingly more common in the other valleys of Arunachal as well.

Jamir Ali's present condition belies the hope of his great grandfather, who, a landless peasant of Mymensingh district of East Bengal (now Bangladesh), migrated in the first decade of the 20th century to the Brahmaputra Valley in Assam, in order to be an owner-cultivator. His great grandfather did, in fact, become an owner-cultivator, as was his grandfather, but, excessive subdivision of inherited land led to his father becoming landless, a status Ali now carries. Unlettered himself, he has been forced by poverty to keep all his children unschooled and unlettered. His daughter's illness — jaundice — put him in debt of Rs. 5,000, a sum which he has not been able to repay even after two years. The death of his daughter (from jaundice) initially kept the moneylenders at bay but, soon, the pressure to repay the loan increased, and, Ali decided to migrate in search of better earnings. With his eldest son pulling a rickshaw and his second son working both in his own field and in the fields of others, (as a wage labourer) Ali has been able to repay 20 per cent of his debt.

In Arunachal Pradesh, people like Ali are an important segment of the peasantry, extending the permanent cultivation of land which earlier remained uncultivated. The contractual arrangements that guide the relationship between the sharecroppers and the landlord is only short-term and eviction may take place at any time. The tenants may also change landlords. So far, no legislation has been passed to control sharecropping. Migrant sharecroppers have been able to improve their economic condition, but, very few sharecroppers manage to send their children to school.

Box 4.2

Government 'crowding-out' the community?

The 'crowding-out' hypothesis has attracted a good deal of attention in recent years. In its simplest version, the hypothesis states that a rise in Government expenditure tends to reduce private investment, so that the overall investment does not increase. In more general terms, the hypothesis implies that Government initiative tends to dampen private initiative. The empirical testing of the hypothesis has produced mixed results. The hypothesis holds true when the Government initiative and private initiative are competitive, but, not when the Government and private initiatives are complementary. The provision of indivisible goods — infrastructure facilities or social overhead capital — by the Government facilitates private initiative. The complementary relation ends when the Government goes beyond the provision of public goods and takes up tasks, which can be done by the private sector.

In Arunachal Pradesh, the Government took upon itself the task of modernising the economy. The people followed the Government and participated in various developmental activities. In the process, however, an impression was created that the Government was the initiator and executor of the development process. Individual initiative, drive and 'entrepreneurship' were not considered central to the process of development, Government activism came to be associated with private passivism. In some cases, the Government's developmental activities seem to have totally replaced traditional participatory community action. For example, in the past, the people constructed bridges over small rivers and streams, they built community- council houses, repaired the village roads in their own villages, and undertook many other such activities. Once the Government took over the task of constructing bridges and roads, community action in these areas has gradually declined. Today, the Government is trying to revive the old community spirit and redefine the role of the private sphere in the development process. Private entrepreneurship and community action are being encouraged in an attempt to regain a sense of ownership, which has always been a vital part of tribal culture.

The bullock-driven plough soon became a symbol of agricultural modernisation, as it was used as the main instrument in the extension of permanent cultivation. Along with the changes in agricultural practice, came growth in the secondary and tertiary sectors, contributed in the initial years largely by people from other parts of the country.

The force behind this growth was the Government. The overwhelming role of the Government in the economy is reflected in the high share of Government expenditure as a proportion of the State income. In Arunachal Pradesh, Government expenditure constitutes about 80 per cent of State income. The total Government expenditure formed 93.67 per cent of the Net State Domestic Product (NSDP) in 1990-91. The size of the Government, relative to the economy, has not declined much in the last decade: Government expenditure, as a proportion of the State's net domestic product, was 80.75 per cent during 2002-03. However, the funds from the Centre and the resulting Government expenditure does not appear to have been transformed into high productive social overhead capital. Evaluating this expenditure by the yardstick of growth of domestic product, suggests that the productivity of Government expenditure in the State is low. In spite of being low-productive, Government expenditure has been the main force behind the growth of the State economy.

The Government is trying to revive the old community spirit and redefine the role of the private sphere in the development process. Private entrepreneurship and community action are being encouraged in an attempt to regain a sense of ownership, which has always been a vital part of tribal culture.

B. Arunachal's income: a comparison with other States

Arunachal Pradesh started on the road to development with a low level of income. Guided by Government planning and activated by the participation of the people in Government-sponsored developmental activities, the Arunachal economy achieved a sustained growth that exceeded the growth rate of many other States in the country. High growth rates of income in Arunachal Pradesh have raised its position in the income-ranking of the States in the country. While in 1980-81, more than half of all States had per capita incomes higher than that of Arunachal Pradesh, by the mid-1980s, Arunachal had reached the median position among all States and Union Territories in the country, and, thereafter, Arunachal's per capita income was above the median income. Arunachal remained above the median for a few years and then dropped below it, by the end of 1990s. The relative position of Arunachal Pradesh can be better understood by relating its income to that of Bihar, the State with the lowest per

Table 4.3

Income index of States in India, 2000

Class Interval	No. of States/ UTs	States and UTs			
< 0.40	1	XXXI.	Bihar (0.308)		
0.401 – 0.450	6	XXX.	Orissa (0.403)	XXVII.	Assam (0.431)
		XXIX.	Uttar Pradesh (0.423)	XXVI.	Madhya Pradesh (0.447)
		XXVIII.	Jharkhand (0.42)	XXV.	Chhattisgarh (0.448)
0.451 – 0.500	7	XXIV.	Rajasthan (0.466)	XX.	Nagaland (0.475)
		XXIII.	Jammu & Kashmir (0.468)	XIX.	Tripura (0.490)
		XXII.	Manipur (0.473)	XVIII.	Arunachal Pradesh (0.493)
		XXI.	Meghalaya (0.474)		
0.501 – 0.550	9	XVII.	Sikkim (0.506)	XII.	Himachal Pradesh (0.540)
		XVI.	Mizoram (0.510)	XI.	Kerala (0.544)
		XV.	West Bengal (0.511)	X.	Gujarat (0.544)
		XIV.	Andhra Pradesh (0.513)	IX.	Tamil Nadu (0.549)
		XIII.	Karnataka (0.531)		
0.551 – 0.600	4	VIII.	Andaman & Nicobar Islands (0.552)	VI.	Maharashtra (0.581)
		VII.	Haryana (0.579)	V.	Punjab (0.589)
0.601 – 0.650	1	IV.	Pondicherry (0.629)		
> 0.650	3	III.	Delhi (0.667)	II.	Chandigarh (0.692)
				I.	Goa (0.696)

Note: Each State is flanked by two numbers, the first one, in Roman numerals, shows its rank among the States and Union Territories, and, the second one in Arabic numerals shows its income index.

capita income, and of Punjab, the State with the highest. In 2000-01, Bihar's per capita income was 35.02 per cent of Arunachal's per capita income and Punjab's per capita income was 173.30 per cent of Arunachal's per capita income[36].

The income indices of the States and Union Territories of the country have been constructed to make a comparison between the economic position of Arunachal and the rest of the country[37]. The data for Uttaranchal was not available and the indices have been constructed for the 31 States and Union Territories (27 States and four Union Territories). The year chosen is 2000. The positions of different States and Union Territories, in terms of internationally comparable indices, are shown in Table 4.3.

Table 4.3 shows Bihar in the opening class with the lowest rank, 31, and an income index of 0.308. In the next class, there are six States with ranks, 30 to 25; Orissa has the lowest rank (30) in this class and an index of 0.403. Arunachal Pradesh belongs to the class 0.451 to 0.500, which has seven States, five of which are from North-East India. Arunachal's rank is 18 and its income index is 0.493. With the country's index at 0.530, the people of Arunachal have a command over resources, which is slightly below the average for the country.

C. Sectoral composition of income in Arunachal

The sectoral composition of income in Arunachal over the period 1970-71 to 2001-2002 shows a steep decline in the share of the primary sector and a big increase in the share of the services sector. In recent years, the services sector in Arunachal Pradesh has come to occupy a predominant position in the State's net domestic product, a position that is higher than agriculture, the traditional occupation of the people. In 2001-02, the share of the services sector in State income was 41.68 per cent, exceeding the primary sector's share by 7.01 percentage points (See Table A 4.1 in the Appendix). Agriculture's share at 28.89 per cent was much below the services sector share and was double the share of public administration. The secondary sector accounted for 23.65 per cent of the State income in 2001-02. This figure is, however, quite misleading because a closer look reveals that the bulk of the secondary sector activity is accounted for by construction. Industrial or manufacturing activities are of little importance, accounting for only about 4 per cent of the State income. In the country as a whole, industry constitutes one-fourth of income, which is marginally below the share of agriculture.

In recent years, the services sector in Arunachal Pradesh has come to occupy a predominant position in the State's net domestic product, a position that is higher than agriculture, the traditional occupation of the people.

[36] *Data from Economic Survey, Government of India, 2001-2002.*
[37] *See Technical Notes for details.*

An economy based predominantly on *jhum* cultivation has gradually undergone a huge structural transformation, reducing significantly the relative importance of traditional economic activities. In 1970-71, primary sector activities — agriculture, forestry and logging, fishery, mining, and quarrying — accounted for 59.19 per cent of NSDP income, the secondary sector activities — manufacturing, construction, electricity, gas and water supply — accounted for 20.33 per cent, and the remaining 20.48 per cent came from the tertiary sector. In the primary sector, agriculture occupied the topmost position generating 38.33 per cent of the State income in 1970-71. In the secondary sector, construction was the most important activity, and manufacturing activities contributed less than one per cent of the State income in 1970-71. In the services sector, public administration was relatively more important accounting for 9.98 per cent of the income of the State.

An important aspect of change in the sectoral composition of the State domestic product is that in the last 32 years, the contribution from manufacturing activities has never been more than 6 to 7 per cent of the State income. The share of manufacturing, which was 0.85 per cent of the State income during 1970-71, increased steadily throughout the 1970s and 1980s reaching 6.60 per cent of the State income, the highest value, in 1989-90. Since then, the share of manufacturing has fallen gradually to 4.51 per cent in 2001-02.

Table 4.4

Changes in sectoral composition of income in Arunachal

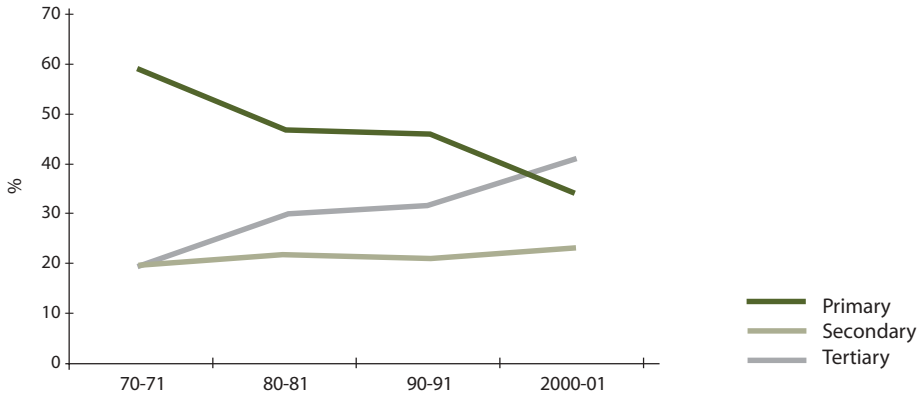
Sector	1970-71	1980-81	1990-91	2000-01
Primary	59.19	47.28	46.19	34.67
Secondary	20.33	22.21	21.56	23.65
Tertiary	20.48	30.51	32.25	41.68

Source: Extracted from Estimates of Domestic Product, Arunachal Pradesh, Directorate of Economics and Statistics, Itanagar, 2002.

Sectoral growth

From 1970-71 to 2001-02, the services sector grew at an annual average rate of 9.38 per cent, the highest growth among the three broad sectors — primary, secondary, and tertiary. The growth rates of the primary and secondary sectors during this period were 5.93 and 7.68 per cent respectively. Agricultural growth rate was 6.53 per cent

Figure 4.2: Sectoral contribution to NSDP, Arunachal (%)



per annum, a rate which is much higher than the rate of growth of population in the State. The manufacturing sector expanded at an average annual rate of 11.81 per cent during the period 1970-71 to 2001-02 (See Table 4.5).

In the 1971-81 period, agriculture grew at 6.40 per cent per annum and manufacturing growth was as high as 14.20 per cent per annum. Like manufacturing industry and the secondary sector, the tertiary sector expanded quite rapidly in the 1970s, at a rate of 11.39 per cent per annum. In the 1980s, the tertiary sector's growth slowed to 7.62 per cent. In this period, agricultural growth increased to 9.18 per cent per annum.

During the last decade, 1990-91 to 2001-02, the agricultural growth rate declined to 2.68 per cent per annum, largely because of the low rate of expansion of permanent cultivation and the slow spread of modern inputs such as fertilisers and high-yielding varieties of seeds. In the same period, forestry and logging, experienced a negative growth of 6.27 per cent per annum (for the first time), due largely to the Supreme Court ban on felling and logging activities. Manufacturing recorded a small increase of just 2.02 per cent. In spite of the overall slowdown in the State economy, (NSDP growth rates declined from close to 8 per cent to 4.5 per cent) the 1990s saw the tertiary sector grow at 7.87 per cent per annum, and public administration grew at an annual rate of 10.85 per cent.

Table 4.5

Sectoral growth in Arunachal

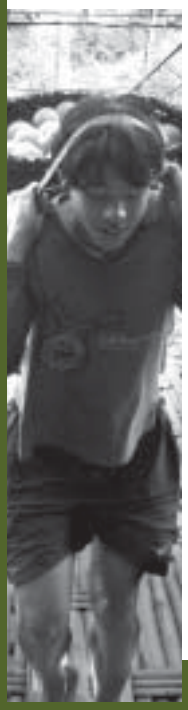
(Rate of growth in % per annum)

Sectors	1971-1980	1981-1990	1991-2002	1971-2002
Agriculture	6.40	9.18	2.68	6.53
Forestry & Logging	0.32	4.05	-6.27	2.94
Fisheries	16.09	34.28	8.50	19.99
Mining & Quarrying	14.39	37.26	1.33	16.53
Primary	**4.61**	**8.48**	**1.32**	**5.93**
Manufacturing	14.20	7.85	2.02	11.81
Construction	7.70	6.26	2.55	6.78
Electricity Gas, etc.	0	0	0	0
Secondary	**8.03**	**6.43**	**5.11**	**7.68**
Transport, Storage & Communication	9.61	21.84	26.92	12.91
Communication	10.12	3.08	13.66	6.43
Trade, Hotel & Restaurants	17.60	9.69	3.33	9.35
Banking & Insurance	27.96	20.77	8.35	17.16
Real Estate & Business Services, etc.	3.57	4.54	-1.36	12.07
Public Administration	10.81	5.29	10.85	7.78
Other Services	9.58	9.50	6.44	10.03
Tertiary	**11.39**	**7.62**	**7.87**	**9.38**
NSDP	**7.07**	**7.81**	**4.54**	**7.34**

*Note: Growth is average relative growth, per annum in per cent, it is the estimated value of 100*b from log y = a + bt, (where y is income and t is time in years).*

Source: Based on Estimates of Domestic Product, Arunachal Pradesh, Directorate of Economics and Statistics, Itanagar, 2002.

From 1970-71 to 2001-02, the services sector grew at an annual average rate of 9.38 per cent, the highest growth among the three broad sectors — primary, secondary, and tertiary.



D. Changes in the occupational structure

With the change in the structure of production, the occupational structure of the people has changed. Though the primary sector remains the largest employer even today, its relative importance has fallen substantially. Data constraints restrict our analysis to a period of two decades only: 1970s and 1980s. According to the 1971 Census, 80.44 per cent of the workers were engaged in the primary sector, 19.12 per cent in the tertiary sector and only 0.44 per cent in the secondary sector. In the course of 20 years (1971-1991), there was a marked decline in the proportion of workers engaged in the primary sector from 80.44 per cent to 67.44 per cent — a decline of 13.00 percentage points. This decline in the primary sector was accompanied by a rise in the share of the secondary and tertiary sectors: The secondary sector gained by 8.22 percentage points and the tertiary sector by 4.78 percentage points. The decline in the share of the primary sector came mainly from a fall in the share of employment in cultivation. The cultivators who formed 78.34 per cent of the workers in 1971 grew very slowly, only at an average yearly rate of 0.56 per cent during 1971-81. This small growth reduced their share to 60.36 per cent — a fall of 17.98 percentage points. Though the share of cultivators fell, the share of agricultural labour rose sharply from 1.96 per cent to 5.13 per cent. However, other sub-sectors of the primary sector — livestock, forestry, fishing, hunting and mining, and quarrying — made rapid progress.

In 1971, the secondary sector employed less than one per cent of the labour force. By 1981, 8.92 per cent of the workers in the State found employment in this sector. The employment-generating capacity of this sector in the 1980s increased at a slower rate than that of the tertiary sector, so that by 1991 the share of the secondary sector dropped to 8.66 per cent. In the secondary sector, construction activities overshadowed industrial activities: Of all workers in this sector, 69.09 per cent were engaged in construction activities and 30.91 per cent in industrial activities, both household and non-household. The growth and performance of the secondary sector is determined mainly by what happens to construction activity. In the 1970s, employment in construction expanded very sharply; the average annual growth being as high as 44.2 per cent and this raised the share of employment in this sector from a mere 0.10 per cent in 1971 to 6.97 per cent in 1981. In the 1980s, construction activities slowed down and the employment in this sector increased at only 0.7 per cent per annum. This reduced the share of construction to 5.98 per cent in 1991, a fall of 0.98 percentage points from 1981.

On the other hand, the share of tertiary activities fell in the 1970s but, rose in the 1980s. In 1991, the tertiary sector employed 23.90 per cent of all workers; the majority was employed in 'other services'. (See Table A 4.2 in the Appendix for details.)

E. Sectoral contribution to the growth of income

An important characteristic of Arunachal's economy is the rapid growth of the services sector. A separate services sector or a manufacturing sector did not exist prior to 1947. All manufacturing and service activities were integrated in the household sector; the extra-familial mode of organisation for production did not exist. With the introduction of direct administration, the services, manufacturing and construction sectors — separate from the agricultural sector — appeared.

During the period, 1970-71 to 2001-02, agriculture contributed more prolifically to the growth of the Arunachal economy than any other sector. Though agricultural growth was not very high compared to the other sectors, yet, the size of the sector has meant a substantial contribution. In this period, agriculture accounted for 35.97 per cent of Arunachal's NSDP and 32.08 per cent of Arunachal's economic growth came from agriculture[38]. Table A 4.3 in the Appendix shows the sectoral contribution to the growth of the Arunachal economy.

Forestry and logging is an important sector of the Arunachal economy with its contribution forming, on average, 12.14 per cent of the NSDP during 1970-71 to 2001-02, but, its relatively low growth of only 2.94 per cent per annum has limited its contribution to the economic growth to just 4.87 per cent. The primary sector, as a whole, is responsible for 39.92 per cent of the economic growth during this period.

Manufacturing grew during 1970-71 to 2001-02 at a high rate of 11.81 per cent, but, its small size — its average contribution being 4.04 per cent of the NSDP — kept its relative weight in the growth of the NSDP to 6.51 per cent. In contrast, construction with a growth rate of 6.78 per cent per annum, accounted for 16.43 per cent of the growth of the State economy. This contribution emanated mainly from its relatively big size — during the period — construction contributed on average 17.75 per cent of the State's income. The overall contribution of the secondary sector was 21.78 per cent of the State's economic growth. The primary and secondary sectors together contributed 61.70 per cent of the NSDP growth, the remaining 38.30 per cent came from the tertiary sector. In this sector, public administration forms the largest sub-sector with its contribution amounting to 10.49 per cent of the NSDP. The contribution of public administration to the NSDP growth is also the largest among all the sub-sectors of the tertiary sector; it formed 11.15 per cent of the growth of NSDP.

There is a significant decadal variation of relative sectoral contributions to the growth of NSDP in Arunachal Pradesh. In the 1970s, agriculture contributed 35.56 per cent to the State's economic growth; agriculture's contribution increased to 41.95 per cent in the 1980s but, fell steeply to a modest 19.89 per cent during the period 1990-91 to 2001-02. It was in the 1980s that the primary sector's contribution soared to 54.36 per cent and, in the 1990s, it dropped to only 10.02 per cent. In the 1990s, the contribution of forestry and logging was negative, it suffered a decline of more than 10 per cent. The secondary sector's contribution to the NSDP growth dipped in the 1980s and rose sharply in the 1990s. In the 1970s, the tertiary sector's contribution was 39.29 per cent, and this increased to 64.30 per cent during the period 1990-91 to 2001-02.

Forestry and logging is an important sector of the Arunachal economy with its contribution forming, on average, 12.14 per cent of the NSDP during 1970-71 to 2001-02, but, its relatively low growth of only 2.94 per cent per annum has limited its contribution to the economic growth to just 4.87 per cent.

[38] The sectoral contribution has been worked out using the following formula:
Sectoral contribution to the growth of NSDP = Sectoral contribution to the NSDP x Sectoral Growth. The sectoral contributions to the NSDP growth so obtained are added and the contribution of each sector is divided by the sum and expressed as a percentage.
Symbolically it is,

$$SCi\ (un) = (SSi \times SGi)$$
$$SCi\ (sd) = [SCi\ (un) \times 100] / \Sigma\ SCi\ (un)$$

Definitions: $SCi\ (un)$ = Sectoral Contribution of the i^{th} sector, unstandardised
SSi = Sectoral Share of the i^{th} Sector in NSDP
SGi = Sectoral Growth of the i^{th} Sector
$SCi\ (sd)$ = Sectoral Contribution of the i^{th} Sector, standardised

F. Per capita Net District Domestic Product in the districts

An examination of the relative per capita Net District Domestic Product (NDDP) averaged over the eight-year period (at constant prices for 1993-94) shows substantial variation in the district incomes reflecting high inter-district inequity. The average per capita NDDP is a rough measure of district income and represents the economic position of the district for the entire period. The average per capita NDDP, along with related data, appear in Table 4.6. The difference between the per capita income of the richest and poorest districts is very wide. The per capita income of Lower Subansiri is less than half (46.36 per cent) of that of the richest district, Dibang Valley. Lower Subansiri's position is also much below the State's average; its per capita income is 70.33 per cent of the State's average per capita income during the period. Six districts — Dibang Valley, West Kameng, East Siang, Tawang, Upper Siang and Papum Pare, arranged in descending order — have per capita incomes above the State average over the eight-year period. Seven districts — West Siang, Lohit, Tirap, Upper Subansiri, East Kameng, Changlang, and Lower Subansiri, arranged in descending order — have incomes below the State average.

The ranking of the districts changes (though not substantially) when the average is taken for a sub-period. That is, the ranks of the districts based on their eight-year average per capita income are disturbed if average per capita income for a shorter period is considered. When a three-year average covering the period 1998-99 to 2000-01 is taken, the ranks of four districts change and those of nine districts remain unchanged. In any period of averaging, the Dibang Valley district maintains its first rank and Lower Subansiri its lowest rank. In three-year averaging, the districts which find their ranks changed are East Siang, which rises from third rank in the eight-year average to second place replacing West Kameng, which drops to the third position. Another district that gains is Upper Subansiri, which rises to the ninth place from the tenth place; replacing Tirap, which drops to the tenth position. The change in these ranks is, however, not very significant.

Table 4.6

Real per capita Net District Domestic Product: 1993-94 to 2000-01

Districts	N	Mean	Rank	Minimum	Maximum
Tawang	8	10,541	4	9,287	12,082
West Kameng	8	12,391	2	10,698	14,740
East Kameng	8	7,237	11	6,703	8,035
Papum Pare	8	9,334	6	7,848	10,582
Lower Subansiri	8	6,179	13	5,811	6,899
Upper Subansiri	8	7,268	10	6,075	8,438
West Siang	8	8,595	7	7,842	9,465
East Siang	8	10,719	3	8,223	12,203
Upper Siang	6	9,878	5	9,337	10,374
Dibang Valley	8	13,328	1	12,652	13,890
Lohit	8	8,450	8	7,655	9,275
Changlang	8	7,167	12	6,364	7,846
Tirap	8	7,602	9	7,166	8,256
Arunachal Pradesh (Per capita NSDP)	**8**	**8,760**		**8,401**	**9,424**

Note: N is the number of years; unit of Minimum, Maximum, and Mean is Rupee. Number of districts is 13, before June 2000. (The Minimum is the lowest and Maximum is the highest level of real per capita Net District Domestic Product during the period).

Source: Computed from Estimates of District Domestic Product, Arunachal Pradesh, 1993-94 to 2000-01, Directorate of Economics and Statistics, Government of Arunachal Pradesh, Itanagar.

Differential growth of income in districts

The growth of income in the different districts of Arunachal Pradesh during the 1993-94 to 2000-01 period varies widely. Upper Subansiri had the highest growth among all the 13 districts. Income in this district grew at an average annual rate of 4.90 per cent. Income in Papum Pare also grew at an average annual rate of 4.30 per cent during the period. East Kameng had the

slowest growth in income, an average rate of only 0.61 per cent (see Table A 4.4 in the Appendix).

The growth performance in Tirap and Changlang was also poor. In Tirap, the income level grew at 1.11 per cent and in Changlang at 1.42 per cent. Dibang Valley, the district with the highest per capita income among all the districts of Arunachal Pradesh, achieved a growth rate of 2.59 per cent, a rate marginally below the State average growth rate of 2.78 per cent. Lower Subansiri, the district with the lowest per capita income, experienced a growth rate of 2.60 per cent, almost the same as Dibang Valley, and, slightly less than the State average.

The per capita income also shows different growth rates across the districts. It varied from a high growth rate of 5.72 per cent per annum in East Siang and 3.69 in Upper Subansiri to a negative growth of –1.5 per cent in Changlang and –1.19 per cent in West Kameng. In fact, six out of the 13 districts show negative growth rates in the per capita income during the period, these include Papum Pare, Dibang Valley, Lohit and Tirap, in addition to Changlang and West Kameng.

Structure of the District Domestic Product

The sectoral composition of the District Domestic Product (DDP) shows that in Arunachal Pradesh, a State considered to be largely agricultural, some districts are not so dependent on agriculture as a source of income. For Arunachal as a whole, 31.38 per cent of the domestic product comes from the agriculture sector. The Siang region, Dibang Valley, Changlang, Lohit, East Kameng, Tawang, and Lower Subansiri are all dependent on agriculture for substantial portions of their income. (See Table A 4.5 in the Appendix for details.) The district with a high dependence on agriculture is East Siang, in which during 1993-94 to 2000-01, on average, 51.64 per cent of the Net Domestic Product came from agriculture.

Not surprisingly, in Papum Pare — the district where the capital of the State is located — the dependence on agriculture is very low, but, in some other districts also, the relative importance of agriculture is low. In Papum Pare, agriculture accounts for only 14.00 per cent of the net domestic product during 1993-94 to 2000-01. In West Kameng, only 14.16 per cent of the Net Domestic Product came from agriculture.

Forestry and logging is an important sector in the State. Once again, the importance of this sector varies substantially in the districts. While about 8.33 per cent of the State's domestic product comes from forestry, in West Kameng, 26.91 per cent of the Net Domestic Product comes from this sector. There are two other districts whose income share from forestry and logging is more than 10 per cent. One is Changlang with 13.56 per cent of its income from forestry and logging, and the other is Upper Siang, where 12.07 per cent of the income is generated from forestry and logging. The district, which is least dependent on forestry and logging, is East Siang, where only 3.53 per cent of the income comes from forestry and logging. Forestry and logging contribute around 5 per cent of the district domestic product in a number of districts — 5.51 per cent for Papum Pare, 5.88 per cent for Upper Subansiri, 5.07 per cent for West Siang, and 4.23 per cent for Dibang Valley .

In Arunachal Pradesh, there are only three districts — East Siang, Dibang Valley and Changlang — where more than 50 per cent of the income comes from primary activities. (Upper Siang and East Kameng also have about 49.26 per cent and 46.36 per cent of domestic product coming from the primary sector). In Papum Pare and Upper Subansiri, less than one-third of the income

comes from primary activities. The dependence on the primary sector is the lowest in Papum Pare — the contribution of the primary sector to the domestic product is only 20.34 per cent here.

The industrial sector is still largely underdeveloped in Arunachal. In more than half of the districts, manufacturing industries account for less than 2 per cent of the domestic product. The least industrialised district is Tawang, where, on an average, only 0.99 per cent of the domestic product came from manufacturing activities during the period 1993-94 to 2000-01. Close to Tawang is East Kameng, where also manufacturing activities account for only 1.09 per cent of domestic product. Then follow in succession: Upper Siang with 1.17 per cent of its domestic product coming from manufacturing activities, and Lower Subansiri, with 1.19 per cent of its domestic product coming from the manufacturing industries. At the other end of the spectrum of industrialisation is Tirap, where 13.16 per cent of the domestic product came from industry during the 1993-94 to 2000-01 period. Next to Tirap stands Lohit, where the industrial sector accounts for 5.91 per cent of income. Papum Pare, in spite of being the district where the capital, Itanagar, is located, is one of the least industrialised districts of Arunachal Pradesh; only 2.09 per cent of its domestic product comes from manufacturing industry.

In the secondary sector, the activity that overshadows manufacturing is construction. Its contribution to the domestic product varies from 25.69 per cent in Upper Siang to 6.23 per cent in Tawang, in the 1993-94 to 2000-01 period. The tertiary sector has emerged as an important sector of the economy — in some districts tertiary activities account for a major share of the domestic product. In Papum Pare and Tawang, the tertiary sector yields more than half of the domestic product. In Papum Pare, the tertiary sector's share of domestic product is 53.67 per cent, and, in Tawang it is 52.74 per cent. There are six districts where this sector contributes between 30 to 40 per cent of the domestic product. In Upper Siang, the tertiary sector accounts for 23.23 per cent of the domestic product. The large contribution of the services sector in few districts comes largely from public administration. In Papum Pare, public administration accounts for 30.85 per cent of the domestic product. In a few districts, public administration contributes less than 10 per cent to the domestic product.

Structural transformation of the district economies

The period of analysis of district income is only eight years, from 1993-94 to 2000-01. This eight-year period is too short to study the changes in the structure of the domestic product. Like the State economy or the national economy, the economies of different districts of Arunachal Pradesh have undergone some transformation, though the magnitude of transformation in the eight-year period is comparatively limited. What is unusual is the fall in the share of the secondary sector along with the decline of the primary sector in most of the districts.

As is evident in Table A 4.7 (in the Appendix), in all the districts, without exception, the relative importance of the tertiary sector increased during the 1993-94–2000-01 period. The primary sector's share fell in all districts, except in Upper Siang, where it rose by 1.43 percentage points. Tawang experienced the highest decline in the primary sector's share (–3.26 percentage points per annum) closely followed by West Kameng (–3.20 percentage points per annum). The fall in the share of the primary sector in Tawang was not matched by a rise in the share of manufacturing industries. It was the rise in the share of the tertiary sector, which compensated for the decline in the share of the primary sector. Tawang's case is not an exception, it is a pattern found

in 10 out of the 13 districts: the fall in the primary sector's share of the District Domestic Product being compensated not by the rise in the share of the secondary sector but by that of the tertiary sector. In the tertiary sector, public administration's relative importance increased in all the districts. The relative share of public administration in the district domestic product rose by 1.64 per cent, the highest increase in Papum Pare, not surprisingly, and the lowest increase, in Lohit (0.04 per cent).

The share of agriculture declined in all but two districts of the State – Upper Subansiri and Upper Siang. In Upper Siang, agriculture's share increased by 2.18 per cent points per annum and, in Upper Subansiri, the share of agriculture increased at the rate of 0.17 per cent points per annum. In Arunachal Pradesh, as a whole, the share of agriculture fell marginally by 0.25 per cent points per annum. The share of forestry and logging fell in all districts, the highest fall was in Tirap (2.44 per cent points per annum). The fall in the share of forestry and logging in the composition of domestic product was also pronounced in West Kameng, which experienced a fall of 2.36 per cent points. In the State as a whole, the share of forestry and logging in SDP fell by 1.53 percentage points per annum during 1993-94 to 2000-01. The district economies, like the State economy, seem to have passed from a situation where the primary sector was predominant to one where the tertiary sector has expanded rapidly, without passing through a growth phase in the manufacturing sector, a rather uncommon phenomenon.

Sectoral contributions to the growth of DDP/sectoral growth rates

This analysis relates to a period when Arunachal Pradesh witnessed a rather lopsided growth. The sectoral share of agriculture, which provides sustenance to the majority of people in the State, declined in a number of districts. The share of forestry and logging, an important activity which contributes close to 10 per cent of the State's Net Domestic Product, also declined in all the districts during 1993-94 to 2000-01. In some districts, the decline in forestry and logging was very sharp: in East Kameng, the decline was 71.82 per cent, the highest in the State, followed by Tirap (30.05 per cent), and Tawang (26.25 per cent). The lowest decline was recorded in Upper Siang (6.70 per cent). The decline in forestry and logging in some districts led to a negative growth rate in the primary sector. In nine districts out of 13, the growth rate of the primary sector was negative; the smallest decline, 0.16 per cent, was in Dibang Valley, and the highest decline, over the period, was 7.54 per cent, in Tirap. (See Table A 4.9 in the Appendix for details.) The secondary sector also performed indifferently in a number of districts, often recording even negative growth. In a few districts, the secondary sector performed well: in West Kameng, the secondary sector grew at 4.82 per cent and, in Tawang, at 4.34 per cent over the period.

In some districts, the decline in forestry and logging was very sharp: in East Kameng, the decline was 71.82 per cent, the highest in the State, followed by Tirap (30.05 per cent), and Tawang (26.25 per cent). The lowest decline was recorded in Upper Siang (6.70 per cent).

The performance of the tertiary sector not only surpassed all other sectors but, also led to the overall growth of the domestic product in all the districts. The growth of the tertiary sector varied from 8.56 per cent per annum in Changlang to 10.09 per cent in Tawang. The growth of public administration, an important sub-sector of the tertiary sector, was also high.

The negative growth of forestry and logging and the limited growth in the agriculture sector meant that it was the growth of the tertiary sector that led to the positive growth of the domestic product in all the districts.

Box 4.3

Specific features of the New Agricultural Policy of Arunachal, 2001

Addressing problems related to shifting cultivation

Special emphasis to be given to shifting cultivation, ensuring better land management, introducing improved cultivation in slope land through agro-forestry, horticulture, and encouraging other household activities. The programme is to be designed in such a way that there will be simultaneous thrust on weaning the *jhum* farmers towards better modes of cultivation.

Location-specific strategy for development

Efforts will be made to formulate an area-specific, differentiated strategy taking into account the agronomic, climatic, socio-economic practices as well as the resource-worthiness of the farmer. Special emphasis will be made for introducing newly developed HYV seeds, improved planting material, adoption of new technology and mechanised farming.

Convergence of allied activities

There would be a shift from the commodity approach to a systems approach in agriculture. All land-based activities like that of agriculture, sericulture, livestock, fish-rearing, etc., would be given a new dimension and synergetic functional assignment. The policy will aim at avoiding duplication of programmes/works by different functionaries, as far as possible. Towards that end, there will be regular monitoring and evaluation of all schemes implemented by the Agriculture and allied departments through an appropriate mechanism.

Technology transfer

Importance will be accorded to identify new location-specific and economically viable improved species of agriculture, sericulture, livestock, and fish-rearing. The entire extension system will be revitalised. Innovative and decentralised institutional changes will be introduced to make the extension

system responsible and accountable. The development of human resources through capacity-building and skill upgradation of extension functionaries is to receive due attention.

Supply of inputs
Adequate and timely supply of inputs such as seed, fertiliser, pesticides, agri-tools and implements, credit at reasonable rate to farmers will be provided by the Government and other institutions subject to availability of resources and funds. Greater emphasis will be given to increase the consumption of such inputs for achieving the targeted increase per unit of area. As far as possible, use of organic manure/compost will be encouraged to avoid ill-effects of inorganic fertilisers.

Facilitate private investment in agriculture
Efforts would be made to create conditions that encourage participation of private enterprises in the establishment of agro-based industries. An incentive package and guidelines would be finalised ensuring participation of the private sector and financial institutions in the agricultural sector as a whole. NABARD will have to play a major role in channelising investment.

People's participation
The new policy would encourage formation of Self-Help Groups and village committees, at different levels. The village committee would be vested with the task of maintaining and managing the assets created so far like irrigation channels, terraces, market sheds, etc

Research and technology package
Location-specific agricultural research, based on identified agro-climatic zones, will be accorded foremost importance. Development of need-based technology package for achieving higher productivity would constitute the thrust area of the new policy. Efforts will be made to build a well-organised, efficient and result-oriented agricultural research and education system for introducing technological changes in the agricultural sector.

Marketing infrastructure
Emphasis will be laid on development of marketing infrastructure and techniques of preservation, storage and transportation, with a view to reducing the post-harvest losses and ensuring a better return to the grower. Upgradation and dissemination of market intelligence will receive particular attention. Efforts will be made to strengthen the market infrastructure.

Agro-processing
Setting up of agro-processing units in production areas will be given priority. To reduce post-harvest wastage, an effort would be made to add value, especially to agricultural and horticultural produce, by setting up small processing units. The Small Farmers Agricultural Business Consortium (SFAC) will be activated to cater to the needs of farmer entrepreneurs. Tea plantations will be brought under the agriculture sector, but, for processing, it may be under the industries sector.

Price support
Market intervention scheme, involving procurement through a notified agency, will be implemented for selected agricultural/horticultural crops, so that the farmers are assured remunerative prices.

Use of Information Technology (IT)
The database for the agricultural sector will be strengthened to ensure greater reliability of estimates and forecasting, which will help in the process of planning and policy-making.

Flood and drought management
It will be the endeavour of the Government to device a mechanism through which the floods and droughts, affecting agricultural production, are tackled. The provisions of the National Crop Insurance Scheme will be reviewed, facilitating its introduction in the State. In the foothill areas, water-pumping systems will be provided to exploit the groundwater.

Further, contingency agriculture planning would be encouraged along with the use of drought and flood-resistant crop varieties in the affected areas.

Source: Excerpted from the New Agricultural Policy, Government of Arunachal Pradesh, http://arunachalpradesh.nic.in.

G. The way forward

Given the resource-rich character of Arunachal Pradesh, there was considerable optimism in the early years of planning. In the 1970s, industrial activity started with the key role being played directly by the Government. The 1980s saw the setting up of a number of industries in the State, ranging from sawmills to papermills, but, many of these soon started to incur losses. By the mid-1990s, many of the State-run industries faced closure as the losses piled up. Following the Supreme Court's restriction on the felling of trees in 1996, many plywood factories and sawmills in the State also closed. If the 1980s was the decade of industrialisation for Arunachal, then, the 1990s was the decade of deindustrialisation. The performance on the manufacturing front has been rather disappointing.

Since agriculture continues to be a significant contributor to the State's income, increasing productivity in agriculture by using modern cultivation techniques, double cropping, and increased irrigation is a priority.

This de-industrialisation has meant a slowing down of the growth of the State domestic product. By the middle of the 1990s, the cumulative effect of de-industrialisation resulted in a virtual stagnation of the per capita State Domestic Product. Given the importance of manufacturing industries in economic growth and the somewhat uninspiring experience of the State with Government-managed medium-scale industries, it is imperative that a growth-oriented policy, which encourages private initiative and enterprise, be adopted.

The challenge is to ensure that the industrial development in this fragile hill State is sustainable, non-polluting and environmentally sound. It is important that the industries that are best-suited to the State, its resources, and its people are encouraged. While these should be largely in the private sector, the Government will need to play an active role both as a facilitator and as a regulator.

Since agriculture continues to be a significant contributor to the State's income, increasing productivity in agriculture by using modern cultivation techniques, double cropping, and increased irrigation is a priority. Being a late starter due to historical circumstances, Arunachal has the advantage of learning from the experience of the rest of the country. The Government of Arunachal has announced a New Agricultural Policy, which accords top priority to increasing the income of farmers. This is necessary in view of the topographic disadvantages and communication bottlenecks that hinder other income-generating activities. The Policy, therefore, emphasises on all income-generating activities like cash crops, floriculture, fruit culture, fish and pig-rearing, and agro-processing (For details of the New Agricultural Policy of Arunachal, see Box 4.3). Arunachal has the choice to adopt HYV technology or to go in for organic farming to cater to the high-end and high-value niche markets. The role of the Government in the promotion of this strategy is critical. The Government must facilitate the change from the largely subsistence mode of production to the market mode by providing finance, negotiating 'contract agreements' and buy-backs by corporate houses that require agricultural produce. In addition, the private sector should be persuaded to set up agricultural processing plants in Arunachal. Cold storage facilities, transportation, and marketing assistance are the other areas that require attention for the development of this sector.

- After agriculture, the three most promising sectors where Arunachal has enormous potential are: horticulture-floriculture, plantation, and tourism. As mentioned, a majority of farmers practise slash-and-burn cultivation, which is now gradually being replaced by permanent cultivation. The Government has taken measures for terracing of hillsides for permanent cultivation and the replacement of *jhum* fields by horticulture, and the plantation of commercial trees and crops. In spite of these measures, *jhum* continues because sufficient forward and backward linkages of new agricultural and horticultural practices have not been put into place and farmers lack the necessary incentives. There are no cold storage facilities to prevent distress sales. In many areas, commercial production or production for profit is new to many farmers, and so are markets operating on cash-based transactions. The successful operation of a commercial farm requires a person to be equipped with risk-coping mechanisms. The risk factors are many: climate, price, crop or plant diseases, and calamities. In order to reduce the risk, it is necessary that the Government should provide insurance cover to the farmers, so that they can undertake ventures with high returns. Useful technological interventions like biotechnology are also desirable for certain cash crops like ginger.

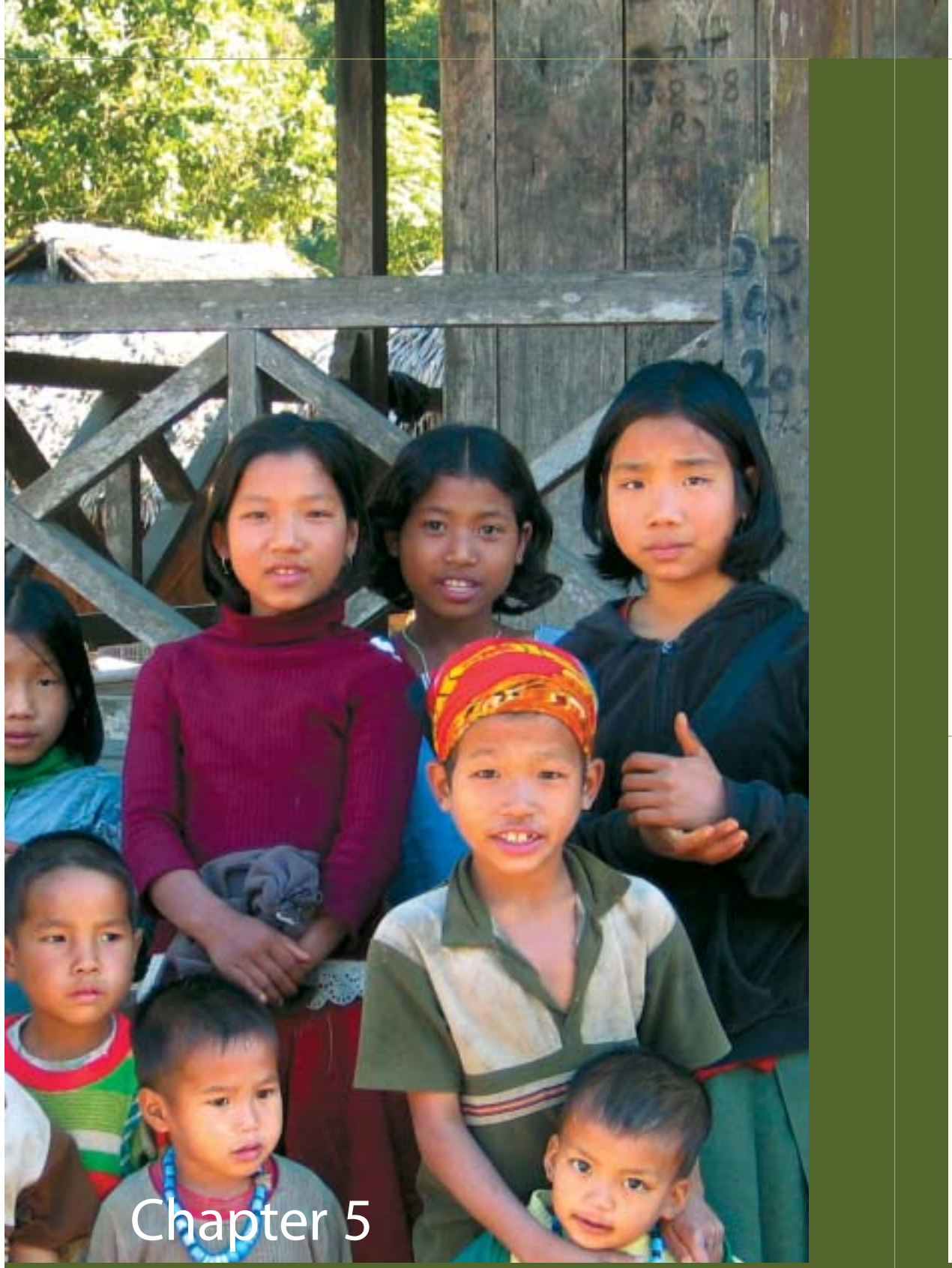
- Local entrepreneurs should be encouraged to establish fruit and flower-processing industries. Fruits and flori-products have good national and international markets. The success of Kiwi and Apple plantations in Kameng affirms the high potential of horticulture. The setting up of local processing facilities for fruits, flowers, and plantation crops can provide employment opportunities for the people and lead to an increase in income.

- Arunachal with its beautiful valleys, verdant forests, spectacular rivers, and fascinating people has immense potential for tourism. However, tourism requires that the infrastructure should be adequately developed. While communication links to most of the districts are reasonably good, there are few places to stay (apart from Government guest houses and Inspection Bungalows) and the Department of Tourism needs to draw up a phased plan to develop areas selectively and promote certain destinations by providing accommodation and other facilities. The destinations will have to be developed in consonance with the local communities. It may be possible to provide a unique experience to tourists by building low-cost infrastructure in the villages adjoining district headquarters, by using local materials and local design inputs. This will create employment opportunities for the local people. The involvement of private consultants to develop this sector in a manner that is not intrusive or damaging, is an alternative that can be considered.

- Value-addition to different forest products will encourage the process of industrialisation. At present, forest produce is sold to other States without value-addition. In view of the hilly terrain, low level of local demand, and high transport cost, setting up of large-scale industries does not appear to be feasible, at least for the time being. An important role can be played by small-scale industries in areas like forest-based products: furniture, medicinal plants, extraction of citronella oil, and the like. Financial support to local entrepreneurs is essential for setting up these industries.

Bank finance is a problem in the State, in view of the prevailing institution of property rights in which the right to tribal land is inalienable.

- Bank finance is a problem in the State, in view of the prevailing institution of property rights, in which the right to tribal land is inalienable. Due to this, the banks cannot take over mortgaged land in case of default of a loan. There is also the issue of land records. The ownership of land (mainly cultivable land) is not recorded, there is no title deed to the land, and this restricts the mortgaging of land for bank loans. However, finance is a necessary pre-requisite for the development process and this finance needs to come from the Government and the banking system, so that local enterprise can be encouraged. The banks need to devise special schemes which are suitable for the region, keeping in mind the specificities that prevail. They need to adopt a flexible approach rather than insist on meeting conditions, which require changes in the customary community property rights. The conduct of a cadastral survey is a time-consuming process in the hilly terrain, and, for the moment, the Government has decided to issue land possession certificates in order to facilitate bank finance. The other area, which requires attention, is the development of the financial market. This requires the strengthening of contract-enforcing mechanisms, which are quite weak in Arunachal Pradesh.



Chapter 5

Human development in Arunachal

The idea of human development

In traditional development theory and its policy prescriptions, central importance is assigned to the production of goods and services. It is the growing capacity of a country to produce an increasing variety of goods and services that is taken to be the propulsive force behind the entire process of development. The growing capacity takes into account a whole range of factors from technology to social mobility, which are associated with development (Kuznets, 1966). In the commodity-centric paradigm of development, both education and health appear as components of human capital. The expenditure on these fronts is considered an investment, which tends to raise the stock of human capital (Schultz, 1961). In stressing the instrumental role of education and health, traditional development theory seems to forget their intrinsic value.

The human development model enacts a radical shift of focus from the basket of commodities and services approach to human beings and their choice sets, their freedoms, and especially their action spaces in shaping their capabilities and well-being. Health and education are seen mainly in the light of their intrinsic values – a healthy life is wanted for its own sake (UNDP, 1990). Good health status has its instrumental value but, this instrumental aspect of health is not considered only with reference to its role in the creation of economic value; its role in the creation of socio-cultural value is also emphasised. Similarly, the intrinsic value of education is stressed, but, its instrumental role is not neglected. The Human Development Index (HDI), which incorporates three variables — health, education, and income — measures human development.

The HDI is used to track the status of human development in Arunachal Pradesh. In the absence of trend data, it is not possible to trace a time-path of human development for the State or its districts[39] but, an attempt has been made to calculate the HDI for Arunachal for the year 2001.

The human development model enacts a radical shift of focus from the basket of commodities and services approach to human beings and their choice sets, their freedoms, and especially their action spaces in shaping their capabilities and well-being.

[39] *The method of construction of the HDI and the problems of data are discussed in the Technical Notes.*

A. Human development in Arunachal Pradesh and its districts

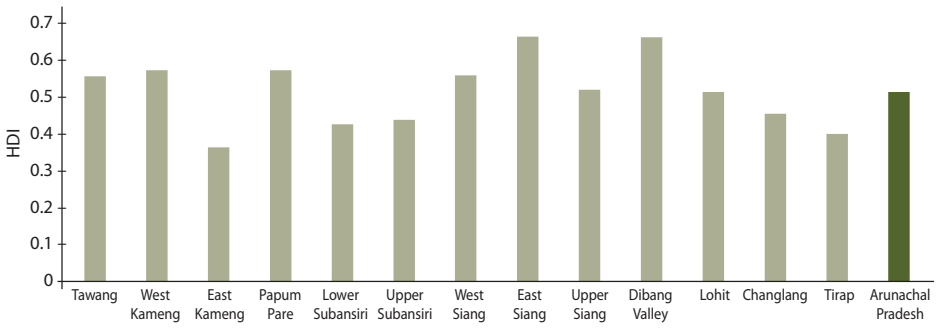
The Human Development Index for Arunachal for the year 2001 is estimated to be 0.515[40]. Of the three indices, which make up the HDI, the value of the education index is 0.566, the health index has a value of 0.484, and the income index has a value of 0.495.

The districts of Arunachal Pradesh show considerable variation in the levels of human development[41]. East Siang has the first rank with an HDI of 0.660. Dibang Valley is next with an HDI value of 0.659. Papum Pare, the district in which the State capital is located, is in third place together with West Kameng. East Siang owes its first position to its good health status, it is one of two districts – the other being Papum Pare – with Life Expectancy at Birth above 60 years. In both income and education, East Siang stands in the third place but, its relatively high health index pushes its HDI up to the first place.

Papum Pare and West Kameng are followed by West Siang in fifth place. West Siang's relative strength is in education and relative weakness is in income. In education, its rank is second and this offsets its low rank in income and health (it ranks seventh in income and fifth in life expectancy). Lower Subansiri district has the lowest income index (0.191) but, is ranked at number 11 in the HDI rankings. Its education index value helps it to better its HDI ranking. East Kameng and Tirap also have low income indices and are ranked at number 13 and 12 respectively, in the HDI. Few districts show consistent performance across indicators, these are East Siang, Upper Siang and, perhaps, West Kameng. Others have a rather varied record, a district like Papum Pare, for example, has the first place in both the education and the health index, but, is ranked in the ninth place in the income index, which pulls its overall HDI rank to third place. Tawang is ranked at number 12 and 11 in education and health respectively, but, its relatively high income index gives it a rank of 6 in the HDI.

While the value of the HDI for Arunachal is 0.515, a comparative analysis across States is problematic because it does not take into consideration the contextual factors, nor does it capture the specific historical circumstances that shape the process of human development in the State. It is, therefore, pertinent to look at the contextual factors, so that the process of human development in Arunachal can be placed in its proper perspective.

Figure 5.1: HDI of Arunachal Pradesh and its districts, 2001



[40] The XII Finance Commission categorised 28 States in five categories — high, high middle, middle, lower middle, and low — on the basis of their HDI values for the year 2001, and Arunachal Pradesh was categorised as a State with a middle HDI value.

[41] The HDI has been constructed for the 13 districts, which were in existence before 28th June, 2000. Three new districts, Kurung Kumey, Lower Dibang Valley, and Anjaw came into being subsequently. Kurung Kumey district was created on 28th June, 2000, by bifurcating Lower Subansiri district. In December 2001, Lower Dibang Valley was created; it was earlier a part of Dibang Valley district. The youngest district in the State is Anjaw, created on 4th December, 2003, by sub-dividing Lohit district. Data on income and other variables is not available for these newly-created districts, and, therefore, the HDI is restricted to 13 districts only. Refer to technical note for details of methodology.

Box 5.1

Averages: do they hide more than they reveal?

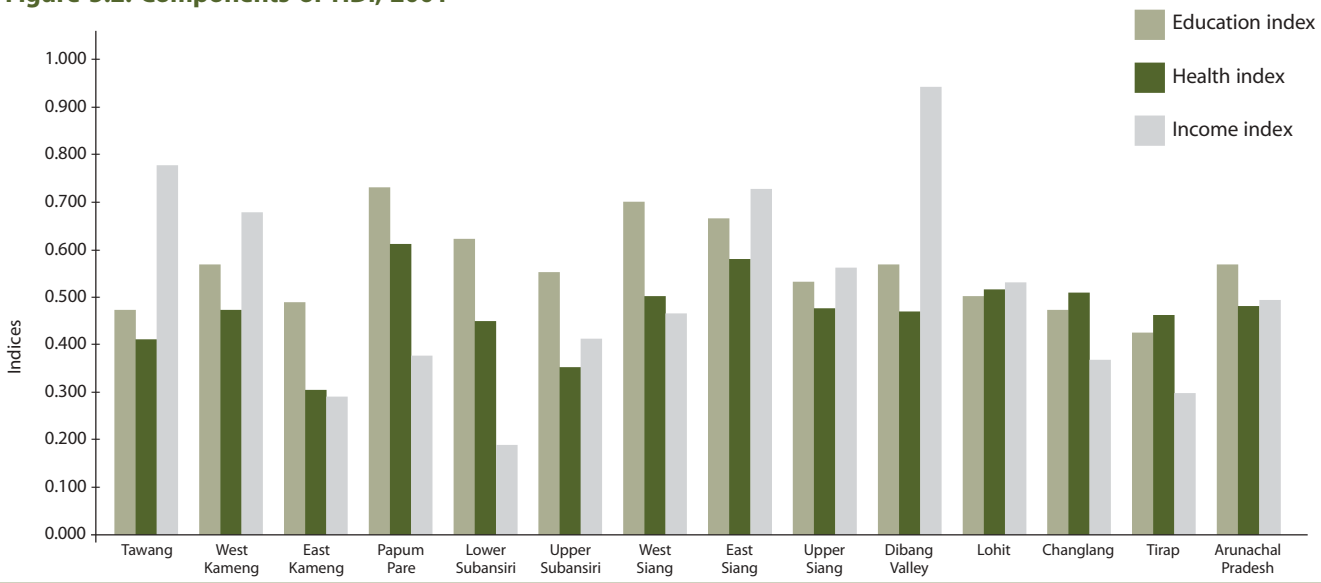
The Human Development Index (HDI), the Human Poverty Index (HPI) and other indices have been constructed to measure the performance of different districts of the State, the units of our analysis. The districts are ranked on the basis of these indices, which are averages. A district may have a high HDI and a low HPI thus giving an impression of high development. But, district-level indices hide the inequalities within the district. A district with a low HPI may contain some pockets with severe deprivations that need immediate attention. Policy actions based on these indices — which are averages — may not be adequate or what is required. If indices are constructed on circle level data, this problem can be addressed to a certain extent, but, even this may not be good enough. 'Average values' based on quantitative information cannot capture the qualitative aspects of many development-related problems.

Table 5.1

The HDI and its components for Arunachal and its districts, 2001

Districts/State	Education Index	Education Index Rank	Health Index	Health Index Rank	Income Index	Income Index Rank	HDI Value	HDI Rank
Tawang	0.472	12	0.413	11	0.780	2	0.555	6
West Kameng	0.566	6	0.473	7	0.680	4	0.573	3
East Kameng	0.489	10	0.306	13	0.291	12	0.362	13
Papum Pare	0.729	1	0.613	1	0.376	9	0.573	3
Lower Subansiri	0.626	4	0.457	10	0.191	13	0.425	11
Upper Subansiri	0.552	7	0.356	12	0.408	8	0.438	10
West Siang	0.701	2	0.506	5	0.467	7	0.558	5
East Siang	0.666	3	0.585	2	0.729	3	0.660	1
Upper Siang	0.532	8	0.484	6	0.557	5	0.524	7
Dibang Valley	0.572	5	0.465	8	0.942	1	0.659	2
Lohit	0.503	9	0.522	3	0.530	6	0.518	8
Changlang	0.473	11	0.512	4	0.371	10	0.452	9
Tirap	0.428	13	0.461	9	0.301	11	0.397	12
Arunachal Pradesh	**0.566**		**0.484**		**0.495**		**0.515**	

Figure 5.2: Components of HDI, 2001



B. Human development – the challenge ahead

Given the relatively low levels of different indicators of human development in Arunachal Pradesh, finance is likely to be a crucial issue. The Government has been the catalyst for the development process in Arunachal and continues to be the prime mover even today. The Government of Arunachal Pradesh spends a substantial part of its resources on the development of health and education infrastructure, as is evident from the Government expenditure ratio, an indicator defined as the sum of Government expenditure on human priority areas — education, health, water, and nutrition — divided by the national income. While this ratio is defined for a country, the ratio can provide some insight into the pattern of development in a State as well. The data in Table A 5.3 in the Appendix on the public expenditure pattern in Arunachal Pradesh shows that public expenditure on social priority sectors is high in Arunachal. Of the total social sector expenditure, the expenditure on health, education, water and nutrition, was on average, as much as 75.94 per cent during the 1993-94 to 2001-02 period.

The ratio itself (expenditure on the social sectors as a percentage of State Domestic Product) varied from a minimum of 11.53 per cent in 1999-2000 to a maximum of 19.89 per cent in 1996-97 and, on average, during 1993-2002, it was at 17.00 per cent of the State's Net Domestic Product. UNDP suggests that this ratio should be at least 5 per cent. The ratio in Arunachal is much higher.

All the States of North-East India, especially the hill States, spend liberally on the social sectors. During 1998-99, Arunachal Pradesh spent 8.28 per cent of its Gross State Domestic Product (GSDP) on education, and 3.65 per cent on health (NHDR, 2001). In the country, the highest spender on the social sectors was Sikkim; in 1998-99 its expenditure on education and health was as much as 12.55 per cent and 4.92 per cent of its GSDP, respectively. The smallest spender in the country on these sectors was Maharashtra, where the expenditure on education and health constituted only 2.21 and 0.61 per cent of its GSDP respectively, in 1998-99.

Of the total social sector expenditure, over the 1989-2002 period, education had the largest share at 42.01 per cent, (average for the period) followed by water (17.21 per cent) and health (16.51 per cent). Nutrition accounted for only 0.53 per cent of the expenditure. In nutrition, Government expenditure has been low, but in education, health, and water, it is high. This is reflected in the dramatic improvements in the literacy rate and the school participation rates in the last three decades. The lack of a complementary role for the private sector has meant that the entire responsibility is that of the Government alone. In recent years, private sector participation in education and health is increasing. In the coming years, the role of the private sector in these sectors is expected to increase further. However, on grounds of equity, the Government's role in the social sectors continues to be critical, but is constrained by the limited resources at its disposal. A high growth of the State income is the only way that the Government's expenditure in these areas can continue. The modernisation of agriculture, along with the expansion of horticulture, floriculture, tourism, and development of hydel power, holds the key to a sustained growth of income, a pre-condition for human development in the State.

C. Caveats

Access to markets is crucial to the development process and to the issue of livelihoods and incomes. Equity in the distribution of incomes and resources, between genders and regions, between the present and the future, are issues that are discussed in the following chapters.

This State Human Development Report deals with the central issues of human development – the areas fundamental to human development: health, education, and income. The preceding chapters have dealt with these sectors and the special circumstances and concerns for the State. In the chapters that follow, the Report discusses gender inequities in the development process, inequalities and deprivations, the critical role of infrastructure development and issues of biodiversity, conservation, and development. The State has only recently embarked on the path to development. Being a late starter may mean that it is lagging behind other States, but, this has its own advantages. Arunachal can learn from the experience of other States and chalk out a path that is appropriate to its unique natural endowments and character, and is acceptable to its people.

There are some contextual factors in Arunachal Pradesh which restrict the use of standard methodology in the estimation of a number of variables, such as income, consumption, and poverty.

- The problem of estimation of income and consumption is ubiquitous; but, the magnitude of this problem is relatively high in an economy where production is meant mainly for home consumption and the level of monetisation is low. In rural Arunachal Pradesh, the *jhum* cultivators — who outnumber the sedentary cultivators — depend, to a significant extent, on the Common Pool Resources (CPRs) for their sustenance. Various edibles, fuels, and house-building materials gathered from CPRs are not marketed and their valuation is a problem in the estimation of income. Imputed values have been added in the estimation of income and consumption. The imputation of value involves some subjectivity[42].

- The measurement of literacy is a problem in Arunachal Pradesh where the medium of instruction is English from nursery school to the university level. No local language is taught even at the elementary level. This makes initial schooling more of a language-learning exercise than a knowledge-gathering activity. The medium of learning receives primacy over content and, when a student drops out after one or two years of schooling, her skill in an alien medium

The problem of estimation of income and consumption is ubiquitous; but, the magnitude of this problem is relatively high in an economy where production is meant mainly for home consumption and the level of monetisation is low.

[42] *Refer to Technical Notes for details.*

remains low and her ability in the core subjects, such as numeracy, does not develop. As a result, the school dropout soon falls into the category of functional illiteracy. In spite of this, she tends to claim literacy by virtue of having been schooled. In a Census or a sample survey, testing of reading and writing skills is practically impossible and this results in the literacy rate being over-reported. In education, the official data on the combined gross enrolment in few districts show extremely erratic behaviour. However, in the absence of any other data, the official enrolment data published by the Directorate of Economics and Statistics, Government of Arunachal Pradesh, has been used.

In the estimation of the Human Poverty Index, the availability of safe sources of drinking water is an important indicator. In Arunachal Pradesh, as high as 78.6 per cent of people are reported to be using safe sources of drinking water, but, the quality of drinking water is suspect.

- In the estimation of the Human Poverty Index, the availability of safe sources of drinking water is an important indicator. In Arunachal Pradesh, as high as 78.6 per cent of people are reported to be using safe sources of drinking water, but, the quality of drinking water is suspect. The water supplied by pipes in the rural areas is not treated; the piped water supplied is untreated spring or stream water. This is often the case not only in the rural areas but, also in many towns where untreated water is supplied through pipes. In our definition, which closely follows UNDP's, piped water is considered to be safe drinking water, and this tends to underestimate the measure of human poverty.

- The behaviour of certain variables in Arunachal Pradesh is difficult to explain. The child sex ratio is an example. The Census data shows that the sex ratio of the tribal population declined in Arunachal Pradesh, during the 1961-1991 period. This decline may be explained in terms of the gender gaps in education and income: women are less literate and have less command over resources than men. These two factors, along with a number of other factors, tend to make males healthier than females, which may lead to a fall in the sex ratio. However, the low child sex ratio in the tribal population cannot be explained by these factors[43].

[43] The only plausible explanation is discrimination against the girl child, resulting in sex-selective foeticides. However, there are no reports that indicate such a practice. There is the possibility of the' son preference' being carried to tribal societies as they become more urbanised and exposed to mainstream value systems, but, this cannot explain the adverse child sex ratio, per se.

Chapter 6

Women: less than equal

Gender

and human development

A perspective that aims at the enlargement of human capabilities as one of its core concerns cannot remain oblivious to the striking disparities between males and females in many spheres of life. The transformative and emancipative potential of any discourse of social change remains severely limited unless the centrality of the gender question is explicitly recognised and incorporated into ideas and policies.

There is a need to understand the degree and nature of disparities that exist between the genders, as well as the conditions in which such disparities are created, sustained, and defended. UNDP's Human Development Reports since 1995 have clearly demonstrated that nowhere in the world do women enjoy opportunities equal to men, although in some spheres and in many countries significant progress has been made towards gender equality. The four critical elements of the human development idea — productivity, equity, sustainability, and empowerment — demand that gender issues should be addressed as development issues and as human rights concerns.

This chapter seeks to assess the gender disparity in Arunachal Pradesh, by first constructing the Gender-related Development Index (GDI), then evaluating the access and reach of women in health and education, using standard indicators like life expectancy, sex ratio, Infant Mortality Rate (IMR), literacy rate, and the work participation rate. A separate section discusses the issue of women in decision-making. Governance and crime against women are discussed in the following section. The chapter concludes with some actionable suggestions.

A. Gender-related Development Index

The Gender-related Development Index (GDI) is the HDI, adjusted for gender inequality. The global Human Development Report uses the same three indicators — Life Expectancy at Birth, adult literacy rate and Gross Enrolment Ratio and the real GDP per capita in terms of purchasing power parity in dollars - used in the construction of the HDI, but, focuses on the inequality between the sexes. Although many important dimensions of gender inequality such as intra-family distribution of resources, security and dignity of individuals, are not captured by the GDI, yet, it is widely used as a measure of relative deprivation between men and women.

The transformative and emancipative potential of any discourse of social change remains severely limited unless the centrality of the gender question is explicitly recognised and incorporated into ideas and policies.

The GDI for Arunachal Pradesh is estimated to be 0.529. The GDI ranking of the districts follows a similar ranking pattern as the HDI, suggesting that districts that have relatively better HDI indicators are also doing better in GDI, and the districts with relatively lower HDI values have higher gender inequity. East Siang is ranked first and East Kameng is ranked at the bottom of both the HDI and the GDI rankings. In fact, the GDI ranks are only marginally different for most districts. Districts with relatively high GDI ranks include East Siang, Dibang Valley, and Papum Pare[44], while East Kameng, West Kameng, and Tirap have the three lowest ranks. Lower Subansiri, West Siang, Upper Siang, and Lohit all have higher GDI ranks than HDI ranks, indicating better gender equity. West Kameng alone has a substantially lower GDI rank than its HDI rank.

Table 6.1

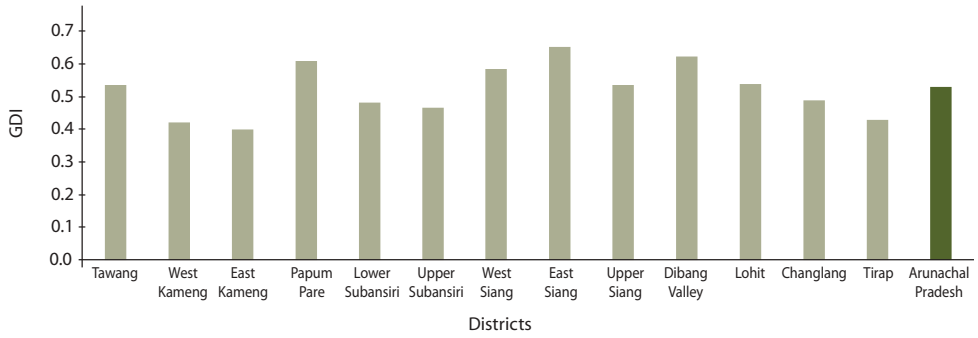
HDI and GDI ranks for districts of Arunachal Pradesh, 2001

Districts	GDI		HDI	
	Value	Rank	HDI Value	Rank
Tawang	0.538	6	0.555	6
West Kameng	0.424	12	0.573	3
East Kameng	0.400	13	0.362	13
Papum Pare	0.611	3	0.573	3
Lower Subansiri	0.483	9	0.425	11
Upper Subansiri	0.471	10	0.438	10
West Siang	0.585	4	0.558	5
East Siang	0.654	1	0.660	1
Upper Siang	0.539	5	0.524	7
Dibang Valley	0.627	2	0.659	2
Lohit	0.538	6	0.518	8
Changlang	0.490	8	0.452	9
Tirap	0.432	11	0.397	12
Arunachal Pradesh	**0.529**		**0.515**	

Well-being and survival

The right to lead a long, healthy and productive life is fundamental to the idea of human development. The capacity to lead a meaningful life includes, among other things, access to a set of entitlements that ensures survival and a certain basic minimum quality of life for individuals. Gender differences in basic access reflect deep-rooted biases in social structures and belief systems. Greater gender justice in the distribution of food, healthcare and other resources helps in ensuring the survival and health of women. Women's work, autonomy in making reproductive choices, and their relative status in the family and community, also has a bearing on their survival and well-being.

Figure 6.1: GDI, Arunachal and its districts, 2001



[44] The districts of Arunachal Pradesh have been reorganised in the recent past. In order to maintain consistency, inter-district variations have been analysed with reference to 13 districts, unless otherwise specified. Dibang Valley here refers to (Old) Dibang Valley, before its bifurcation into Dibang Valley (New), and Lower Dibang Valley. Lower Subansiri refers to the undivided Lower Subansiri, prior to the creation of Kurung Kumey district. Refer to technical note for details of methodology.

Life Expectancy at Birth for women

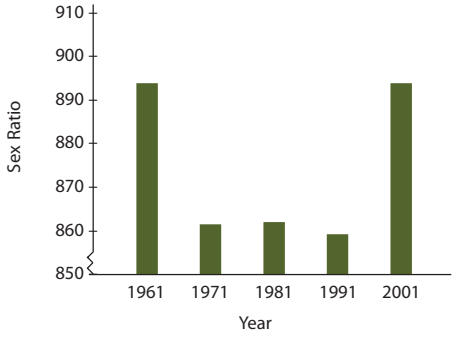
Life Expectancy at Birth (LEB) for women in Arunachal Pradesh is estimated to be 54.51 years, which is marginally higher than the male life expectancy in the State, 53.66 years. At the district level, in four out of the 13 districts, life expectancy for men is estimated to be higher than that for women. While women in Papum Pare, the most urbanised district, have the highest Life Expectancy at Birth, women in East Kameng have the lowest life expectancy[45]. Life Expectancy at Birth for women in the State is not only lower than the current national average of 64.84, but also lower than the country's average in 1981-85.

Sex ratio

The sex ratio (defined as the number of females per 1,000 males) is another indicator of the health, nutrition, and survival status of women. A low gender ratio typically represents a lower social status of women, which creates conditions for discrimination at various levels. Dreze and Sen (1995) maintain that this ratio also captures the extent of intra-household gender inequalities. Although the sharp decline in the sex ratio in India is a cause for concern, at a disaggregated level there are significant regional variations. Regions having higher percentage of Scheduled Tribe populations are typically found to have a higher sex ratio, reflecting a lower degree of gender discrimination (Rustagi, 2000).

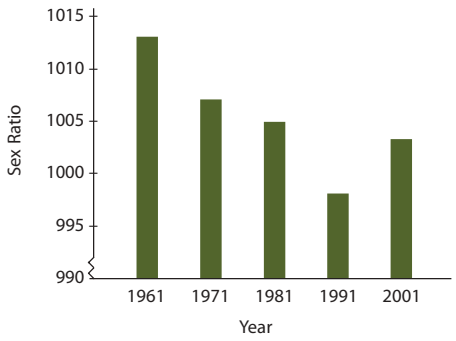
The sex ratio in Arunachal declined from 862 women per 1,000 men in 1981, to 859 women per 1,000 men, in 1991. More recently, however, it has increased to 893 in the 2001 Census. Among the districts, West Kameng has the lowest and East Kameng and Lower Subansiri have the highest sex ratio. The overall sex ratio in Arunachal is skewed due to in-migration. In order to isolate the effects of migration, we consider the sex ratio among the Scheduled Tribe (ST) population, which consists largely of the indigenous population. The ratio shows a steady decline in the 1961 to 1991 period, (from 1013 to 998) although it registered an increase in the last decade and has gone up to 1003 (per 1,000 males) in 2001 (Figure 6.3).

Figure 6.2: Sex ratio in Arunachal Pradesh, 1961-2001



The sex ratio in Arunachal declined from 862 women per 1,000 men in 1981, to 859 women per 1,000 men, in 1991. More recently, however, it has increased to 893 in the 2001 Census.

Figure 6.3: Sex ratio for the Scheduled Tribes in Arunachal Pradesh, 1961-2001



[45] When the newly-created districts of Kurung Kumey, Lower Dibang Valley, and Dibang Valley (New) are taken into consideration, among the 15 districts, six have male life expectancies higher than the female life expectancy. Papum Pare continues to be the district with the highest life expectancy for females, while the lowest female life expectancy is in Kurung Kumey district. Dibang Valley (New) and East Kameng have only marginally higher female life expectancy than Kurung Kumey.

Sex ratio among children

The Child Sex Ratio (CSR), which is less likely to be affected by in-migration, registered a sharp decline from 982 in 1991 to 964 in 2001. Another disturbing feature of this decline is that it is more pronounced in the rural areas, in urban areas the ratio has been increasing in the last decade (See Table A 6.4 in the Appendix). It is important to note that the CSR in the State declined by 18 during 1991-2001, the same as the fall at the all-India level. Among the States of North East India, Sikkim, Tripura and Mizoram registered an increase in CSR during the same period, while the decline in the other States of the region has been less severe than that in Arunachal Pradesh. In 1991, the CSR among the ST population was 976, which was lower than that of all social groups. At a disaggregated level, of the 13 districts, only three — Papum Pare, Lower Subansiri and Upper Siang — show an increase in CSR, the other districts recorded a decline during the last decade.

Infant and child mortality

Infant and child mortality rates are among the most widely used indicators of health status. Although female Infant Mortality Rate (IMR) was estimated to be 76 (per 1,000 live births) for the State as a whole, considerable inter-district variation in the IMR exists. Among the 13 districts, East Kameng has the highest Infant Mortality Rate for females, while East Siang has the lowest.[46]

Universally, the inherent biological vulnerability of the male infant in a gender-neutral environment makes the male IMR higher than the female IMR. The male disadvantage disappears in the subsequent four years, and the gender gap in mortality becomes marginal. However, the gender bias in childcare often results in excess female mortality in the 1-4 age group, particularly in the South Asian context.

Box 6.1

Son preference: emulating 'developed India'

The widely noticed phenomenon of differential treatment of the girl child within the family is closely related to the preference for the male child. The reasons for this preference for boys are complex and diverse — they range from the purely economic considerations of old-age insurance to the socio-cultural value systems that attach a higher importance to boys than to girls. Although gender relations are considered to be relatively more egalitarian in tribal societies, in Arunachal Pradesh preference for a son seems to be high in comparison to other States of North-East India.

According to NFHS-2, 41.9 per cent of married women in Arunachal want more sons than daughters, and only 2.5 per cent want more daughters than sons. The preference for sons is higher in rural than in urban areas, and it declines as the educational levels of the respondents increases. Curiously, however, while 30.4 per cent of those with a high standard of living revealed a higher preference for a male child, among the poor, 39.2 per cent preferred a male child and son preference was highest among those with a medium standard of living.

[46] However, when IMR is calculated for all the 15 districts, Kurung Kumey and Lower Dibang Valley have the highest and the lowest female IMRs.

Figure 6.4: Child Sex Ratio, 2001, Arunachal Pradesh

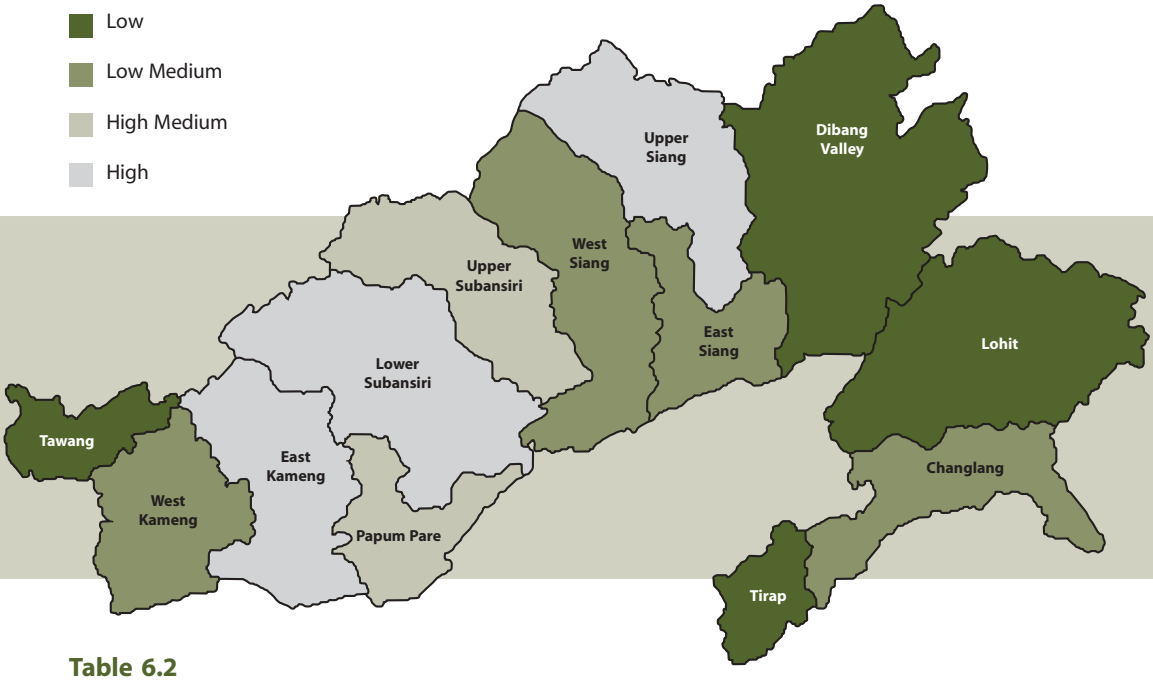


Table 6.2

Sex ratio in the age group 0-6, Arunachal Pradesh, 2001

Districts/State	Total	Rural	Urban
Tawang	948	948	948
West Kameng	955	956	952
East Kameng	1,035	1,027	1,058
Papum Pare	978	967	990
Lower Subansiri	1,005	1,013	945
Upper Subansiri	985	985	985
West Siang	950	949	953
East Siang	958	945	1,003
Upper Siang	1,010	1,010	NA
Dibang Valley	946	947	939
Lohit	933	927	966
Changlang	954	958	912
Tirap	941	933	1,000
Arunachal Pradesh	**964**	**960**	**980**

Note: NA means not applicable, as there was no urban population in Upper Siang district.

Source: 2001 Census (final) data.

Based on this data, the following classification has been made:

Class	Range of Child Sex Ratio	Frequency (No. of Districts)
High	> 1,000	3
High Medium	976 – 1,000	2
Low Medium	950 – 975	4
Low	< 950	4

Of the 13 'old' districts of Arunachal, female IMR is found to be higher than male IMR in as many as five districts, a result which is rather unexpected in a pre-dominantly tribal society.[47]

The under-five mortality rate for girls is estimated to be 137 (per 1,000 live births) for the State as a whole. Among the districts, it varies between 94 in East Siang to as high as 202 in East Kameng. The under-five mortality rate for girls is higher than the male under-five mortality rate (131 per 1,000 live births) in the State as a whole, and in nine out of the 13 districts.

Both IMR and under-five mortality rate for girls are negatively correlated with the female adult literacy rates. While the high female mortality points to the prevailing social attitude towards the girl child, improvement in the female literacy rate might contribute towards eliminating the gender bias in childcare that results in high mortality for the girl child. Owing to lack of trend data on IMR and Under-Five Mortality Rates for Arunachal Pradesh, we cannot say anything about the pattern of change in these variables.

Nutritional status

The intra-family distribution of nutritional status is an index of the relative access of males and females to food consumption, both in qualitative and quantitative terms. According to the India Nutrition Profile, 1998, the average consumption of foodstuff was nearly the same among boys and girls. However, in the 4-6 year age group the average consumption was lower among girls for the entire foodstuff except pulses. Among the adults, generally average consumption was similar among males and females. While the average intake of cereals, green leafy vegetables, roots and tubers, and other vegetables were above the suggested level of balanced diet at all ages, pulses, milk and its products, fat and oils, as well as sugar, were below that level.

The percentage of severely undernourished children was found to be marginally higher among girls than among boys, but, the percentage of moderately malnourished children was higher in case of boys. Thus, so far as the overall nutritional status is concerned, no serious gender discrimination was found, according to the 1998 survey.

One of the crucial aspects of the food consumption pattern in the State is the high average consumption of leafy vegetables, roots and tubers as well as fish and meat, not only in comparison to the national averages, but, also when compared to neighbouring States. A substantial proportion of these items are collected from forests and *jhum* fields. A key aspect of women's nutritional status is their participation in forest-related activities and access to forest resources. Women's access to forests and other Common Pool Resources is intrinsically linked to their micro-level strategies for risk dispersion, mutual support and solidarity in a high-risk ecological-economic context. As these resources become increasingly privatised, the food security prospects of households in general, and the access of women to food and nutrition in particular, will need to be carefully monitored.

[47] Estimates from the 1991 Census also show higher female IMR in 4 districts among the 11 districts for which data was available (Rajan and Mohanachandran, 1998). Among the Scheduled Tribes population in the State, IMR and Under-Five Mortality Rate were found to be higher for males than for females in 1991, both in the urban as well as rural areas (Rajan and Mohanachandran, 2001).

B. Gender gaps in education

Education is one of the fundamental means for expanding opportunities, building capabilities and safeguarding freedom. Access to education is essential for making informed choices, participating in political and economic processes, using new technologies, and protecting oneself against exploitation. It is not just a means to enhance human capital, raise productivity, and achieve higher earning levels, but also an end in itself. Denial of access to education and learning processes, in effect, is denial of the basic freedom to build a better future for individuals and the society as a whole. Given the emancipatory potential of education, gender differentials in educational attainments reflects not only a significant aspect of the prevailing gender inequalities, but, more importantly, it also has a bearing upon the quest for a better tomorrow for women as well as for men[48].

Women's literacy

The literacy rate for women in Arunachal Pradesh, according to Census 2001, is 43.5 per cent, ten points lower than the national average of 53.70 per cent. However, the State has made rapid progress in raising women's literacy – from only 14.02 per cent in 1981 to 43.5 per cent in 2001. In rural areas, women's literacy rate is as low as 36.90 per cent, and the rural-urban gap in female literacy continues to be very high. (In 2001, the literacy rate among urban women was as much as 69.5 per cent, almost twice the literacy rate for rural women.) (See Table A 6.5 in the Appendix) Among the Scheduled Tribe population, literacy for women went up from 7.31 per cent in 1981 to 24.94 per cent in 1991. The adult literacy rate for women went up from 11.01 per cent in 1981 to 23.59 per cent in 1991, but, in rural Arunachal Pradesh, adult female literacy rate is only 19.13 per cent, which is much lower than that in the other States of North-East India. Although the State has made significant progress, considerable inter-district variations exist in women's literacy rates; it ranges from 60.4 per cent in Papum Pare to 28.6 per cent in East Kameng district and 28.8 per cent in Tirap district. Among the other districts, those with relatively high female literacy levels are West Siang and East Siang. Substantial gaps exist between the urban and rural female literacy levels in many districts. The gap is the highest in Tirap followed by Tawang, Changlang, Lower Subansiri, and Dibang Valley respectively. The urban-rural gap in female literacy is lowest in East Siang district. Given the inaccessibility and inadequacy in the provisioning of social infrastructure, there is a huge gap between the opportunities available to rural women and their urban sisters.

Given the inaccessibility and inadequacy in the provisioning of social infrastructure, there is a huge gap between the opportunities available to rural women and their urban sisters.

Gender gap in literacy

Gender differences in educational attainment are one of the important indicators of relative well-being of women. The gender gap in literacy in the State, as per the 2001 Census, is lower than the national average. The gap between male and female literacy rates declined very slowly during the 1981-2001 period. In rural areas, the gender gap in literacy is more prominent than that in the urban areas. Although the gender gap in literacy has been narrowing in the urban areas, it has remained at around 20 per cent during the past two decades in the rural areas – a fact that needs to be addressed in all future initiatives.

[48] Female literacy or education, however, should not be equated with empowerment. An equally important question is to consider what kind of literacy is being achieved: is it adaptive or transformative? How is it being used — to challenge gender bias or to attract a marriage partner? (Patkar, 1995) Gender bias must be seen essentially as a multi-layered phenomenon, of which illiteracy is only one of the many correlates (McDougall, 2000).

Figure 6.5: Gender gap in literacy rate: 2001, Arunachal Pradesh

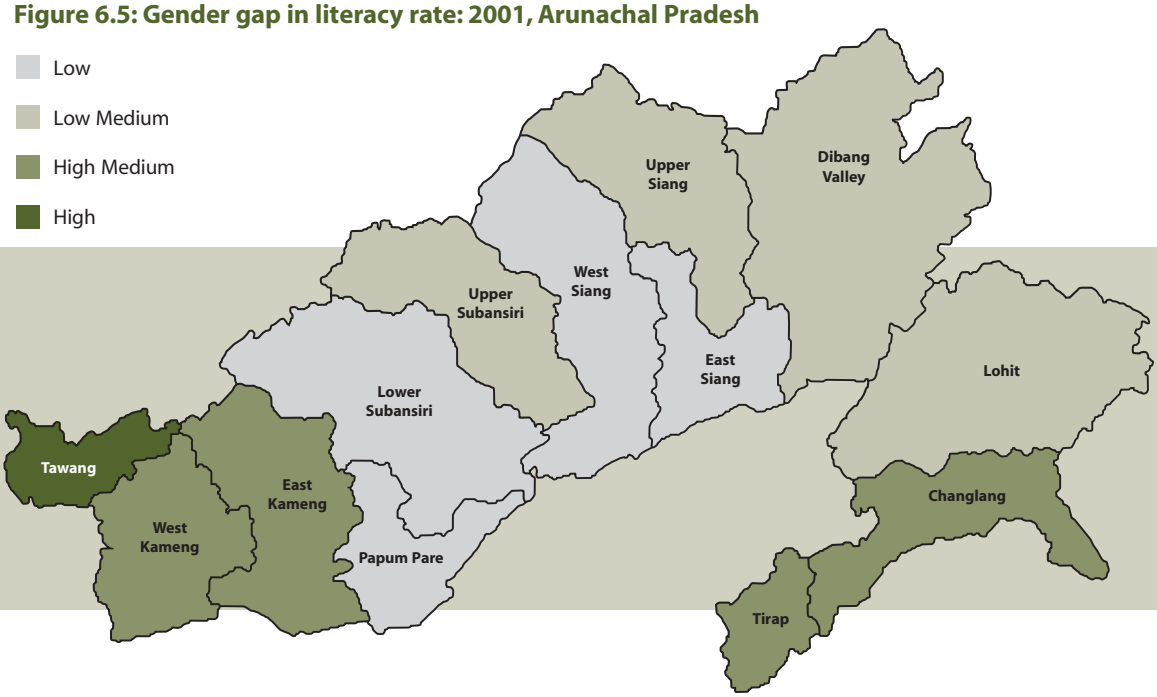


Table 6.3

Literacy rate in Arunachal Pradesh, 2001

Districts/State	Total	Male	Female	Male-Female Gap
Tawang	47.32	60.32	30.04	30.28
West Kameng	60.76	70.29	47.46	22.83
East Kameng	40.64	52.36	28.59	23.77
Papum Pare	69.32	77.27	60.35	16.92
Lower Subansiri	44.79	53.37	36.01	17.36
Upper Subansiri	50.35	59.55	40.70	18.85
West Siang	59.47	66.63	51.56	15.07
East Siang	60.73	68.42	52.42	16.00
Upper Siang	49.78	58.71	38.79	19.92
Dibang Valley	58.89	67.21	48.66	18.55
Lohit	56.07	65.74	44.54	21.20
Changlang	51.32	62.13	39.23	22.90
Tirap	41.73	53.36	28.84	24.52
Arunachal Pradesh	**54.34**	**63.83**	**43.53**	**20.30**

Source: 2001 Census (final) data.

On the basis of this table, the following classification has been made:

Class	Range of Gender Gap	Frequency (No. of Districts)
High	26 – 31	1
High Medium	22 – 26	4
Low Medium	18 – 22	4
Low	15 – 18	4

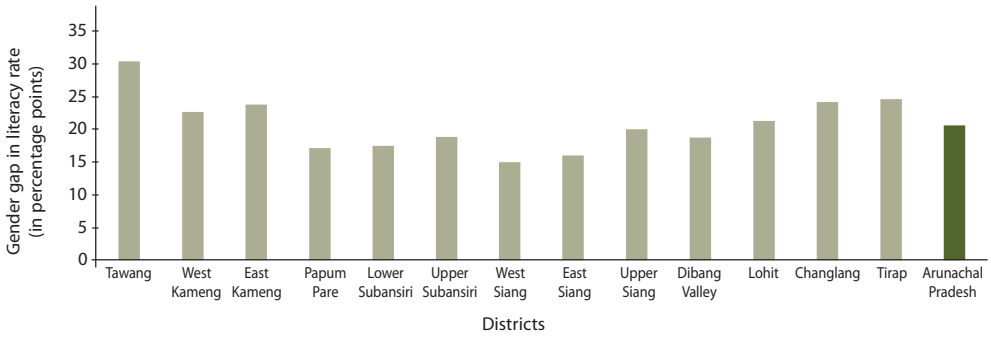
In comparative terms, the gender gap in literacy in Arunachal Pradesh is the highest among all the States of North-East India — both for the total as well as for the rural population (see Table A 6.6 in the Appendix). At a disaggregated level, the gender gap in literacy was highest in Tawang district, followed by Tirap, and it was lowest in West Siang in 2001. The districts with a higher gender gap in literacy than the State average include the western districts of West Kameng and Tawang on the one end, and the eastern districts of Tirap, Changlang, and Lohit on the other. The gender gap in adult literacy is higher than that of the overall literacy. Changlang has the highest gender gap in adult literacy, followed by Tirap, West Kameng, Tawang, Lohit, and Upper Siang, all of which show higher gender gaps than the State average. Such patterned concentration of districts having high gender gap in literacy rates may imply the importance of shared social attitude in determining gender difference in access to education[49] – an issue that needs further examination. Another disturbing fact is that in two out of the 13 districts — West Kameng, East Kameng — the gender gap increased between 1991 and 2001, while in Lower Subansiri, Tirap, and East Siang, the decline was marginal (see Table A 6.7 in the Appendix).

The gender gap in literacy among the ST population, although lower than the gap in the total population, is quite high. Despite the rise in female literacy among the ST population, the gender gap increased substantially from 13.48 percentage points in 1981 to 19.06 percentage points in 1991. This implies that the expansion of educational opportunities has not been gender-neutral - women within the ST population are lagging behind their male counterparts.

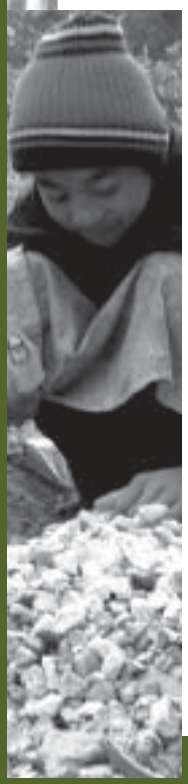
Educational attainment levels

The relative educational deprivation of females gets manifested, not just in the literacy rates, but also in terms of other educational indicators as well. Among literate females, a substantial proportion has studied only up to the below primary level. In 1991, of the total female literates in Arunachal Pradesh, 36.4 per cent had studied up to the below primary level, while in the rural areas, 40.9 per cent of the literate females had studied up to that level. In some districts like East Kameng, 48 per cent of the female literates had not studied beyond the primary level. On the other hand, 6.1 per cent of literate males had studied up to graduation and beyond, but only 3.6 per cent of women could reach that stage in 1991.

Figure 6.6: Gender gap in literacy rate, Arunachal, 2001



[49] The share of ST population in total population may be another factor influencing the gender gap in literacy. However, the correlation between gender gap in literacy and percentage of ST population to total population was found to be weak, although the coefficient was negative, when district level data from 1991 Census was analysed.



The National Family Health Survey (NFHS-2) data for 1998-99 shows that median years of schooling among males in Arunachal Pradesh was 4.4, while that for females was only 2.1. Once again, the survey found the median years of schooling for women in Arunachal to be the lowest among all the States of North-East India.

Among the women in the age group 15-44, many of whom are in the workforce, 71.02 per cent were illiterate, 21.17 per cent had studied up to below matric level, 6.07 per cent had completed matriculation, and only 1.74 per cent had studied up to graduation and above. According to the 1991 Census, in four out of the 11 districts, namely Tawang, East Kameng, undivided Lower Subansiri, and Tirap, the level of illiteracy among the females of this age group was higher than 80 per cent in 1991.

Thus, notwithstanding the substantial improvement in literacy levels for both men and women, gender gaps in the level of education received, pose a critical challenge for eliminating the gender bias in education, in Arunachal.

The girl child: more hurdles than opportunities?

The gender bias in educational attainment results from the discriminatory attitude towards the girl child and her education. A number of studies carried out have shown that societies and families benefit immensely when women are educated. An important determinant of the gender gap in education is that many of the benefits of female education are societal — a more productive workforce, lower fertility rate, lower Infant Mortality Rate — whereas the costs are private (King and Hill, 1999). Apart from the tangible costs such as tuition fees, uniforms, and school supplies, an important component of cost of education of the girl child is the opportunity cost in the form of foregone child labour (McDougall, 2000).

According to NFHS-2, the percentage of children not attending schools in the age group 6-14 was 18.3 in Arunachal. Among boys, 14.1 per cent were out of school, while, among girls, the percentage was as much as 22.7. In the age group 6-10, the gender gap in school attendance was found to be even greater. An examination of the different factors that are put forward as reasons for 'not attending school' provide an insight into the additional constraints faced by the girl child. Among the boys who have never attended school, distance of school was the most important reason, followed by 'not having an interest in studies'. But, among the girls, the most important reasons were requirement for household work (30.8 per cent), the school is too far away (16.1 per cent), and the cost of education (10.5 per cent). Only 0.7 per cent of the sample considered education to be unnecessary for boys, while for girls, 5.6 per cent felt it was unnecessary. Compared to boys, a high percentage of girls cited sibling care as the main reason for not going to school. Among the girls, who had dropped out from school, the main reasons were household work, not having interest in studies, and the cost of education. Marriage was cited to be the main reason for discontinuing education for 13 per cent of out-of-school girls.

In Arunachal Pradesh, educational infrastructure continues to be inadequate, but, its expansion over the past three decades or so has been impressive. Girls, as a result, have better access to schooling today than in the past. The enrolment ratio among girls in the age group 6-11 has gone up from 24.1 per cent to 33.4 per cent, while in the 11-14 age group, it improved from 28.5 per cent to 53.7 per cent during the period 1981 to 1991 (NHDR, 2001).

Improvement in enrolment, however, does not guarantee access to adequate level of education. The dropout rates in relatively remote regions of Arunachal are very high, especially for girls. Dropout rates in Classes I-V for girls have come down substantially from 72.2 per cent in 1981-82 to 45.10 per cent in 1998-99. It is still higher than the national average, but unlike in many other States, dropout rates for girls in the State at this stage is lower than that for boys. The dropout rate in Classes I-VIII for girls, similarly, has declined from 83.60 per cent in 1981-82 to 65.86 per cent in 1998-99. To draw a comparative picture, the dropout rate for girls in the State in 1998-99, was much higher than that in Manipur and Nagaland but, lower than that in Assam, Meghalaya, and Tripura. During the 1981-82 to 1998-99 period, the decline in dropout rate in Classes I-VIII for girls was sharper in Arunachal Pradesh than that in Assam, Meghalaya, Mizoram, and Tripura, while Manipur, Nagaland and Sikkim have registered much more impressive decline in dropout rates during the same period. In case of dropout rates in Classes I-IX, girls have a higher dropout rate than boys. The dropout rate for girls in these classes are also higher in Arunachal Pradesh compared to Assam, Manipur, Meghalaya, Mizoram, and Nagaland (NHDR, 2001).

There has been a significant growth of educational opportunities in Arunachal Pradesh during the post-Independence period, particularly since the 1980s, but, crucial gender gaps in different dimensions of educational attainment continue to act as barriers to gender equality. The need to close the gender gap in literacy can hardly be overstressed, but, for real empowerment of women in the State, the focus has to shift to the quality and intensity of education of the girl child. Gender bias in the level of educational attainment can create and sustain critical deprivations, not only for women, but for society as a whole.

C. Women and work

Access to employment and earnings is vital for control over resources as well as for participation in decision-making processes, both within and outside the household. One of the fundamental aspects of gender discrimination, in almost all parts of the world, is the unequal access of women to gainful employment opportunities. A substantial section of women remain outside the job market and, when they enter the job market, they typically have limited access to the well-paid and secure jobs. A majority of women work in the informal sector with a low level of earning and poor working conditions. While the underlying causes of such differences in access to employment are complex and diverse, unequal opportunities for learning and education, socially constructed barriers, along with patriarchal ideologies, are responsible for women's unequal participation in income-generating employment opportunities.

Notwithstanding the substantial improvement in literacy levels for both men and women, gender gaps in the level of education received, pose a critical challenge for eliminating the gender bias in education, in Arunachal.

The relatively lower level of participation in paid work, however, does not mean that women have a lower work burden. Women shoulder a disproportionately higher share of reproductive responsibilities, including child-rearing, caring, and other types of domestic work. They also contribute substantially towards meeting the consumption and survival needs of household members. Although women perform some of the most onerous and tedious tasks, and spend a considerable amount of time and energy in doing unpaid domestic work along with a host of 'productive' and income-generating activities, their contribution remains undervalued and unrecognised. In much of the developed and developing world, women's employment is constrained by a number of structural inequalities such as relatively lower wage rates and fewer hours

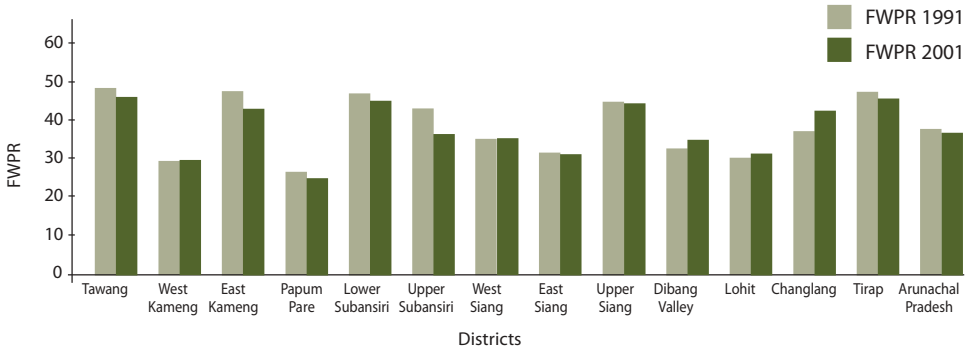
of paid work for females, sex segregation in the job market, sex stereotyping of jobs, resulting in designation of women's jobs as unskilled, and explicit barriers to entry of women in some segments of the job market.

The key question that needs to be addressed in the context of economic transformation of Arunachal Pradesh, is the changing pattern in the gender division of labour, and the underlying changes in the social attitudes and stereotypes. In her pioneering work on the economic role of women during the process of economic development, Ester Boserup has shown that as a result of increasing population density and, consequently, intensification of agriculture, shifting cultivation systems with collective ownership over land are usually transformed into a system of peasant production with private ownership of land, using animals for cultivation and transport. These changes are usually accompanied by significant changes in the position of women (Boserup, 1970). Generally, privatisation leads to transfer of land to males and marginalisation of women in production activities, which, in turn, lead to their marginalisation in society and in the household as well. "Although there is no matriarchy in NEFA", noted Verrier Elwin in his book, *A Philosophy for NEFA*, "women hold a high and honourable position. They work on equal terms with the men in *jhums* and make their influence felt in the tribal councils" (Elwin, 1957/99). However, the State has undergone a significant and multilayered transition in the last few decades, and gender roles within and outside the household are being redefined through this ongoing transition. Across the State, there is a great deal of diversity in the pace, direction, and nature of change in gender roles. While improvement in the level of education, greater facilities for learning and skill-building, along with improvement in infrastructure have opened new employment opportunities for a section of women in the State, the gender gap in access to new opportunities continues to be a cause of concern.

Work Participation Rates

The economic contribution of women remains systematically underreported in the official data systems. The conceptual problems associated with valuation of unpaid and unaccounted work, perceptions of the interviewers, the social conditioning of the respondents as well as the social construction of work, along with other factors, have contributed to the underestimation of women's work. In Arunachal Pradesh, given the relative

Figure 6.7: Female Work Participation Rates, 1991-2001



importance of subsistence production, and low level of commercialisation of the economy, the problems of underestimation of women's work are likely to be far more serious.

Work Participation Rates (WPR) (defined as the proportion of total workers involved in various economically productive work to total population) in Arunachal Pradesh, during 1981-1991, for both males and females, tend to be higher than the national average. In 2001, Female Work Participation Rate (FWPR) of the State was 36.45 per cent as compared to the national average of 25.68 per cent (See Table A 6.10 in the Appendix). The gap between male and Female Work Participation Rates in the State was lower than that at the national level. This is largely due to the relatively high percentage of ST population and the low level of development in the State.

The relationship between economic development and Female Work Participation Rate is often conceptualised in terms of a U-shaped curve. During the initial stage of development, a high portion of non-agricultural productive activity takes place in households, where women find it easy to combine their traditional domestic responsibilities with part-time productive work. With a higher level of development, the production structure gets more formalised and the possibilities of such informal work shrink. A second set of arguments emphasise the shrinking span of working life, resulting from the greater consciousness of the need to learn rather than earn in the early years of life on the one hand, and the lowering of the average exit age with the growth of the organised sector on the other, in contributing to the decline of work for both males and females (Durand, 1975). At an advanced stage of development, the spread of education among women, greater skill acquisition, as well as rising levels of living enhance the employability of women in the economy, particularly in the service sector, leading to rising work participation rates among females. FWPR in Arunachal Pradesh declined significantly from 51.28 per cent in 1971 to 36.45 per cent in 2001, although an increase in FWPR was noticed in the urban areas during 1991-2001. The decline in the overall FWPR in the State can be largely attributed to a sharp decline in FWPR in the rural areas. The work participation rate among males also exhibited a similar pattern. The gap between male and Female Work Participation Rates increased during 1971-91 but, in the 1990s, it declined, partly because of a sharper fall in the Male Work Participation Rate (MWPR) during the period. As expected, the gender gap in work participation is much higher in the urban areas than in the rural areas (Table 6.4).

Table 6.4

Work Participation Rates in Arunachal Pradesh, 1971-2001

(Percentage figures)

		1971	1981	1991	2001
All Population	Male	63.14	58.63	53.76	50.69
	Female	51.28	45.67	37.49	36.45
	Total	**57.65**	**52.63**	**46.24**	**43.97**
Rural	Male	62.78	58.50	53.69	51.13
	Female	52.27	47.64	40.86	41.33
	Total	**57.88**	**53.42**	**47.69**	**46.47**
Urban	Male	70.32	60.24	54.18	48.99
	Female	10.58	11.62	11.95	16.69
	Total	**51.57**	**41.47**	**36.39**	**34.19**

Note: (i) Work Participation Rates = {Total Workers (Main + Marginal) / Total Population} ×100.
(ii) Figures for 2001 are based on provisional population totals.

Source: Census of India, 2001, Series-13, Arunachal Pradesh, Provisional Population Totals, Paper-3 of 2001.

At a disaggregated level, in 2001, Tawang, closely followed by Tirap and Lower Subansiri, had the highest FWPR, while Papum Pare had the lowest. In the case of urban Female Work Participation Rates, (which are significantly below those in the

rural areas of all the districts) East Kameng is at the top with 21.82 per cent while, in Lohit, the participation rate is less than half this — 10.45 per cent, which implies that in East Kameng one in five urban women is a worker, in Lohit, the proportion is one in ten. On the other hand, the Rural Work Participation Rate is as high as 50.87 in Tirap (one in two women is working) and, even in Papum Pare where it is the lowest, almost one in three women is likely to be working. The gender gap in work participation is highest in West Kameng, while Lower Subansiri has the lowest gap between the genders. West Kameng, followed by Lohit, have the highest gender gap in rural WPR, while rural Lower Subansiri and Tirap have the lowest gender gap in the rural areas. The gender gap in WPR is significant in the urban areas — it is highest in Tirap and Changlang, and lowest in East Kameng, and Lower Subansiri (See Table A 6.8 and Table A 6.9 in the Appendix).

In general, the gender gap in work participation is considerably lower in the rural areas than in the urban areas.

If we look at the inter-temporal change in FWPR at the district level, we find that during the 1981-91 period, all districts registered a decline in FWPR with undivided Dibang Valley and Lower Subansiri registering the highest decline[50]. During 1999-2001, the FWPR declined in 10 districts, with Upper Subansiri and East Kameng showing the highest decline. Among the three districts which have shown an increase in FWPR — Dibang Valley, Lohit, and Changlang — the increase was highest in Changlang district.

The inter-district variations in FWPR can be explained to some extent by the differences in the level of development. Regression analysis shows that in 2001, the FWPR was negatively correlated with the female literacy rate and the percentage of urban population to total population. In 1991, the FWPR was

Box 6.2

The girl child worker

According to Census 1991, 5.7 per cent of children in Arunachal Pradesh, in the age group 5 to 14, were working, which was marginally higher than the national average of 5.4 per cent. Although the percentage of working children in the State had come down from 11.3 per cent in 1981 to 5.7 per cent in 1991, the percentage of working girl child continued to remain higher than that of boys. In 1991, 6.7 per cent of girls and 4.6 per cent of boys were working as against 13.2 per cent of girls and 9.5 per cent of boys in 1981. The incidence of the girl child worker was considerably higher in rural than in urban Arunachal Pradesh, but, in rural as well as in the urban areas of the State, the percentage of working girl children was more than that of working boys. In comparative terms, the percentage of the working girl child was higher in Arunachal than in any other State of North-East India, except Mizoram.

The percentage of working girls in the 5-14 age group is clearly not an adequate measure of the extent of prevalence of child labour — but, it does clearly indicate that girls face significant disadvantages at a very early stage of their lives. Special attention has to be given to the additional constraints faced by the girl child in programmes aiming at the elimination of child labour from the State.

[50] The analysis was carried out for the nine districts, for which data was available from the 1981 Census.

positively correlated with the share of ST population in the total population. The FWPR among the ST population was higher than that of the total population, particularly in the rural areas[51].

Another significant dimension of women's work in Arunachal Pradesh is the relatively high proportion of marginal workers among the female workers. In 1991, of the total marginal workers in the State, 87.31 per cent were females, and only 12.69 per cent were males. Of the female marginal workers in the State, 96.44 per cent reported household duties to be their main activity. Most of the marginal workers were engaged in agriculture — the percentages of cultivators and agricultural labourers among the female marginal workers were 82.44 and 15.33 respectively. In 2001, of the total female workers, 8.13 per cent are marginal workers, while, among the males, the percentage of marginal workers is only 4.60. In 2001, of the total marginal workers in the State, 61.23 per cent were women. The relatively high proportion of females among marginal workers signifies the additional constraints faced by women in entering 'productive' work, as well as the pattern of household risk management, where women's labour is kept as a buffer to meet unexpected shortfalls in consumption or earnings.

Labour Force Participation Rate

Labour Force Participation Rate (LFPR) is defined as the proportion of persons who are either employed or seeking work in the age group 15 years and above. The LFPR was 69.9 per cent in 1999-2000, as per NSS estimates. The female LFPR in Arunachal Pradesh was 42.3 per cent, slightly higher than the national average of 38.5 per cent. However, female LFPR in the State was lower than that in Nagaland, Meghalaya, and Mizoram.

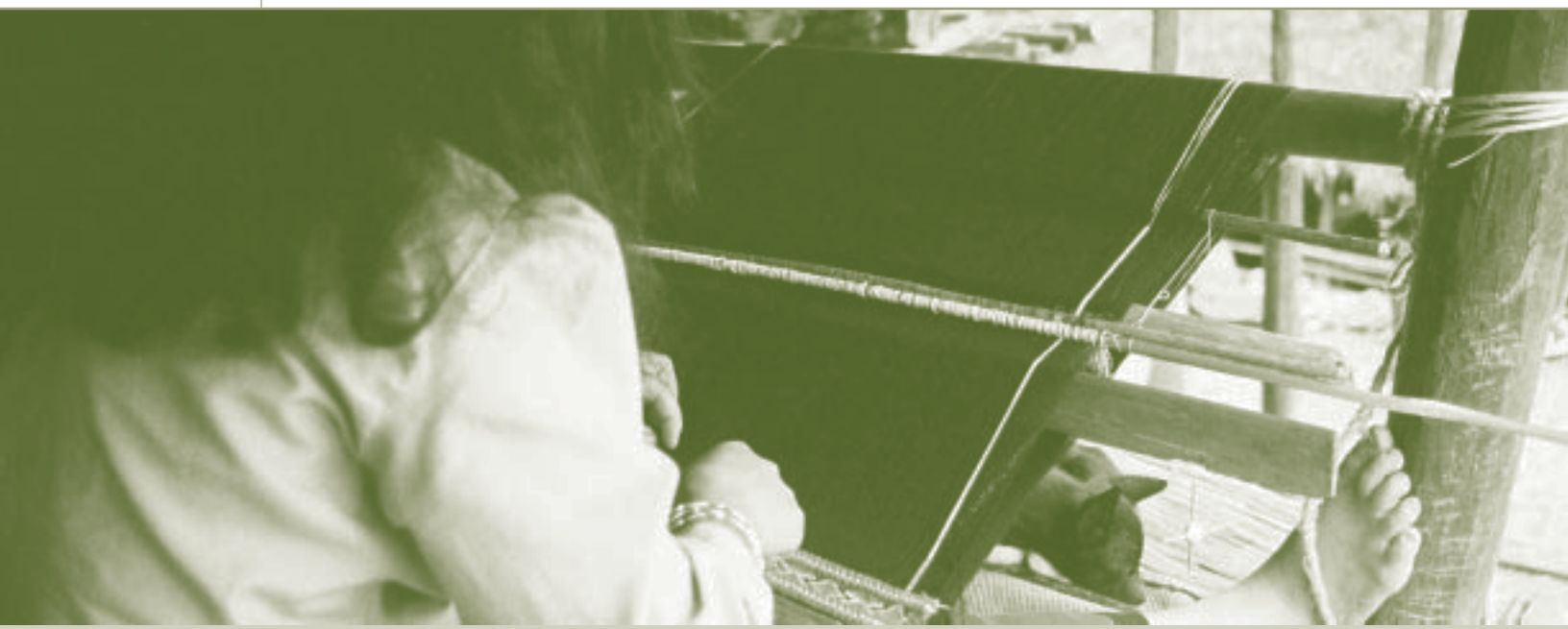
The decline in female LFPR in the State, during 1993-94 to 1999-2000, was higher than that of male LFPR. In the rural areas, female LFPR has declined from 63.6 to 48.8 per cent, while it has registered a marginal increase from 16.5 to 17.4 per cent in the urban areas during the same period. It is important to note that as per NSS estimates, during 1993-94 to 1999-2000, the growth rate in employment of males in the State was 0.5 per cent per annum, but female employment actually declined (–0.7 per cent per annum). While in the urban areas, female employment increased at the rate of 10.7 per cent per annum, in the rural areas it declined at the rate of 1.4 per cent per annum (NHDR, 2001).

Sectoral distribution of female workforce

Occupational diversification of the workforce, particularly a shift of workers from low productive to high productive occupations, signifies better earnings and, hence, better access to resources. In Arunachal Pradesh, a substantial proportion of female workers are engaged in agriculture. In 2001, 76.60 per cent of female workers were working as cultivators[52] and 4.49 per cent worked as agricultural labourers. Thus, only 18.91 per cent were engaged in non-agricultural activities. The inter-district variation in the percentage of female workers engaged in non-agricultural activities is quite high — ranging from 55.37 per cent in Papum Pare to only 7.98 per cent in Tirap. The percentage of female agricultural labour to total female workers is highest in Dibang Valley, closely followed by neighbouring Lohit, and is lowest in Tirap.

[51] The conclusion is based on data for 1991.

[52] According to the Agricultural Census 1995-96, female-managed operational holdings constitute 16.07 per cent of the total operational holdings, and account for 13.30 per cent of the total operated area.



Box 6.3

Women and weaving

The spider was the first weaver in the world. It was by watching the spider spin its web that the women became proficient in the art of weaving, and the men learned to span rivers with cane suspension bridges. (Singpho folklore)

In the beginning, only Donyi Polo — the Sun Moon God — knew the art of weaving. He taught it to a female spirit, who taught the wife of the first man to weave. (Bori Adi folklore)

Arunachal has a rich tradition of crafts such as weaving, pottery, smithy work, and basketry. Most women are skilled weavers. Each community has a distinct pattern or design and, it is often possible to tell a person's tribe by looking at the *galle* (a sarong like wrap-around skirt) worn by the women or by the jackets and shawls worn by the men. The designs reflect the social and religious systems from which they emanate. Motifs are drawn from everyday life, and from the world around them, from myths and legends. Many of the designs reveal the spiritual and religious beliefs of the people and reflect their belief in the cosmic order.

Verrier Elwin has given a detailed account of the weaving skills of the women of NEFA in his writings (Elwin, 1988). Like many other traditional crafts, weaving also requires a wealth of ecological knowledge. The intricate motifs and designs, the combination of colours, all reflect the social status and ethnic origins of the people. Women are the custodians of this knowledge, and to the elaborate process of spinning, dying, and weaving. The loom that is traditionally used is the loin loom, and the colours used are organic colours, prepared largely from the plants that grow in the forests. Today, however, fly shuttles have been introduced in the Government-run training centres, although the loin loom still continues to be popular.

In recent years, the importance of weaving as a livelihood option is being recognised, given the demand for hand woven fabric in the domestic and the international market. According to the Census of Handlooms (1987-88), nearly 47,000 workers in the State were engaged in weaving on a part-time or full-time basis. However, there were only 500 full-time workers in weaving, and another 200 workers engaged in preparatory work. This is because this activity is largely in the non-formal sector. On the 46,000 looms in the State, the average production was only 1.26 metres of cloth per loom, as against the national average of 5.12 metres. This shows that there is significant scope for expanding weaving as a livelihood option for women. A recent study of the micro enterprises in Arunachal identifies weaving as one of the areas where indigenous women have already made some progress (Upadhyay and Mishra, 2004).

Notwithstanding the considerable skills that many women have in weaving, recent studies show that often women do not find time to weave their own *galle*s, although they have looms in their houses, and they do have basic weaving skills. Specialist weavers are becoming hard to find and, even the older women in the villages are beginning to buy shawls from the market.

Thus, if weaving is to be a livelihood option, it will require financial and marketing support, as well as training and design inputs.

The pattern of occupational diversification of workers in the State shows that female workers are moving out of agriculture at a much slower pace than their male counterparts. For example, in 1971, among the total male main workers, 68.78 per cent were engaged in the primary sector, only 0.66 per cent were working in the secondary sector, and the remaining 30.56 per cent were in the services. By 1991, the share of male workers in the primary sector had come down to 54.60 per cent, and their shares in the secondary and tertiary sectors had gone up to 12.34 and 33.06 per cent respectively. In contrast, the distribution of female workers in different sectors in 1971 was 97.11 per cent in primary, 0.14 per cent in secondary, and 2.75 per cent in the tertiary sectors. In 1991, 89.93 per cent of female main workers were still engaged in the primary sector, 2.21 per cent in the secondary, and 7.87 per cent in the tertiary sector.

Women's employment: qualitative aspects

The earnings and other opportunities, which are normally associated with employment, are also influenced by the quality of employment. Although we do not have enough data to objectively assess the quality of employment of female workers in the State, indirect evidence clearly suggests that female workers in the State generally work in low-paid jobs with little job security. First of all, an overwhelming majority of female workers in the State work in the unorganised sector. Secondly, even when they are employed in non-agricultural occupations, particularly in government services, a higher proportion of women workers are found in the lowest ranks of the job hierarchy. While the share of female workers in the Service Sector expanded more than that of the male workers during 1971-91, this growth has also been accompanied by ghettoisation of women workers in the lowest paid jobs. The skill level of the female workforce, along with gender-based discrimination, may be one of the reasons for this. In 1991, while 55.9 per cent of the male main workers were illiterate, 87.9 per cent of the female main workers were illiterate. In rural areas, the percentage of illiterates among the female main workers was as high as 90 per cent. Only 1 per cent of the female main workers had studied up to graduation and above.

Even among the women workers who were engaged in the non-agricultural sectors, the percentage of illiterates was as high as 54.06 per cent in 1991. Among the female main workers working in 'other services', which in case of Arunachal Pradesh mainly consists of the Government sector, 41.67 per cent were illiterate and 11.82 per cent had studied up to the primary level or below. Among the female workers in 'other services', only 11.16 per cent had studied more than the higher secondary level, in 1991. Thus, there is a limited degree of diversification of occupation among the female workers, and they typically secure jobs in the low-skill, low-earning end of the spectrum.

In 1991, while 55.9 per cent of the male main workers were illiterate, 87.9 per cent of the female main workers were illiterate. In rural areas, the percentage of illiterates among the female main workers was as high as 90 per cent. Only 1 per cent of the female main workers had studied up to graduation and above.

D. Women in decision-making

The empowerment of women crucially depends upon their participation in the decision-making process. The capability to shape one's own future through legitimate and participatory processes of decision-making is of intrinsic value in any democratic society.

Unfortunately, women face hindrances while participating in the decision-making processes from both within and outside the domestic sphere. The structural inequalities in terms of relative deprivations in earnings, education, employability, and overall well-being, creates strong barriers for effective participation of the majority of women in the decision-making process. Further, the social stereotypes of proper 'feminine roles' — some of which are internalised by women themselves — put a limit on the free expression of preferred choices by women.

indigenous communities. Traditional social differentiations as well as newly-emerging economic differentiations within these communities also impact on the position enjoyed by women of different strata. Along with that, the migration from different parts of the country, education, mass entertainment, media exposure, and external cultural influences have all influenced the gender relations in the changing social milieu.

As far as decision-making within the household is concerned, strong inter-community differences in the relative position of male and female members are evident in the State. While the relative supremacy of adults in general, and earning adults in particular, vis-à-vis children, is near-universal among some of the indigenous communities of Arunachal Pradesh, experienced old adults command greater respect and play a decisive

Box 6.4

Women and property rights

Evidence from across the world suggests that as economies make the transition from collective to private ownership of land, there tends to be a concentration of private ownership over resources in the hands of males. Arunachal Pradesh has been undergoing this transition during the last few decades. As there has been no cadastral survey in the State, it is difficult to estimate the pattern of ownership of land. Access to land is governed and monitored by village communities with little interference from the State machinery, notwithstanding the recent efforts to codify land ownership and management laws. Given women's marginalised position in the traditional community-based institutions, women get disinherited from community resources, particularly land, as these resources become privatised. The inheritance laws of most communities in Arunachal Pradesh do not allow women to inherit land or property. Women have no right to movable or immovable property, except to a share of their mothers' ornaments.

It is difficult to categorise the status and position of women in Arunachal Pradesh in general terms. Given the substantial influence of traditional mores, community institutions, and regionally differentiated socio-cultural practices, there are variations in the condition and position of women among the different

role in the decision-making processes. The changing values, disintegration of old family systems, and differences in the world view of the young and the old, in varying forms and degrees, are now changing the balance of power and authority within the households and clans[53].

[53] According to the Agricultural Census 1995-96, female-managed operational holdings constitute 16.07 per cent of the total operational holdings and, they account for 13.30 per cent of the total operated area.

No generalisation about gender differences in intra-family decision-making processes can be made for the State, given the degree of inter-community heterogeneity. Gender relations in many of the migrant families, though not completely immune from the influence of the general social milieu of the State, are largely governed by the social conditions of the State or country of their origin as well as their relative social position in terms of the caste-class hierarchy within the original society. Among the indigenous communities themselves, there is a great deal of difference in the relative position of women in decision-making, though, by and large, anthropological evidence does suggest a greater acceptance of female autonomy among these communities. It is, however, equally important to avoid the generalisation that women have a role in decision-making within all communities of Arunachal Pradesh, since, in many cases, male dominance is found to be quite high. Again, within the communities where women enjoy some control over decision-making within the household, this participation is almost always enjoyed within well-defined and differentiated spheres of action and socially sanctioned parameters.

Data collected by NFHS-2 describes these complexities. According to NFHS-2, among the female respondents, 84.1 per cent decide what items to cook, but, when it comes to obtaining health care for one's own self, only 32.1 per cent of women take the decision alone, 35.9 per cent decide it together with their husbands. As far as decisions regarding purchasing jewellery or other major household items are concerned, only 15.7 per cent decide on their own, while 56.8 per cent decide it along with their husbands. Among the respondents, 22.5 per cent take their own decisions regarding going and staying with their parents or siblings, 49.1 per cent decide it along with their husbands, while in the case of 22.2 per cent, the decision lies exclusively with their husbands. Among those who earn cash income, 46.2 per cent can take a decision on how to spend it on their own, while 38.9 per cent decide after consulting their husbands. In 13.6 per cent of cases, women do not decide how to spend the money they have earned. The survey reveals that 46.8 per cent of women do not need any permission to visit the markets, and 53.7 per cent do not need any permission to visit friends or relatives. Around 78.6 per cent have some access to money. There is no consistent pattern in the rural-urban divide: while more rural women participate in decision-making regarding cooking and personal healthcare, a comparatively higher proportion of women participate in decision-making regarding purchasing jewellery or staying with parents or siblings in the urban areas. Urban women also have greater access to money. It is interesting to note that educated women, and those with a high standard of living, have less freedom of mobility, although they have comparatively higher access to money than the illiterate, and sometimes, poorer women.

Gender and governance

Gender equality cannot be achieved through a set of policies and programmes alone; more fundamentally, it calls for a restructuring of the political, economic, and socio-cultural goals and priorities. Given the unequal distribution of resources and opportunities between the sexes, women's empowerment has to be assigned a central place in the agenda of social transformation. Throughout the world, in varying forms and degrees, there exists a considerable gap between men and women, in terms of their access to political power. However, as the HDR 1995 (UNDP) points out, significant progress has been made towards greater political participation of women at various levels.

Arunachal Pradesh has made the journey to Parliamentary democracy in a short span of less than 50 years, and democratic political

processes, institutions, and practices have been gradually accepted by the tribal communities. As elsewhere in the developing world, and particularly in the tribal world, the establishment of formal institutions of liberal democracy has not been smooth or uniform across the State. However, if there is one key aspect of the political development of Arunachal Pradesh in the post-Independence period that needs urgent attention, it is the near-complete marginalisation of women in politics.

The traditional village chief and the village councils continue to remain the key political institutions at the village level. These institutions, in spite of the considerable diversity in their power, area of operation, and modes of decision-making, have been largely described as democratic and participatory. However, women are rarely allowed to take any part in these traditional institutions.

The share of women members in the State Legislative Assembly has never exceeded 5 per cent. The highest number of women members in the 60-member Assembly has been three. As far as Parliamentary representation is concerned, no woman member has ever been elected to the Lok Sabha from the State. In the last 25 years, there has been only one woman MP from the State, and she was elected to the Rajya Sabha. Thus, at least in terms of representation in the formal structures of political power, women in Arunachal Pradesh remain completely marginalised.

The traditional village chief and the village councils continue to remain the key political institutions at the village level. These institutions, in spite of the considerable diversity in their power, area of operation, and modes of decision-making, have been largely described as democratic and participatory. However, women are rarely allowed to take any part in these traditional institutions. Women of all tribes have little say in community affairs. They are not represented in traditional village councils. The Tangsa, Nocte, Singphos, Sulung, Sherdukpen, and Nyishis do not allow women even as observers. (Dutta, 1975). The percentage of women as village chiefs is only 1.13 per cent. In eight of the 13 districts, there was not a single woman appointed as the village chief. The share of women village chiefs was highest in Dibang Valley, where also it is only 2.20 per cent. In recent years, there has been some representation of women in modern civic bodies (Sumi Krishna, 1997). The transition to the three-tier Panchayati Raj System has considerably altered women's position in the political institutions at the grass roots level. For the State as a whole, the proportion of women at the village, intermediate, and district Panchayat levels were 39.60, 34.99 and 33.82 per cent respectively, in the recently-concluded Panchayat elections.[54] The introduction of reservation for women in the decentralised institutions of governance may play a catalytic role in gradually eliminating the gender bias in the sharing of political power in the State.

In the absence of reliable data, it is difficult to estimate women's share in top managerial and technical posts in the State. However, given the low levels of industrialisation and the thin presence of the private corporate sector in the State, the share of women in top-level decision-making may be assessed indirectly by looking at their share in the top-level bureaucracy. In the top levels of civil administration in the State, the share of women was found to be 6.66 per cent only.

The Gender Empowerment Measure (GEM) developed by the UNDP, which uses data on real per capita income to measure women's control over economic resources, share in professional and managerial jobs to evaluate participation in the decision-making processes, and share in Parliamentary representations to estimate access to political opportunities, for a variety of reasons, cannot be an adequate measure of women's empowerment at the State or at the district level. The relatively large share of the unorganised sector, the discrepancy between women's earnings and women's control over income, and the terms of political discourse make these variables inadequate for judging the real empowerment of women in India (HDR-Karnataka, 1999). Therefore, the GEM indicator has not been estimated for the State.

[54] *These figures exclude data from Tirap district.*

E. Crime against women

Economic prosperity and well-being require efficient, just, and non-discriminatory rule enforcement and monitoring mechanisms. One of the key determinants of a healthy and just social order is its treatment of vulnerable social groups and individuals. Protection and freedom from violence is one of the fundamental aspects of basic human well-being in a rapidly changing world.

Crime against women is amongst the most evocative, traumatising, and politically volatile subjects in India. Often, women are victims of not just individual acts of violence; in the political mobilisation of and against social groups, violence against women has been used as a potent political weapon. It crucially affects various aspects of their well-being, such as mobility, emotional and psychological capabilities, self-esteem as well as the freedom to lead a normal and healthy life. Conventional development indicators, even the human development indicators, have been criticised for their neglect of this aspect of women's well-being (Hirway and Mahadevia, 1996). The degree and nature of violence directed against women varies across regions, classes, and cultures, and often women feel more insecure in more developed and well-connected regions, particularly in the cities.

However, there are obvious problems in quantifying the extent of violence directed against women. Firstly, most of the crimes against women go unreported for a variety of reasons, such as the attached social stigma, distrust of legal mechanisms, fear of retaliation, and so on. Secondly, some forms of violence are justified within the structure of the socially sanctioned value systems, beliefs, and practices to such an extent that

Table 6.5

Crime against women: 2000-2002

Districts	As % of Total Crime	Per 10,000 Population
Tawang	8.97	1.103
West Kameng	2.80	0.402
East Kameng	8.54	1.985
Papum Pare	4.92	1.916
Lower Subansiri	6.43	1.091
Upper Subansiri	6.11	1.504
West Siang	9.59	2.987
East Siang	9.97	2.748
Upper Siang	8.02	1.298
Dibang Valley	8.53	2.142
Lohit	5.11	0.906
Changlang	4.24	0.558
Tirap	3.53	0.465
Arunachal Pradesh	**6.89**	**1.595**

Note: Calculations are based on average of three years - 2000, 2001, and 2002.

Source: The Director General of Police, Government of Arunachal Pradesh, Itanagar.

Figure 6.8: Crime against women, 1991-2002

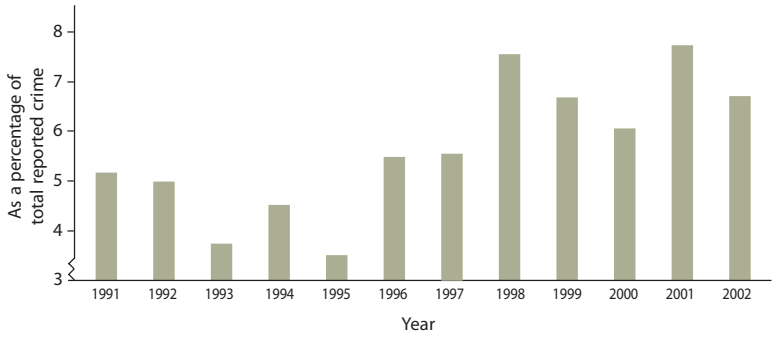
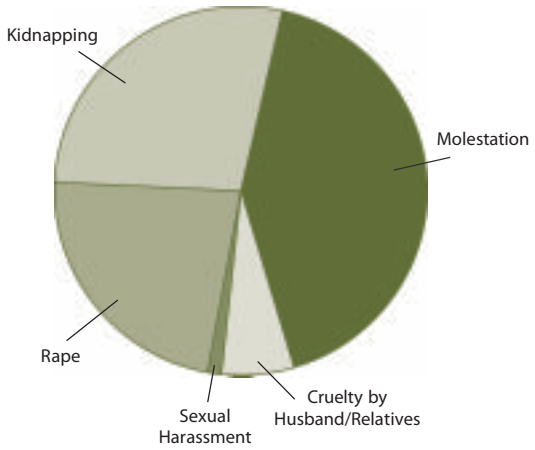


Figure 6.9: Crime against women (2000-2002)



it remains unnoticed and is hardly described as violence or crime[55].

The question of violence against women in Arunachal Pradesh is extremely complex because the police and legal infrastructure is less developed in the State than the rest of the country. Traditional community laws and institutions continue to play a vital role in conflict resolution and administration of justice. The simultaneous existence, overlapping spheres of actions, and fuzzy boundaries between the formal and informal legal frameworks make the situation difficult. The incidence of reported crimes and that of crime against women, by and large, are on the rise. The share of crime against women in total crime has gone up from less than five per cent in the early 90s to more than six per cent during 1998-2002. As regards inter-district variations in crime against women as a percentage of total crime, in 2000-2002 it was highest in East Siang, closely followed by West Siang, and lowest in West Kameng. As high as 20 per cent of the crimes against women were reported from West Siang, while East Siang and Papum Pare contributed 15.25 and 14.83 per cent respectively. Crime against women (per 10,000 population) also has West Siang on top, followed by East Siang, and Dibang Valley, while West Kameng has the lowest crime against women.

It is difficult to draw conclusions regarding the security of women on the basis of these official statistics, partly because the increase may reflect a trend of higher reporting of crimes rather than higher incidence of crime, as the legal and policing infrastructure in the State continue to be at an early stage of development. The composition of crime against women for the State as whole in 2000-2002, shows that 41.74 per cent of the cases relate to molestation, 28.18 per cent to kidnapping, and 22.67 per cent to rape[56], while cruelty by husbands and relatives accounted for 6.35 per cent of the total reported crime against women. Women typically become easy targets of violence in

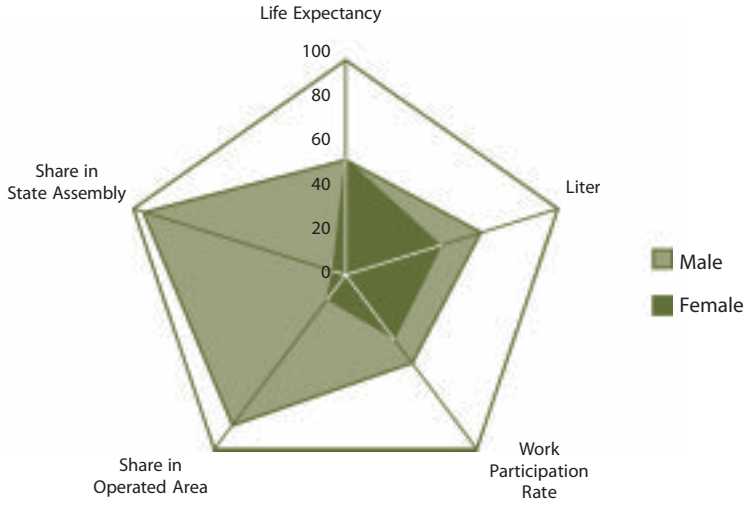
[55] Domestic violence, for example, is hardly treated as a crime, even by the victims themselves. According to NFHS-2, there is widespread domestic violence in most States of North-East India. The study reveals that in Arunachal Pradesh, of the total respondents, 61.5 per cent have been beaten or physically mistreated at least once in the past 12 months while 13.1 per cent have been beaten many times during the period. Both tolerance of and experience of domestic violence are significant barriers to women's empowerment.

[56] According to NGO activists, the nature of rape has undergone a change in Arunachal Pradesh — while in the past, in many cases, it took the form of forced marriages, in recent years, rape is just a brutal criminal assault on a woman.

areas of prolonged and chronic conflicts. In parts of the State, where there has been some insurgency, women face constraints not just as victims of violence but, also in terms of denial of opportunities and options, which would otherwise have been available to them under normal circumstances.

The challenge before the Government and the civil society in Arunachal Pradesh is two-fold: on the one hand steps have to be taken to prevent crime against women and, on the other hand, there is an urgent need for awareness and gender sensitisation campaigns, both within the law-enforcing agencies, and as among the general public, so as to ensure better reporting of crimes against women.

Figure 6.10: Gender disparities



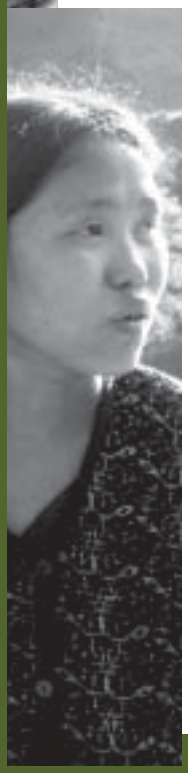
The way forward

Enormous challenges lie before Arunachal Pradesh in achieving gender equality in access to health, education, and earnings (Figure 6.10). There is a clear need to mainstream gender concerns in the overall policy-making and implementation of various Government-sponsored programmes. Adequate representation and participation of women in decision-making has to be ensured through affirmative action at various levels. However, the goal of eliminating discriminatory and gender-oppressive beliefs and practices cannot be realised without meaningful civil society initiatives. Better coordination between the Government and civil society institutions will help bridge the gender gap in specific spheres and regions. The success of such targeted programmes, however, will remain limited unless there is a holistic transformation of the overall framework of governance and decision-making to make it more inclusive and participatory, as "capabilities are an interlocking set; they support one another, and an impediment to one impedes others" (Nussbaum, 2002).

The Gender Budgeting initiative[57], which has been adopted by the Government of India, says that both the Central and the State Governments should ensure "not less than 30 per cent of the funds/benefits are earmarked in all the women-related sectors". It also directed that a special vigil be kept on the flow of the earmarked funds/benefits through an effective mechanism to ensure that the proposed strategy brings forth a holistic approach towards empowering women. A study conducted by the National Institute of Public Finance and Policy (NIPFP) of the Union Budget in 2001-2002, concluded that "the gender incidence of the benefits of public expenditure is difficult to measure in precise quantitative terms, since the bulk of the expenditures are meant to provide services that are essentially public in nature, for instance, benefits of expenditure on defence, maintenance of law and order, and dispensation of justice are enjoyed by all citizens irrespective of caste, creed or sex. Nevertheless, considering the gender bias inherent in a male-dominated society, the Budget should provide some idea about how much is earmarked specifically for the

In parts of the State, where there has been some insurgency, women face constraints not just as victims of violence but, also in terms of denial of opportunities and options, which would otherwise have been available to them under normal circumstances.

[57] *For details refer to the Study on Gender Budgeting by NIPFP, New Delhi, available at* ***http://wcd.nic.in/chap11.htm***



benefit of women. The suggestion is not that the gender-wise break-up of all government expenditure should be provided, but, that the expenditure meant primarily for women be shown separately so that they can be easily culled out from budget heads of social and economic services in which it is possible to segregate such expenditures. With this objective in view, the report recommended the following priority actions for gender-sensitive budgeting:

- Mechanism to collate gender disaggregated data from relevant departments be developed to obtain the gender-wise relevant statistical database, targets, and indicators.

- Gender audit of plans, policies, and programmes of various ministries with pro-women allocations should be conducted.

- The provisions for women in the composite programmes under education, health, and rural development, etc, should be segregated to protect the provisions by placing restrictions on their reappropriation for other purposes."

Implementing the gender-based budgeting initiative will be extremely useful in Arunachal and will help to better understand the impact of the development process on women.

While equality and empowerment of women requires simultaneous action in a number of areas, some areas critical to gender equity are:

- Enhancing women's capacities: in spite of the fact that there are new opportunities for a section of women in Arunachal Pradesh, particularly in the last few decades, these are not available to a large section of women. Notwithstanding the significant gains in overcoming the gender gaps in education and health, the pace of progress has been inadequate and uneven within the State.

- Expanding opportunities for women: opportunities to earn income and to participate in decision-making forums are essential for the empowerment of women. Specific opportunities, training, and skill impartation are required to enhance income opportunities. In view of the prevalent community spirit and collective will for mutual assistance, organising self-help groups for income-generation should be encouraged.

- Ensuring legal justice for women: building and strengthening the institutional machinery to ensure implementation and monitoring of gender-empowerment policies.

Some specific measures that need to be undertaken to empower women are outlined below:

Access to capacity-building:

Over the last few years, some improvement has been made in building the capacities of women and girls in Arunachal Pradesh, but, it is clear that much more needs to be done. The following steps are suggested:

- The goal of universal high quality primary education has to be realised. In districts with low literacy rates for women, such as Kurung Kumey, East Kameng, Tawang, Tirap, and Upper Subansiri, area-specific targeted programmes should be implemented so as to enhance women's access to education.

- Easily accessible and cost-effective facilities for higher education and distance education should be made available to women.

To reduce gender disparity in healthcare, the following strategies may be beneficial:

- The State must take steps to reduce infant and maternal mortality rates through a phased, time-bound programme. Special emphasis has to be given to strengthen health infrastructure in the remote and relatively less developed districts of the State.

- Access to health services in rural areas, including those for reproductive health, must be improved both in quantity and quality.

Access to economic opportunity:

Efforts to ensure economic equality must take into account women's economic circumstances, economic capabilities, and the level of economic development of the State. Concerted efforts are required in the following areas:

- Expansion of employment opportunities for women, particularly in the public sector, has to be made a priority. Innovative and locally viable policies have to be formulated to move women out of gender-segregated employment, and to enhance their access to non-traditional occupations.

- There is an urgent need to enforce the legally prescribed minimum and equal wages for women and men both in the formal and informal sectors.

- Women entrepreneurs, particularly in micro-enterprises, need to be encouraged through effective credit support, skill-enhancement and other measures. There is significant scope for micro-credit schemes specifically targeted at women in rural non-farm areas as well as in the urban informal sector.

- A gender-disaggregated and accurate database is essential for effective policy formulation. All aspects of women's well -being, work, and role in the home need to be exhaustively covered so that specific and appropriate strategies can be designed at the district or even at the sub- district level.

Equality in governance:

Women in Arunachal Pradesh are almost invisible in the government structure. A bold policy initiative with a long-term commitment to implement change is necessary.

- Representation and participation of women in the legislative, judiciary, and executive bodies should be made mandatory.

- It should be legally binding for political parties to reserve a minimum quota for women in party decision-making bodies and, in the distribution of party tickets for elections.

- Gender-sensitisation training for male members of the legislature, civil servants and other members of the Government is critical for achieving gender equality in governance.

- The strengthening of the State Commission for Women will help to address many of the problems faced by women in Arunachal Pradesh.

These measures call for a new gender-centric paradigm of development, and the courage to introduce and sustain this change, so that a more equitable society can be attained.

Representation and participation of women in the legislative, judiciary, and executive bodies should be made mandatory.

Chapter 7

Deprivation and inequality

Deprivation and inequality

when less is more

Before the launch of the development programme in the post-Independence period, the degree of inequality in the distribution of resources in Arunachal was limited. Community ownership of land, and the practice of *jhum* cultivation, constrained the accumulation of capital and thereby restricted the growth of inequalities in the traditional communities. The low productivity in *jhum* cultivation kept the level of consumption low but, mutual insurance, and other traditional redistributive mechanisms, reduced the intensity of absolute poverty. However, developmental activities undertaken by the Government gradually changed the mode of production in agriculture, and brought into being two modern sectors: the secondary and tertiary sectors. In agriculture, permanent cultivation gradually began to grow in importance. Along with the change in the mode of production came institutional changes. Community ownership of land, especially the land in the plains, gave way to individual ownership. The individual ownership of land, the expansion of banking facilities, and the emergence of the market, provided the incentives, and the instruments of accumulation. Slowly, inequality in the distribution of property and income emerged and, with inequality, poverty also increased.

Shaped by the new institution of property rights in recent years, the inequalities have risen to proportions unprecedented in tribal communities, which, not so long ago, were quite egalitarian[58]. In fact, the traditional security mechanisms protected an individual during times of adversity. Community ownership of land, and other natural resources, is a manifestation of this security cover, and this resulted in a comparatively egalitarian society without destitution. Relative poverty, and the unequal distribution of resources and income, was very low in most of the tribal communities.

This community spirit also meant that the individual incentive for savings and accumulation of capital was low. Consequently, a very low rate of capital accumulation kept the community in the slough of perpetual poverty, but, this poverty did not inflict undue suffering on the individuals due to the presence of social solidarity and cohesiveness. The community was poor but, the individual did not feel poor in the absence of high inequalities in resource distribution[59].

[58] While most tribes are comparatively egalitarian, there are social distinctions that divide the people into classes, among certain tribes. In some groups, the society may be divided into chiefs and nobles, a middle class and slaves or servants. Yet, tribal councils are collective, and festivals, dancing and feasting are collective activities.

[59] Wealth and social prestige was often measured by the number of mithuns (a mithun is a bovine species common in North-East India) a person possesses; yet, since the entire village consumed the mithun when it was killed, it actually became a way to redistribute wealth.

The property rights regime that evolved with the growth of the non-agricultural sectors became instrumental in inculcating the profit motive, and also in generating incentives for savings, investment, and accumulation of capital. This has weakened the traditional institutions, and the new institutions have not emerged as viable alternatives to the old tested institutions.

This chapter starts with an assessment of inequalities in the distribution of land and assets, in income and consumption. Various estimates of poverty in Arunachal Pradesh are discussed, with a special focus on poverty estimates based on the SHDR survey. The chapter draws attention to the fact that some specific deprivations that are not part of UNDP's Human Poverty Index (HPI) are relevant in Arunachal, due to the special circumstances that prevail here. Finally, some priority areas have been identified for initiating action.

The chapter draws attention to the fact that some specific deprivations that are not part of UNDP's Human Poverty Index (HPI) are relevant in Arunachal, due to the special circumstances that prevail here.

A. Inequality in land holdings

The main occupation of the majority of the people is agriculture and the ownership of land is an important indicator of the access to productive assets. In the absence of data on land ownership, data on operational land holdings is used for this analysis[60].

The average size of land holdings in the State was 3.55 hectares, according to the Agricultural Census, 1995-96. Of the total workers, land operators constitute 58.2 per cent. In spite of the low population density, more than 38 per cent of the farmers operate on less than two hectares of land. Except in the plains, two hectares of land is not enough to provide a reasonably adequate income to the operators.

There is considerable inequity in the operation of land holdings, and small and marginal holders operate only a small proportion of the land. The data shows that 19.24 per cent of the people are marginal landholders and operate only 3.03 per cent of the land {see Table A 7.1 (a and b) in the Appendix}. Similarly, 7.64 per cent of the land is under the operation of small farmers, who constitute 19.33 per cent of the farming households. Thus, only about 10 per cent of the land is operated by close to 40 per cent of the farming households. In contrast, large land operators, who constitute 5.75 per cent of the total number of farmers, have as high as 23.65 per cent of the land under their operation.

District-wise data shows wide disparity in holdings and pattern of farming. In Tawang, more than 70 per cent of the operators are marginal, and the area under them is 50 per cent of the total. Small and marginal farmers account for 97.21 per cent of the holdings. In contrast, in Upper Subansiri, small and marginal farmers account for less than 10 per cent of farms, and barely 2 per cent of the area. In Lower Subansiri, Upper Siang, Dibang Valley, Lohit, and Changlang, the small and medium farmers account for roughly half the operational holdings and between 11 per cent (in Upper Siang) to 25 per cent (in Changlang) of the land.

The average size of land holdings in the State was 3.55 hectares, according to the Agricultural Census, 1995-96. Of the total workers, land operators constitute 58.2 per cent. In spite of the low population density, more than 38 per cent of the farmers operate on less than two hectares of land.

[60] *A cadastral survey has not been undertaken yet in Arunachal Pradesh, and land ownership data is not available. The rules and institutional mechanisms governing access to land vary from tribe to tribe, and place to place, and there is considerable complexity regarding ownership of land. Data on individual land operations from 1995-96 Agricultural Census has been used for this analysis.*

B. Inequality in asset holdings

Besides land, other assets like houses, livestock, agricultural implements, and consumer durables are important indicators of command over resources. Most of these assets not only generate income, but, also enhance the social status and creditworthiness of the owners. In Arunachal Pradesh, the pattern of asset ownership makes a visible difference to the standard of living.

Asset distribution among the households display a high degree of inequality; 10 per cent of the households at the bottom possess less than 2 per cent of the total assets, while the top 10 per cent of households have more than 40 per cent of the share.

All non-land assets of households are included in assets, these are private household assets, and do not include community-held assets. The average per capita asset holding in the State is estimated at Rs. 29,630. Once again, there is considerable inter-district inequity. The per capita assets are highest in East Siang (Rs. 37,710), and the lowest in Tirap, where the per capita asset holdings (Rs. 16,490), are less than half the asset holding in East Siang, and close to half the State average. (For details see Table A 7.2 in the Appendix). Districts like Tawang, West Kameng, Papum Pare, West Siang, East Siang, Upper Siang, and Lower Dibang Valley also have per capita asset holdings higher than the State average.

Asset distribution among the households display a high degree of inequality; 10 per cent of the households at the bottom possess less than 2 per cent of the total assets, while the top 10 per cent of households have more than 40 per cent of the share. The bottom 20 per cent own less than 5 per cent of the assets, while the top 20 per cent own more than 47 per cent of the assets. The average asset holding of the bottom 10 per cent is only Rs. 3,240 while that of the top 10 per cent is Rs. 141,280, which is more than 40 times as much! Similarly, the difference between the average asset value of the bottom 20 per cent and top 20 per cent is Rs. 88,630. These figures show the high inequality in the distribution of wealth. District-level data reveal a high degree of inequality across the districts (see Table A 7.3 in the Appendix). In East Siang, the difference between average value of assets of the top 10 and bottom 10 per cent is even higher, it is Rs. 206,460. In Papum Pare this difference is Rs. 189,360. Compared to this, in Kurung Kumey the difference is only Rs. 30,500. Similarly, when the average values of the top and bottom 20 per cent are considered, the difference in asset holding ranges from Rs. 24,090 in Kurung Kumey to Rs. 128,160 in East Siang.

C. Inequality in income

The income of the households has been estimated by the production method. An imputed value of products collected from Common Pool Resources (CPRs) – fuel wood, fruits, roots and vegetables, fish, animals, etc, has been added. The average per capita income of the districts ranges from Rs. 8,290 (Kurung Kumey) to Rs. 18,190 (Lower Dibang Valley), and the State per capita income is Rs. 12,930 (see Table A 7.2 in the Appendix). These figures are similar to the per capita gross domestic product estimated by the Directorate of Economics and Statistics, Government of Arunachal Pradesh.

Thus, there is considerable inequality in the income distribution, both at the inter-person level as well as at the inter-district level. The data shows that the bottom 10 per cent of the households have less than 3 per cent of the share while the top 10 per cent of households account for more than 30 per cent of the per capita household income (see Table A 7.4 in the Appendix). Similarly, the top 20 per cent of the people have a share of more than 45 per cent while the bottom 20 per cent have less than 6 per cent of the income. The difference between the average incomes of the top 10 and the bottom 10 per cent is Rs. 28,730. Among the districts, the highest inequity is in East Siang. The recent rise of non-agricultural income in this district is a plausible explanation for the high income inequality here. East Siang has a high level of literacy and reasonably good educational development, and a sizeable proportion of the people are employed in well-paid jobs, and other high income-earning activities. The income inequality of the districts is evident from the high value of the Gini-Coefficients (see Table 7.1).

D. Inequality in consumption

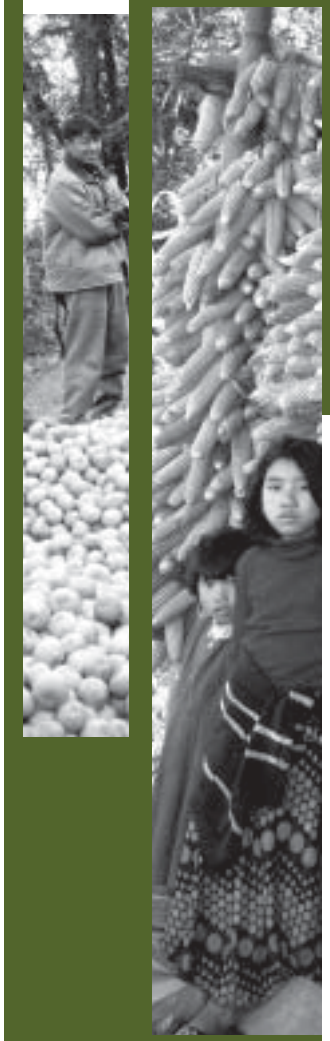
As a measure of economic well-being, consumption has an advantage over income. It is the basket of goods and services consumed by a person that determines his health and well-being. Income of a person may be high but, if it is not used properly, his level of well-being will be low. Consumption is defined to include expenditure on food, water, fuel, and clothing only. Data from the SHDR survey has been used to estimate consumption. The expenditure on health, education, house rent, and liquor is excluded. The consumption expenditure,[61] inclusive of all these items, is presented in Table A 7.2 in the Appendix. The definition of consumption used in this section is mainly nutrition-based, and it includes apart from clothing and fuel, all those items considered adequate to meet all nutritional requirements. The annual per capita household expenditure on these items is estimated to be Rs. 6,330 in the State. Among the 15 districts of the State, the lowest per capita consumption at Rs. 5,260 is in Kurung Kumey. Next comes Dibang Valley (New) with a per capita consumption of Rs. 5,430. East Kameng is also very close to Dibang Valley (New) with a per capita consumption of Rs. 5,640. On the higher side is East Siang with a per capita consumption of Rs. 6,810 per annum.

The definition of consumption used in this section is mainly nutrition-based and it includes apart from clothing and fuel, all those items considered adequate to meet all nutritional requirements.

Consumption expenditure reveals a moderate degree of inequality. The annual per capita household consumption of the bottom 10 per cent of the population is only Rs. 3,187, too low to meet even the minimum requirements, while the top 10 per cent of the population spend on an average Rs. 11,785 in a year (see Table A 7.5 in the Appendix). The share of the bottom 10 per cent of the population is only 5.04 per cent of the total consumption, in contrast to 18.64 per cent share of the top 10 per cent households. Similarly, the top 20 per cent of households account for 32.38 per cent of the consumption expenditure while the bottom 20 per cent account for only 11.46 per cent. The Gini-Coefficients of consumption in the State is 20.41 per cent (Table 7.1).

However, consumption inequality is less than the asset and land inequality in the State. Consumption inequality varies across the districts – the Gini-Coefficients range from 11.26 per cent in Dibang Valley (New) to 22.14 per cent in West Kameng. The average per capita consumption (Rs. 2,448) of the bottom 10 per cent of the households is found to be the lowest in Dibang Valley (New) while it is highest (Rs. 3,582) among the bottom 10 per cent of the people in Papum Pare. Among the top 10 per cent households, the per capita consumption is found to be highest in West Kameng with an annual consumption of Rs. 13,236, and the lowest is in Kurung Kumey with an annual average consumption of Rs. 7,269. The difference between the average consumption of the top 10 per cent and the bottom 10 per cent of the population is highest in West Kameng (Rs. 9,824) followed

[61] *Consumption includes money value of all items of consumption (purchased and collected from the forest and the CPRs). It includes food, housing, clothing, house gas, electricity, fuel, etc., all relating to food expenditure and non-food consumption like tobacco, drinks, and education.*



by Lower Dibang Valley (Rs. 9,182). In East Siang, too, this difference is very high i.e., (Rs. 9,166). Small differences are found in Kurung Kumey (Rs. 3,744), and East Kameng (Rs. 4,063) (see Table A 7.5 in the Appendix).

Table 7.1 shows district-wise inequalities. Measured by the Gini-Coefficient, inequality is found to be higher in assets and land, and lower in income and consumption. The relatively lower inequality in income, and more particularly in consumption, is due to the high proportion of consumable items including food and fuel wood, which the poor collect from the forests and other Common Pool Resources. It seems that the traditional poverty-sharing redistributive mechanisms have not yet vanished completely from the rural areas.

The high inequality in land holding is indicative of the fact that some farms are operated on a large scale, especially in areas where permanent cultivation has been introduced, but, in the other areas where the topography is hilly, the scale of farm operations is relatively small. The inequality in non-land assets is a partial indicator of the inter-household differential in unearned income.

Table 7.1

District-wise values of Gini-Coefficients (in %)

Sl.No	Districts	Consumption	Income	Land	Asset
1	Tawang	12.61	8.21	15.03	38.18
2	West Kameng	22.14	29.79	32.83	60.87
3	East Kameng	12.26	29.69	44.02	40.50
4	Papum Pare	19.80	41.32	40.98	63.72
5	Kurung Kumey	11.34	31.43	35.64*	30.27
6	Lower Subansiri	17.90	35.58	35.64*	52.43
7	Upper Subansiri	21.66	44.67	49.48	53.24
8	West Siang	18.04	37.40	44.08	29.78
9	East Siang	20.58	47.98	28.50	62.48
10	Upper Siang	19.15	35.54	33.30	53.90
11	Lower Dibang Valley	20.28	41.75	56.33@	40.98
12	Dibang Valley (New)	11.26	38.53	56.33@	34.51
13	Lohit	21.67	42.25	46.17	64.27
14	Changlang	19.65	32.37	32.09	32.29
15	Tirap	19.78	38.61	36.64	35.57
	Arunachal Pradesh	**20.41**	**40.27**	**46.55**	**48.18**

Gini-coefficient is a widely used measure of inequality in income or any other quantitative variable.
*Note: * Relates to Lower Subansiri district (1995-96). @ Relates to Dibang Valley (1995-96).*

Source: Income, Consumption and Asset data are from SHDR Survey, and Land data is from Agricultural Census, 1995-96, Arunachal Pradesh.

E. Poverty

Since the 1960s, considerable research has been done on poverty levels and trends across the country, but, in Arunachal, very little research has been done in this area, and the limited information that is available makes it difficult to estimate the extent and intensity of poverty prevalent here even today. Some attempts have been made to quantify and assess poverty, but, these estimates have various shortcomings. A brief review of these estimates follows.

Table 7.2

People Below the Poverty Line in Arunachal Pradesh (in %)

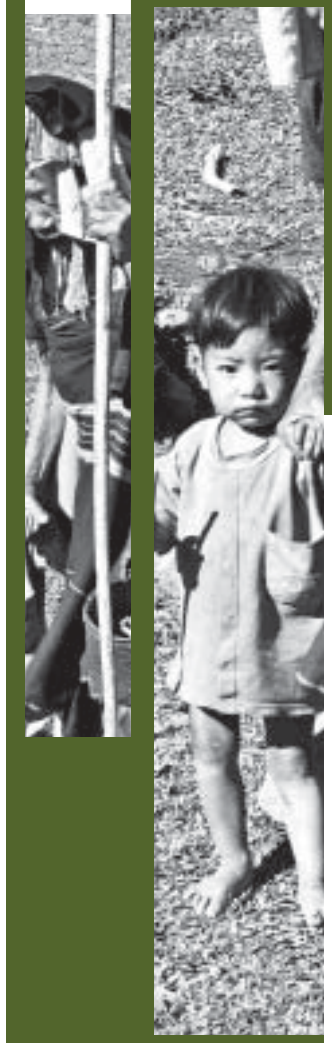
Districts	1992-93	1997-98	Change (+/-)
Tawang	66	77	11
West Kameng	25	87	62
East Kameng	75	49	-26
Upper Subansiri	61	97	36
Lower Subansiri	79	73	-6
Papum Pare	49	75	26
West Siang	65	61	-4
East Siang	53	68	15
Upper Siang	64	67	3
Dibang Valley	34	80	46
Lohit	52	81	29
Changlang	21	80	59
Tirap	67	89	22
Arunachal Pradesh	**54**	**78**	**24**

Source: Statistical Abstract of Arunachal Pradesh, 1999.

Estimates made by the Directorate of Rural Development

A poverty estimate made by the Directorate of Rural Development, Government of Arunachal Pradesh, showed that 54 per cent of families in rural Arunachal Pradesh were poor in 1992-93, and this percentage increased to 78 per cent in 1997-98, an increase of 24 per cent in the course of five years. The estimates show a high degree of inter-district variation in poverty, from 21 per cent in Changlang, to 79 per cent in Lower Subansiri in 1992-93 (See Table 7.2). The picture changed unexpectedly in the next five years. According to these estimates, the poverty ratios in Arunachal increased substantially during the 1992-93 to 1997-98 period, and the inter-district variation continued to be high. In 1997-98, East Kameng had the lowest incidence of poverty (49 per cent), while Upper Subansiri recorded a poverty ratio which was nearly twice as high (97 per cent). During this period, the poverty ratio increased from 25 to 87 per cent in West Kameng, a rise of 62 per cent. In Changlang, it increased from 21 per cent to 80 per cent. On the other hand, poverty declined from 75 per cent to 49 per cent in East Kameng. In Upper Subansiri, poverty rose from 61 to 97 per cent in the course of five years.

These estimates of poverty do not match those of other experts. There is also no plausible explanation for the inter-district as well as the temporal variation of poverty as shown in Table 7.2. Since the Government has been implementing many poverty alleviation programmes, a negative relationship is expected between poverty, and the level of income. Similarly, a negative relationship is expected between the growth of income, and the change in the poverty level.



Estimates made by the Planning Commission

According to the Planning Commission estimates, 39.35 per cent people of Arunachal Pradesh were living Below the Poverty Line (BPL) in 1993-94. In the course of the next few years, poverty declined. In 1999-2000, 33.47 per cent of the people were estimated to be under the poverty line[62] (NHDR 2001).

Estimates by Radhakrishna and others

Radhakrishna, R. et al. (2004), of NSSO use data in their study on chronic poverty and malnutrition in different States and Union Territories of India during the 1990s, and provide an estimate of poverty for Arunachal Pradesh. According to their study, the poverty ratio in rural Arunachal Pradesh was 41.4 per cent in 1993-94, and it declined to

Table 7.3

Percentage of households Below the Poverty Line, Arunachal Pradesh, 2000-2001

Districts	Rural	Urban	Combined
Tawang	23.0	7.7	21.0
West Kameng	25.7	15.9	24.6
East Kameng	26.5	11.1	23.3
Papum Pare	25.4	14.0	20.3
Kurung Kumey	28.9	NA	28.9
Lower Subansiri	23.4	11.3	21.4
Upper Subansiri	28.1	13.0	25.9
West Siang	26.8	11.0	22.3
East Siang	21.9	10.1	17.3
Upper Siang	26.7	NA	26.7
Lower Dibang Valley	19.7	13.5	18.4
Dibang Valley (New)	26.3	NA	26.3
Lohit	28.7	11.8	26.0
Changlang	32.5	13.8	30.3
Tirap	28.6	12.5	26.7
Arunachal Pradesh	**26.7**	**12.3**	**23.7**

Note: NA indicates not applicable because Kurung Kumey, Upper Siang and Dibang Valley (New) have no urban populations.

Source: Estimated on the basis of data from the SHDR Survey.

[62] *The Planning Commission uses the National Sample Survey (NSS) consumption data of Assam, and estimates the poverty ratio for Assam. Assam's poverty ratio is applied to all the States of North-East India including Arunachal Pradesh. All the States of North-East India are assumed to have the same rural-urban poverty ratios as Assam. The poverty line is in rupees per capita per month, in 1993-94 it was Rs. 232.05 (Rural), and Rs. 212.34 (Urban). In 1999-2000, the poverty line for Assam was Rs. 365.43 (Rural), and Rs. 343.99 (Urban).*

23.4 per cent in 1999-2000. The same study shows that the urban poverty of the State declined from 5.8 per cent in 1993-94 to 5.0 per cent in 1999-2000. This estimate is based on State-specific samples. However, in this study too, the Assam Poverty Line is used to estimate the poverty level in Arunachal Pradesh.

Rural poverty in Arunachal is comparable to that in the country as a whole (27.09 per cent), urban poverty in Arunachal (12.3 per cent) is considerably lower than the all-India figure of 23.62 per cent.

An estimation of district-level poverty on the basis of the NSS data has one problem: the small size of sample. Even by pooling both the Central and State samples, a reliable estimate of poverty for the 15 districts of Arunachal Pradesh is not possible. However, the State-level estimate seems to have reasonable reliability. Consumption expenditure obtained from the NSS data, and the estimates obtained from the SHDR survey, gives a similar State-level average for the incidence of poverty.

Poverty estimates based on SHDR Survey

District-wise poverty ratios have been estimated using the SHDR Survey data of 5,257 households. Some households had to be excluded due to incomplete data, and this reduced the actual sample size to 3,699 households. The State-level poverty estimates obtained from the SHDR Survey are different from that of Radhakrishna, R. et al. for 1999-2000. The Assam poverty line has been used in the absence of any other alternative[63].

According to these estimates, 23.7 per cent of the people of Arunachal are living in poverty. Rural poverty (26.7 per cent) in the State is 14.4 per cent points higher than urban poverty. Rural poverty in Arunachal during 2000-2001 is much lower than that in Assam (40.04 per cent in 1999-2000, NHDR, 2001). On the other hand, the urban poverty ratio in Arunachal in 2000-2001 was 12.3 per cent, which is substantially higher than that in Assam (7.47 per cent in 1999-2000). The estimated combined poverty level of Arunachal Pradesh for 2000-2001 is lower than that of Assam for 1999-2000 (36.09 percent). India's combined poverty ratio was 26.10 per cent in 1999-2000, which is 2.40 per cent points higher than that of Arunachal Pradesh for 2000-2001. While rural poverty in Arunachal is comparable to that in the country as a whole (27.09 per cent), urban poverty in Arunachal (12.3 per cent) is considerably lower than the all-India figure of 23.62 per cent.

[63] *The poverty line for Arunachal Pradesh should be different from that of Assam, given the high dependence of the people of Arunachal Pradesh on Common Pool Resources. The price level and consumption basket of goods in Assam is different from that in Arunachal Pradesh. But, in the absence of any State-specific poverty line, the Assam poverty line has been used to estimate the extent of poverty in Arunachal.*

Box 7.1

Public expenditure and poverty

The theoretical relationship between the level of poverty, and the size of the Government is indeterminate. However, if information on the pattern of Government expenditure is available, a relationship can be constructed between poverty and the size of the Government. As discussed earlier, the Government has been playing a very active role in Arunachal. While much of the Government's efforts have been directed to the creation of infrastructural facilities in the State, since the end of the 1970s, various target-oriented programmes to reduce the incidence of poverty have been undertaken. Given the high Government expenditure, a part of which is directed to the reduction of poverty, it is expected that the growth of public expenditure will mitigate poverty by raising the consumption level of the poor. So, the level of income, especially of consumption, of a district and its poverty ratio, can be hypothesised to bear a negative relationship with Government expenditure. An empirical derivation of this two-step relationship — the effect of poverty alleviation programmes on the distribution of consumption, and that of a rise in the per capita consumption on poverty — requires detailed district-wise data on public expenditure. Since detailed data is not available, the effect of per capita household consumption and assets of a district on its poverty ratio is estimated.

The regression of poverty-ratio (P) on the per capita consumption (C) is as follows:

$$P = 53.53 - 3.54\ C \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$
$$\quad (7.9) \quad (4.4)$$
$$R^2 = 0.60 \qquad n = 15$$

where the figures in the parenthesis are the t-values and n is the number of observations (districts). The coefficient of C is quite high, and statistically significant. It explains 60 per cent of the inter-district variation in poverty. This shows that a significant part of the rise in consumption percolates down to the poor. The addition of per capita household assets (A) raises the explanatory power of the regression equation:

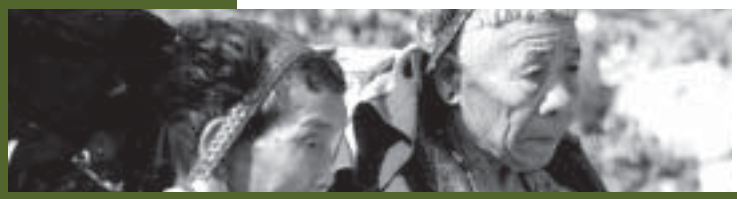
$$P = 46.40 - 2.10\ C - 0.18\ A \qquad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$
$$\quad (5.1) \quad (1.4) \quad (1.2)$$
$$R^2 = 0.64 \qquad n = 15$$

However, the coefficient of neither A nor C is different from zero, at the 10 per cent level. When A is regressed on P, the coefficient of A becomes insignificant. This means that asset accumulation has no significant effect on poverty. The poverty-reducing effect of the rising per capita consumption shows the efficacy of the Government's efforts. Under the circumstances, it is unlikely that rural poverty increased from 54 to 78 per cent during 1993-98, as shown in the estimates by the Directorate of Rural Development, Government of Arunachal Pradesh.

Poverty varies over the districts, ranging from 30.3 per cent in Changlang to 17.3 per cent in East Siang. High poverty ratios prevail in Kurung Kumey, Tirap, and Upper Siang (see Table 7.3). These district poverty estimates have a good measure of reliability, not only because of the large sample size, but also because of their consistency. Using district-level data, a high negative correlation is found between poverty and per capita household consumption (correlation coefficient is –0.77) and between poverty and per capita household assets (correlation coefficient is –0.76). Both the correlation coefficients are significant at 0.01 level.

The concept of human poverty, which is a three-dimensional measure of poverty — the dimensions being the deprivation of health, education, and economic opportunities — is indeed a broad one and is probably more acceptable as a measure of deprivation.

Nutritional poverty has its limitations as a measure of deprivation, especially in Arunachal Pradesh, where a significant part of consumption comes from the forest and Common Pool Resources, and the problem of starvation is not widespread. Besides, the satisfaction of hunger alone is not all that is needed for a deprivation-free life. Protection against common diseases, education, safe drinking water, shelter, and road connectivity for the villages and hamlets are equally necessary for a better life.



In fact, poverty, as a measure of deprivation in Arunachal Pradesh, should capture the hardship and the lack of opportunity of the people, in the context of its sparse settlements, hilly topography, and inaccessibility. The concept of human poverty, which is a three-dimensional measure of poverty — the dimensions being the deprivation of health, education, and economic opportunities — is indeed a broad one and is probably more acceptable as a measure of deprivation for Arunachal Pradesh than any mono-dimensional measure such as the one based on income or consumption. Realising the shortcomings of the income/expenditure approach of poverty estimation, the Government of India has, on the recommendations of an expert committee, switched from the mono-dimensional measure to a measure based on 13 socio-economic indicators. A 13-dimensional poverty index could not be constructed due to the non-availability of data. Therefore, an attempt is made to analyse the deprivation of the people using the United Nations Development Programme (UNDP) concept of poverty.

F. Human Poverty Index of Arunachal Pradesh

The Human Poverty Index (HPI) measures deprivations in health, education, and economic provisioning. The concept of HPI, as detailed in UNDP's HDR, 2002, is used in order to make it comparable[64]. The HPI for Arunachal Pradesh is estimated to be 39.47 per cent — a value that is high by any standard. The HPI for the country as a whole is estimated to be 33.1 per cent, which is much lower than the HPI Arunachal Pradesh. However, the percentage of people under the poverty line (income poverty alone) in Arunachal is less than the ratio for the country as a whole. A high HPI, and a medium HDI of the State, implies that the benefit of human development has not spread sufficiently to impact human poverty. More specifically, it implies that an increase in income has failed to improve the quality of life of the people.

Many districts of Arunachal Pradesh have high levels of human poverty. The HPI in the districts range from 49.27 in East Kameng to 31.06 in East Siang[65]. Seven districts have HPI values higher than 40; districts like East Kameng, Tirap, Lower Subansiri, Tawang, Upper Siang, Upper Subansiri and Changlang have reasonably high HPI values. Only three

Table 7.4

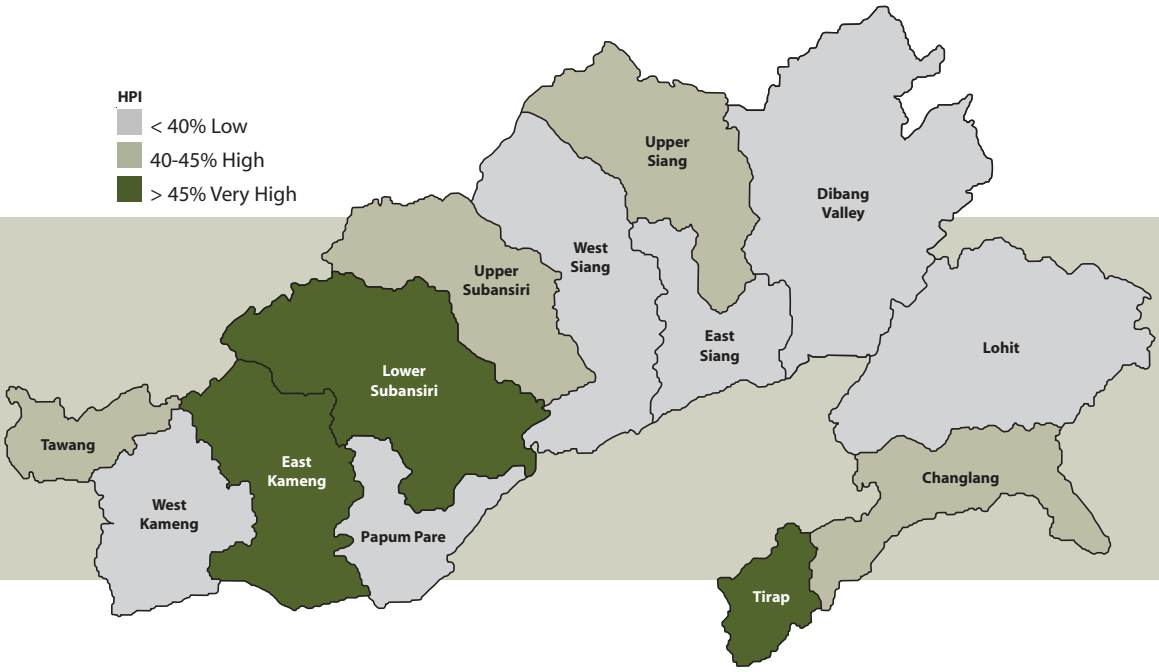
Human Poverty Index of Arunachal Pradesh

Districts/State	Illiteracy Rate (2001) %	Probability at Birth not Surviving to Age 40	Underweight Children Under Age 5	% Population not Using Improved Water Sources	Unweighted Average of Underweight Children and % of Population not Using Improved Water Sources	HPI	HPI Rank
Tawang	52.68	34.890	51.610	25.58	38.595	43.453	10
West Kameng	39.24	28.850	58.910	18	38.455	36.115	4
East Kameng	59.36	43.010	69.770	12.71	41.240	49.270	13
Papum Pare	30.68	22.640	63.730	17.97	40.850	33.085	2
Lower Subansiri	55.21	31.020	62.580	24.93	43.755	45.465	11
Upper Subansiri	49.65	34.350	57.240	21.23	39.235	42.068	8
West Siang	40.53	27.120	54.550	13.14	33.845	34.694	3
East Siang	39.27	21.640	47.060	6.58	26.820	31.069	1
Upper Siang	50.22	33.240	60.710	20.22	40.465	42.460	9
Dibang Valley	41.11	33.690	62.500	18.22	40.360	38.668	6
Lohit	43.93	22.570	57.300	27.06	42.180	38.508	5
Changlang	48.68	24.140	52.630	36.58	44.605	41.739	7
Tirap	58.27	31.640	61.290	28.72	45.005	47.457	12
Arunachal Pradesh	**45.66**	**28.070**	**58.820**	**22.46**	**40.610**	**39.475**	

[64] *See Technical Notes for details.*

[65] *The HPI has been estimated for the 13 'old' districts, due to data constraints. However, the discussion does refer to the new districts of Kurung Kumey and Dibang Valley (New) as well.*

Figure 7.1: Concentration of poverty



districts — East Siang, Papum Pare, and West Siang — have relatively low HPI values, less than 0.35. In Figure 7.1, districts are categorised as having low and high HPI. Districts with HPI of less than 0.40 are categorised as low HPI districts, East Siang, Papum Pare, West Siang, West Kameng, Dibang Valley, and Lohit belong to this category. Districts with HPI in the 0.40-0.45 range are categorised under the high HPI category, and those with HPI values over 45 are districts with very high human poverty. Three districts East Kameng, Tirap and Lower Subansiri fall in this category (see Figure 7.1).

Among the different components of HPI, illiteracy has the highest correlation (0.93) with HPI. However, as the Table 7.4 shows, there is no one-to-one relationship between the different dimensions of HPI. Papum Pare is the least deprived in terms of illiteracy, while in the percentage of population not using safe drinking water sources, it is in the fourth place and, as for the underweight children under age 5, its rank is at number 12. Similarly, East Siang is least deprived when assessed on the probability of people surviving upto 40 years, in underweight children, and in the lack of safe drinking water, but, in illiteracy, it is ranked third. Lohit ranks second in 'probability at birth of not surviving up to 40 years of age', but ranks sixth in illiteracy, and in the proportion of underweight children under 5, and has an extremely high proportion of people without access to safe drinking water. Similarly, in Changlang, the probability of not surviving to age 40 is comparatively low, as is the proportion of underweight children under 5 years of age, but, illiteracy is high, and so is the proportion of people without access to improved water sources. Its overall rank is 7. In East Kameng, the district with the highest incidence of poverty, the proportion of people not expected to live to age 40, the illiteracy rates, the proportion of underweight children, are all high. The percentage of population not using improved water sources varies widely from 6.58 per cent in East Siang to 36.58 per cent in Changlang.

G. Inaccessibility and human poverty

A multidimensional measure of deprivation provides a more accurate picture of deprivation, but, it poses the problem of identifying the causal factors. Correlation analysis shows a close association of different measures of deprivation with inaccessibility. The people in inaccessible areas are found to suffer most from different types of deprivation. While inaccessibility implies not only the level of road connectivity but, also non-availability of healthcare and educational facilities, here inaccessibility refers largely to road connectivity.

According to the Arunachal Pradesh Public Works Department (1997), 61.47 per cent of the villages in the State have no connectivity (see Table A 8.5 in the Appendix). These villages do not have any constructed road within a radius of one km, in case of hilly terrains, and in a radius of 5 km, in the plains. Villages in the inaccessible areas are very often sparsely populated. In the State as a whole, 26.56 per cent of the people live in inaccessible areas (see Table A 8.6 in the Appendix). Both unconnected villages, and the percentage of people with no road connectivity show a positive association with HPI[66]. Thus, many of the inaccessible districts are districts with high HPI.

The people in inaccessible areas are found to suffer most from different types of deprivation. While inaccessibility implies not only the level of road connectivity but, also non-availability of healthcare and educational facilities, here inaccessibility refers largely to road connectivity.

[66] A bivariate correlation of these three variables shows significant relationships. The value of correlation between HPI and villages not connected by road is 0.625 (significant at 0.05 level), and between HPI and people with no road facilities is 0.727 (significant at 0.01 level).

H. Deprivation in health

Deprivation in health, an important component of HPI, is measured by the percentage of people not expected to live up to the age of 40 years. In Arunachal Pradesh, the hilly and steep terrain, inaccessibility, and scattered habitations result in poor access to medical facilities and, consequently, poor health status. In Arunachal, 28 per cent of the people are expected not to survive beyond the age of 40. In the country, the proportion of people who are expected to die before 40 is only 16.7 per cent. Thus, substantial improvements in medical care are required to increase longevity of the people.

Districts located in high-altitude areas and those that are less accessible have more premature deaths. In Kurung Kumey, East Kameng, and Dibang Valley (New), more than 40 per cent of the population is not expected to survive beyond the age of 40.

Not surprisingly, districts located in high-altitude areas and those that are less accessible have more premature deaths. In Kurung Kumey, East Kameng, and Dibang Valley (New), more than 40 per cent of the population is not expected to survive beyond the age of 40. In contrast, the well-connected districts with more plain areas have substantially higher life expectancies. In East Siang, only 21.64 per cent of the people are likely to die before the age of 40. Similarly, in Papum Pare, the district with good connectivity and access to healthcare facilities, approximately 23 per cent of the people are not expected to live beyond 40 years of age. Lohit, another district with a substantial proportion of plains land, also reports a lower percentage of such deaths (Table 7.4).

Premature death (manifested in the form of high probability of death before age 40) can be reduced through preventive and curative health services. Preventive health services, such as those available through immunisation, show a high correlation with such premature deaths[67]. Literacy and awareness, road connectivity along with the favourable behavioural factors, also impact on premature deaths[68].

Surprisingly, variables such as medical facilities, or the distance of the village from the health centre, doctor-population ratio, and hospital bed per 1,000 population, do not have any significant relationship with premature deaths (see Table A 8.25 in the Appendix). This suggests that the creation of medical facilities alone is not sufficient: awareness, willingness, and road connectivity are the more important variables in improving the health status of the population.

In the absence of life tables for the population of other States for the year 2000-01, Arunachal's relative position cannot be ascertained. However, the probability of not surviving to age 40 in Arunachal Pradesh in 2000-2001 was higher than that of all the 15 major States in 1991. The percentage of people expected to die before the age of 40 in Arunachal (in 2000-2001) was higher than that of all the major States of the country in 1981, except Uttar Pradesh. This implies a more than 20-year gap between the other States and Arunachal.

Box 7.2

Inaccessibility – the cause of death?

Untimely death is a frequent caller in the scattered villages located in the remote areas of Arunachal Pradesh. These villages do not have 'jeepable' roads, nor do they have any access to medical services. The field investigators of the SHDR research team heard numerous narratives of untimely deaths, many of which could have been avoided through provision of medical services. Children dying of diarrhoea, young people dying of typhoid, women dying of simple complications resulting from pregnancy, are common in villages, especially those which require more than one day's foot march to reach the nearest health centre. Inaccessibility has meant the tragic termination of life in infancy and childhood. Inadequate medical services means shortened lifespans.

[67] The value of correlation coefficient being –0.74 (significant at 0.05 level).
[68] The percentage of people who are not likely to live up to age 40 has a correlation coefficient of 0.70 with illiteracy, and 0.78 with non-connectivity — both are significant at 0.05 level.

I. Deprivation in knowledge and skill

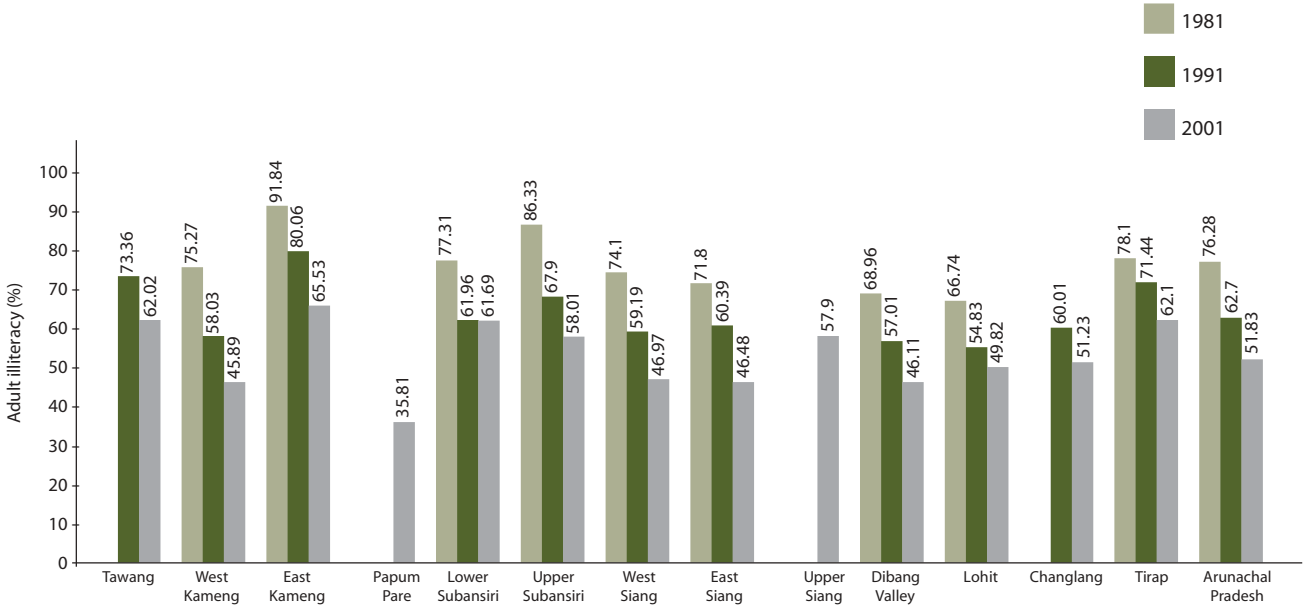
Lack of knowledge and skill limits choice and, hence, constitutes a major deprivation. Deprivation in knowledge and skill can be observed from the prevalence of illiteracy and the non-enrolment and dropout rates. The UNDP approach considers the adult illiteracy rate as a measure of deprivation in knowledge. As is apparent, adult illiteracy reflects a host of socio-economic and cultural factors, and has a bearing on other educational deprivations as well.

Adult illiteracy rate

In spite of the substantial progress that Arunachal Pradesh has made in literacy, adult illiteracy in the State is still high. More than half of the adults in Arunachal are illiterate[69]. Starting from an adult illiteracy rate of 88.7 per cent in 1971 (see Table A 7.8 in the Appendix), Arunachal Pradesh succeeded in reducing the rate to 76.28 per cent in 1981, and to 51.83 per cent in 2001. This substantial achievement is mainly due to the expansion of educational facilities since the 1970s (see Table A 8.18 in the Appendix). However, districts like East Kameng (65.53 per cent), Tawang (62.02 per cent), Lower Subansiri (61.69 per cent), and Tirap (62.10 per cent), all have adult illiteracy rates which are greater than 60 per cent. The highest adult illiteracy is reported in East Kameng as evident from Figure 7.2

An analysis of the progress in the reduction of adult illiteracy across different age groups reveals an interesting dimension of this issue. While the illiteracy rate of the 60+ population declined marginally from 93.3 to 92.6 per cent during 1981-1991; that of the 35-59 age group declined from 85.37 per cent in 1981 to 74.86 per cent in 1991. There was an accelerated fall in the illiteracy rate 15.80 percentage points, for the 15-35 year age group during the same period (see Table A 7.7 in the Appendix). One reason for this is

Figure 7.2: Adult illiteracy-1981, 1991, 2001



[69] *This figure will be higher if functional literacy is taken into consideration. Functional literacy in Arunachal is likely to be low, because the people are schooled in a 'foreign' language, English, and, over time, they tend to forget what they have learnt, because they are not using the learning.*

that within a decade, the group accommodated people belonging to the younger age group, who had a higher literacy rate, and the people of the higher age group with lower literacy levels moved up to the next group. Another reason for the higher literacy in the 15-35 age group is the role of adult education programmes that successfully targeted this age group.

Among the districts, the most rapid decline in illiteracy in this age group was in Upper Subansiri, followed by West Kameng. East Kameng, and Lower Subansiri also experienced a significant reduction of illiteracy during this period. One of the reasons for the success in Lower Subansiri and West Kameng is their sizeable urban population. In Upper Subansiri and East Kameng, the literacy promotion measures were highly successful. In Upper Subansiri, school enrolment ratio also increased, at least upto the early 1990s. The progress was the slowest in Tirap, in the 15-35 age group, and the district continues to have one of the highest adult illiteracy rates in the State.

Illiteracy rate (7+ population)

Starting from near 100 per cent illiteracy, Arunachal Pradesh reduced its illiteracy rate to 45.66 per cent in 2000-2001, which is much higher than the national average. Barring Jharkhand and Bihar, Arunachal has the highest illiteracy rate in the country. In Arunachal Pradesh, illiteracy is highest in East Kameng (59.36). This may be attributed to poor connectivity, and limited schooling facilities in this district. The illiteracy rate is also very high in Tawang, Lower Subansiri, Upper Siang, and Changlang. More than half of the people in these districts were illiterate in 2001. Only in Papum Pare, the illiteracy rate is just over 30 per cent, which is close to the national average (See Table A 7.8 in the Appendix). The high literacy rate of Papum Pare is largely due to the high urbanisation, better educational facilities, and a high percentage of organised sector employment.

Never-enrolled children

The percentage of never-enrolled children in the school-going age is an important indicator of educational deprivation. In the absence of such data for the State and the districts, the illiteracy rate of the 7-14 age group (1991) is used as a proxy measure of never-enrolled children. In 1991, as high as 45.53 per cent of children in this age group were illiterate (Table 7.5). Most of these children were probably never enrolled in school or may have been enrolled for a few months. The illiteracy rate for the 7-14 age group in Arunachal was higher than that of the majority of the States of India. Only Rajasthan (52.78), Bihar (51.74), Uttar Pradesh (49.50), and Meghalaya (49.30) had higher percentages of never-enrolled children.

Among the districts, Tawang had the highest illiteracy rate for this group (56.78 per cent), followed by Tirap, and East Kameng. Even in Lohit, as high as 39 per cent of 7-14 year old children were illiterate. This is the district with the lowest percentage of never-enrolled children. The high proportion of never-enrolled children in Tawang may be due to the fact that less than a third of the habitations have a pre-primary/primary school within the habitation. In this high altitude mountainous district, walking a distance of more than one km, during the rainy season, is a difficult task. East Kameng, another district with a high percentage of never-enrolled children, also has limited schooling facilities. Here, 36 per cent of the villages do not have a pre-primary/primary school within a radius of 0–5 km (Table A 8.20 in the Appendix). In contrast, in Tirap, 80.77 per cent of the villages have education facilities within the village. The high child illiteracy here is probably due to other factors like the high poverty ratio. Though there has been some reduction in this percentage during the last decade, however, in the absence of data, it is difficult to make any estimates for 2001.

Out-of-school children

Never-enrolled children, together with dropouts, constitute out-of-school children. Except for Nagaland (in some years), all the States of North-East India have higher school dropout rates (Class I-V, I-VII, I-X) than the country as a whole. Among the States of North-East India, the situation in Arunachal Pradesh is most disturbing (see Table A 7.9 in the Appendix).

A detailed analysis of the data relating to out-of-school children in the primary age group (6-10) shows that more than 60 per cent of children were not in school in 1991 in the State. This figure was 10 per cent above the all-India average (see Table 7.6). Tirap has more than 70 per cent of out-of-school children, and is closely followed by Lower Subansiri, and Tawang. In spite of the educational progress during the 1980s, in nine out of the undivided 11 districts, more than 60 per cent of children in the (6-10) age group, were not in school in 1991. The scattered and inaccessible location of the villages and the hilly terrain means that children often start schooling at a relatively older age. Besides distance, the lack of infrastructure facilities, along with the socio-economic factors are responsible for the low enrolment of children in schools. In the rural areas, the situation is worse. According to the 1981 Census, 70 per cent children of the (6-10) age group in rural areas were not in schools, which declined to 65 per cent in 1991. Except in West Kameng and Lohit, in all the districts more than 60 per cent children were not enrolled in 1991. There has probably been some improvement in the last decade, especially in the dropout rates in Classes I-V, according to the Annual Report of the Department of Education, MHRD, which states that the dropout rate in Arunachal is 46.89 per cent, which is once again considerably more than the all-India figure which is 39.58 per cent (provisional figures), but, in the absence of (Census) data, no conclusive statement can be made.

Adult illiteracy is not only an indicator of educational deprivation in the present time, but, is also a crucial determinant of future educational deprivation. Illiteracy implies that there is low motivation towards literacy, enrolment, and education. According to the Sarva Shiksha Abhiyan Annual Plan 2004/ 2005 of Arunachal Pradesh, 32.67 per cent of the habitations do not have school facilities. Hence, the provision of educational infrastructure along with the improvement of rural connectivity constitutes the first step to educational access.

Table 7.5

Illiteracy rate in the 7-14 age group, 1991

Districts	Male	Female	Total
Tawang	48.51	64.52	56.78
West Kameng	33.87	47.65	40.54
East Kameng	39.23	68.97	53.00
Lower Subansiri	44.88	52.35	48.46
Upper Subansiri	34.04	50.15	41.79
West Siang	38.79	44.42	41.54
East Siang	35.47	45.56	40.49
Dibang Valley	35.72	48.88	41.73
Lohit	32.32	46.55	39.02
Changlang	40.87	56.94	48.71
Tirap	46.20	67.02	55.98
Arunachal Pradesh	**39.16**	**52.40**	**45.53**
All-India	28.56	43.77	35.84

Note: Lower Subansiri includes Papum Pare, and East Siang includes Upper Siang.

Source: Census of India (Arunachal Pradesh, India) 1991.

Table 7.6

Out-of-school children (%)

	Combined (6-10)		Rural (6-10)	
	1981	1991	1981	1991
All-India	**52.80**	**48.80**	**58.7**	**54.00**
Arunachal Pradesh	**68.10**	**61.90**	**70.00**	**64.80**
Districts				
Tawang	-	67.52	-	67.52
West Kameng	64.18	56.48	65.59	57.09
East Kameng	81.54	64.66	81.54	64.66
Lower Subansiri	72.97	63.00	76.01	68.68
Upper Subansiri	82.52	60.42	82.52	60.42
West Siang	66.92	61.55	71.12	65.39
East Siang	61.86	60.16	65.31	63.15
Dibang Valley	60.53	57.25	60.53	62.61
Lohit	58.75	55.80	60.65	59.86
Changlang	-	64.79	-	64.79
Tirap	68.02	70.26	68.02	73.92

Note: Because of reorganisation of the districts, 1981 and 1991 data for West Kameng and Tirap are not comparable. Dash means data not available.

Source: Census of India (Arunachal Pradesh, India) 1981,1991, Socio-Cultural Tables.

J. Standard of living

The approach to poverty, pursued by the human development approach, takes into account the overall economic provisioning for a decent standard of living, and not just private income. Private income cannot be an adequate indicator of an individual's overall economic status, which also includes crucial public services such as healthcare arrangements, and safe water supply (HDR, 1997). To measure the deprivation in standard of living in Arunachal Pradesh, the percentage of underweight children (0-4), and the percentage of people without a safe source of drinking water, are taken into account. Housing is also a crucial determinant of the standard of living, but, in Arunachal, people continue to live in traditional houses, constructed with locally available materials, which are relatively cheap, easy to construct (because the community helps to construct them) and, therefore, the classification used by the Planning Commission for *kutcha* houses/ *pucca* houses/semi-*pucca* houses, is not appropriate or even applicable. Thus, housing has not been considered specifically.

Underweight children

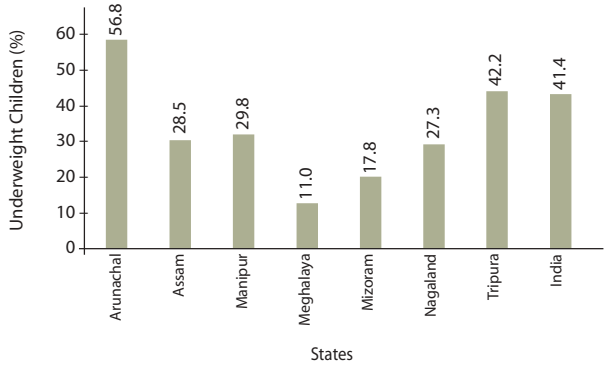
The proportion of underweight children in a population is an important indicator of deprivation. Weight is measured by standard weight for age tables, and low weight for age indicates underweight. The World Health Organisation (WHO) uses various anthrometric measures to study under-nutrition. Underweight may be caused by a number of factors such as malnutrition, the lack of resources, inadequate knowledge of childcare, and the incidence of certain childhood diseases. More than half of the underweight children of the world live in South Asia, of which India's share is more than 70 per cent (Mason et al., 2001).

According to the HDR 2002, only a few countries like Bangladesh, Nepal and Yemen had a higher percentage of underweight children than India.

Studies on child malnutrition in Arunachal Pradesh is a very recent phenomenon. Only since the 1990s, has some attempt been made to assess the extent of child under-nutrition in the State. According to the District Nutrition Profile (DNP) survey, 1995-96, as high as 56.8 per cent of children in the 0-4 age group were underweight. Among the States of North-East India, this figure was highest in Arunachal Pradesh (Figure 7.3). For India as a whole, the average is 41.4 per cent, which is considerably lower[70]. However, the *India Nutrition Profile*, 1998, does not have data for the districts of Arunachal Pradesh. Data from the SHDR Survey has been used to estimate the number of underweight children at the district-level. To measure the percentage of underweight children in Arunachal Pradesh, the normal weight of the Indian children, published by the ICMR, is taken as the yardstick. It is found that 59 per cent of the under-five children in the State are underweight (Figure 7.4). The State-level estimate made by the SHDR team is similar to the earlier estimates made by others for the State.

Interestingly, the percentage of underweight children is considerably lower among children who are less than one year of age (46.97 per cent). It increases sharply to 66.33 per cent for children in the 1-2 year age group. After that, it declines to 60.09 per cent for the 2- 4 age group. An examination of the data shows that East Kameng has the highest proportion of underweight children (69.77 per cent), followed by Kurung Kumey (68.75 per cent). In Papum Pare, too, as high as 63.73 per cent of the children are underweight. The problem of underweight children is the least in East Siang, where only 47.06 per cent of the children are underweight.

Figure 7.3: Percentage of moderate and severely underweight children (0-4) in North-East India



Source: India Nutrition Profile, 1998.

The inverted 'U' shape of the age-specific underweight curve may be explained in terms of insufficient supplementary food, and the inadequate childcare practices followed by the people[71]. Underweight children are more likely to contract illness and disease and sometimes face untimely death. District-level data reveals a high correlation between underweight children and Infant Mortality Rate (IMR) as well as Under-Five Mortality Rate[72] (UFMR).

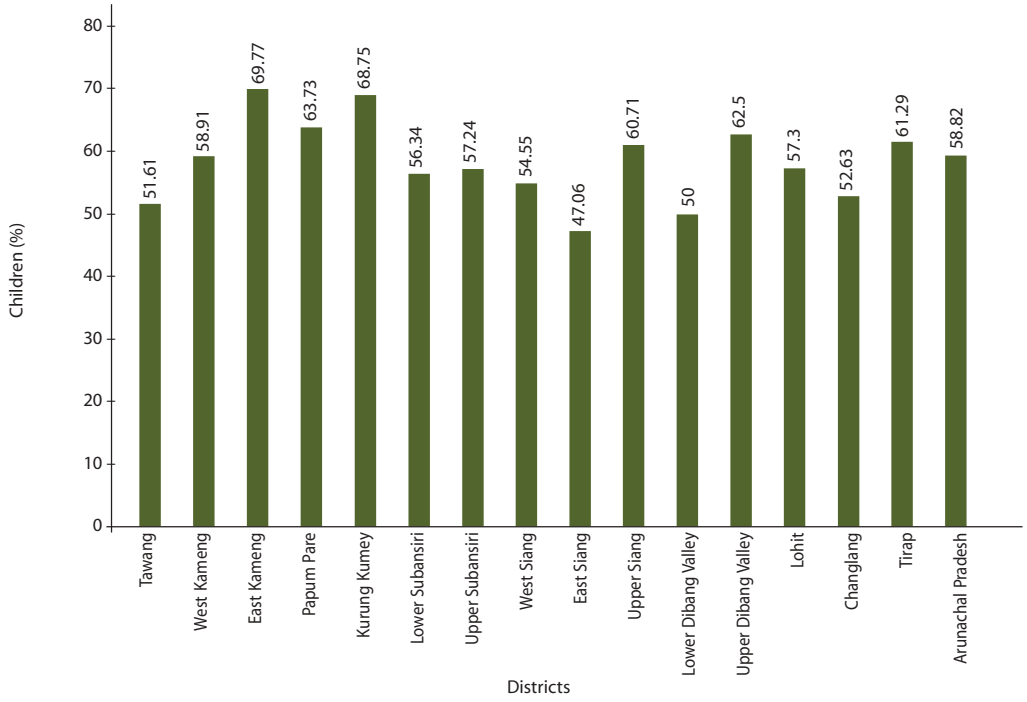
The percentage of underweight children is considerably lower among children who are less than one year of age (46.97 per cent). It increases sharply to 66.33 per cent for children in the 1-2 year age group.

Poverty and underweight children

As is expected, poverty is found to be associated with underweight children. Poor households find it difficult to provide adequate food and healthcare to their children. While the incidence of poverty is relatively low in Arunachal Pradesh, this is not reflected in the health status of the children. However, district-level data shows a positive relationship between underweight and poverty (Table 7.7). The district with the lowest poverty level is East Siang, which has the lowest proportion of underweight children in the State. But, East Kameng ranks

[70] All these are based on Gomez classification. According to the standard deviation measure, 68.4 per cent of the under-five children in the State were underweight, in comparison to the national average of 49.2 per cent.
[71] Refer to State Plan of Action for Children, Government of Arunachal Pradesh, 1997.
[72] The value of the correlation coefficient with IMR is 0.62 and with UFMR the correlation coefficient is 0.68 (significant at 0.05 and 0.01 level respectively).

Figure 7.4: Percentage of underweight children (1995-96)



at number 7 in poverty and at 15 in underweight children. Similarly, in districts like Papum Pare and Changlang, the poverty level and the proportion of underweight children do not match expectations. In Papum Pare, the poverty is low, but, the percentage of underweight children is high. In Changlang, while poverty is high, the proportion of underweight children is relatively low. Intensive field investigation indicates that low level of income is not the singular cause of children being underweight. Other factors such as illiteracy, healthcare practices, and food habits are also important determinants of underweight in children.

Lack of safe sources of drinking water

The availability of safe drinking water is critical to the well-being of a population and non availability of safe drinking water is a major deprivation. Figure 7.5 shows that people who did not have access to safe drinking water in Arunachal, was as high as 56.11 per cent in 1981, but, this declined sharply to 29.98 per cent in 1991, and fell further to 22.4 per cent in 2001[73]. The State's position vis-à-vis the country, with regard to the provision of drinking water, was better both in 1981 and 1991. In 2001, the State slipped marginally below the national average. However, the comparatively low percentage of people without safe source of drinking water should not make the Government complacent. The distance of the safe source of water from the household needs to be examined. In 2000-01, more than 7 per cent of the people had the source of the safe drinking water far away from their households. This percentage should be added to the 22.46 per cent who do not have safe source of water supply, because they are unlikely to be using the distant source. This means nearly a third of the population does not have access to safe drinking water.

[73] *Safe sources of drinking water include taps, tube wells and hand pumps. In Arunachal Pradesh, most of the toilets are of the traditional type that allow faecal contamination.*

Table 7.7

District-wise rank correlation between poverty and underweight children

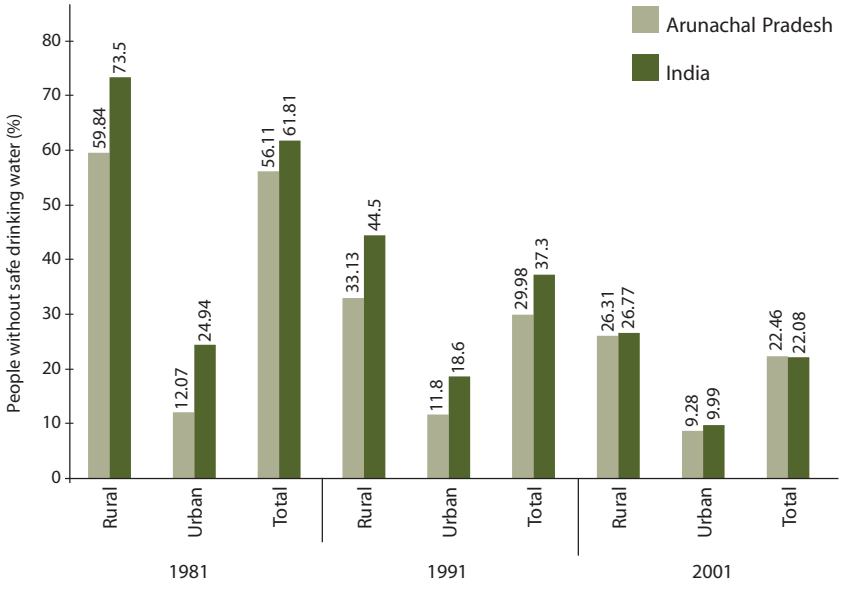
Districts	Poverty (Percentage of People Under the Poverty Line)	Rank	Percentage of Underweight Children	Rank
Tawang	21.0	4	51.61	3
West Kameng	24.6	8	58.91	9
East Kameng	23.3	7	69.77	15
Papum Pare	20.3	3	63.73	13
Kurung Kumey	28.9	14	68.75	14
Lower Subansiri	21.4	5	56.34	6
Upper Subansiri	25.9	9	57.24	7
West Siang	22.3	6	54.55	5
East Siang	17.3	1	47.06	1
Upper Siang	26.7	12	60.71	10
Lower Dibang Valley	18.4	2	50.00	2
Dibang Valley (New)	26.3	11	62.50	12
Lohit	26.0	10	57.30	8
Changlang	30.3	15	52.63	4
Tirap	26.7	12	61.29	11

Source: Data from SHDR Survey

Among the districts, Changlang has the highest percentage of people without access to a safe source of drinking water. As high as 36.58 per cent people of this district use water from unsafe sources. Similarly, in Tirap, Lohit, and Tawang, more than 25 per cent of the people do not have a safe source of drinking water (Table 7.4). Only in East Siang, do more than 90 per cent of the people have a safe source of drinking water.

However, inspite of the existence of these sources of drinking water, there is a high incidence of water-borne diseases. This is because even though taps, hand pumps and wells do exist, the traditional toilets, and general hygiene systems make the ground water very unsafe, especially during the monsoon.

Figure 7.5: People without safe drinking water (in %)



Housing and household amenities

According to the Planning Commission, overcrowded one-roomed *kutcha* houses along with traditional toilet facilities, lack of treated water supply, and erratic power supply reflect poor economic provisioning (National HDR, 2001). In Arunachal, the standard definition of housing and household amenities is inappropriate because much of the rural population continues to live in traditional houses, which are built in different styles, each reflecting the unique culture of the people. The traditional long house of the Nyishis, for example, may house more than 50-60 members, and is built as one long house.

Recognising these special cultural factors, it is not surprising that in Arunachal no significant relationship is found between* kutcha *houses, and the income of the household, educational deprivation, health deprivation, underweight children, and lack of safe drinking water.

Other communities also have similar houses where more than one generation of the family lives (see Box 7.3 for details). The houses do have partitions but, do not necessarily have rooms and, therefore, it is not possible or appropriate to use standard terminology, definitions, and measures, and make any assessment of the standard of living, using the standard indicators.

The partitions make it difficult to identify the number of rooms in the house. The Census classifies this type of long house as one-room households. Similarly, a measure of deprivation in housing is the percentage of *kutcha* houses. This measure is also unsuitable for Arunachal where most houses are built with bamboo, and dried plantains, and will, therefore, be classified as *kutcha*. In areas like Tawang and Kameng, the houses are built of stone and wood, both to protect against the bitter cold and because these are the locally available materials.

Like one-room households, deprivation is also reflected in the congestion in the households. Congestion is usually measured by the person-room ratio. Once again, this idea itself is inappropriate in a society where, being together, is valued. With the increase in urbanisation and spread of education, people are now constructing houses with more than one room, but, these are few. Therefore the person room ratio is not an appropriate indicator of deprivation in Arunachal.

Recognising these special cultural factors, it is not surprising that in Arunachal no significant relationship is found between *kutcha* houses, and the income of the household, educational deprivation, health deprivation, underweight children, and lack of safe drinking water.

Household amenities

Apart from drinking water, household amenities like sanitation and electricity, also impact on the well-being of the people. In Arunachal Pradesh, more than half of the households (52.58 per cent) did not have sanitary toilets, and three out of five households (59.15 per cent) did not have electricity in 1991. There was considerable rural-urban disparity in the provision of these amenities (Table A 7.10 in the Appendix). While the use of toilets is relatively high in Arunachal Pradesh compared to the other States of India, yet, in East Kameng, as high as 77 per cent of the households did not have toilet facilities. Even in the relatively more developed districts – West Kameng and East Siang — more than 68 per cent of the households did not have access to toilet facilities. Only in Tawang, and in West Siang, was the percentage of households without access to sanitary toilets relatively low. As for electricity, districts like East Kameng, Upper Subansiri, and Lohit suffer from acute deprivation. More than 85 per cent of the households in East Kameng did not have electricity in 1991, and, in Upper Subansiri, too, this percentage was as high as 75.48.

Box 7.3

Villages and houses: using available materials and skills

In Arunachal, it is the community that decides who will build a house, where he will build it, and how it will be built. Even the task of collecting the building materials does not fall on the owner of the house alone. More often than not, it is the responsibility of the community to collect the building materials, build the house, and bless the occupants of the house. When accidental fires, which are not too infrequent, gut a thickly populated village of the Apatani tribe, for example, the entire village is rebuilt within a period as short as three days, with men and materials provided to the village by the entire tribe as one person.

Many of the villages in Arunachal are located along the rivers. In other areas, hilltops are preferred as they ensure security. Each tribe has a distinct style and design of house, and village/ settlement, best suited to the area, the climate, and the locally available materials. The range of houses varies from the flung houses of the Sulungs to the enormous houses of the Wancho chiefs. Many communities, like the Apatanis, live in large settlements, and the Adis, too, build big villages.

A typical Nyishi settlement, in the old days, varied from three - four houses to about 30 houses in larger settlements. The individual long houses stand separately, surrounded by granaries and pigsties. A long house can be as much as 50 yards long, depending on the number of hearths it has. The family structure is like a joint family, and it is not uncommon to find 40 to 50 members staying in a single long house. The walls are made of bamboo mats, and the roof is made from dried plantains, cane or paddy straw. The granaries are built away from the main house, to protect them from rats and fires.

Apatani houses are built close together, and are also raised. A notched tree trunk serves as a ladder. Usually, there are two-three hearths in an Apatani house. The materials used are bamboo, paddy straw and cane leaves.

Adi houses are also built with bamboo, wood, leaves, and straw and stand on a platform about three metres high. The Adis have an open platform in the centre of the village, which may be what remains of the old community houses. These are usually larger than ordinary houses, and are open on all sides.

The Mishmis build their homes on the slopes of hills, on bamboo or wooden piles, and use similar building materials. The houses are often very long, and a rich man's house may be more than 30 metres long! At each end there is a verandah and a small guest room. A notched ladder provides the access to the house. Once again, the granaries are located outside the dwelling houses.

The Monpas, who live in the high-altitude areas, live in stone-built houses, and, those who live slightly lower in the valleys prefer houses built of wood. Sometimes, the outer shell is made of stone while wood is used for the inside. The Sherdukpen live in houses built with wood on stone platforms. The houses are small, designed to protect from the cold, and have two to three rooms.

The houses of the Singphos, the Tsangsas, and the Akas also have distinctive features. The Singphos often use big wooden posts instead of bamboo. Their houses have a front verandah, a long hall, and an inner room. The Tsangsa house is built on stilts, and has a double-sloped roof. It also has three parts, and the area under the *chang* (raised portion) is used as a pig sty. The Akas also build high houses, about six feet from the ground, and use bamboo for the floor and the walls. Wooden logs form the pillars, on which the house rests. The Noctes have the *chang*-style houses, constructed on raised bamboo platforms. An open platform in front of the house is used to dry foodstuff, paddy, and other articles. The house is divided into a number of rooms which are used for different purposes. Here again, the pigs are kept under the platform.

Khampti houses are made from strong timber, and have a raised floor and thatched roof. The floor is made of bamboo and *tonku* leaves. The house has three parts, a room for sleeping, a sitting room, and a verandah.

Sources: Census of India 1971, Series 24, Arunachal Pradesh, and People of India, Arunachal Pradesh, Vol XIV, Edited by KS Singh.

K. The way forward

Equity and redistribution

As is apparent, inequalities in land holdings, in assets, and in the distribution of incomes are high in Arunachal. This is, however, a relatively new situation because, in the traditional societies, consumption, income, and assets were distributed in a relatively more egalitarian manner. Interestingly, the broad social goals embodied in the traditional values of different communities of Arunachal Pradesh, and the prescriptive aspects of the human development approach, have many commonalities. An important aspect of the human development model is its identification of a number of attributes such as good health, education, freedom, gender equality to which are attached intrinsic values. The human development approach stresses the point that intrinsically good actions — removal of hunger, eradication of diseases, expansion of educational facilities, etc., — tend to produce instrumentally valuable social outcomes: better health, more enlightened population, higher productivity and income, and, above all, greater equality and social cohesion.

The broad social goals embodied in the traditional values of different communities of Arunachal Pradesh, and the prescriptive aspects of the human development approach, have many commonalities.

It is, therefore, essential to ensure equity and participation. The welfare-enhancing prescription of the human development model can be operationalised by undertaking redistributive measures. More specifically, allocations need to be enhanced in the expansion of health and schooling facilities, which will largely benefit the poor. Civil society may be involved in the decision-making process so as to raise community participation, and promote inclusiveness.

The policy prescriptions of the human development model is appropriate in Arunachal Pradesh, where, in the traditional action space of the people, intrinsically-valued activities enjoyed the dominant position. Since production was not motivated by profit, the instrumental element in it was not all-important. That a lot of time was not used instrumentally is demonstrated by the spontaneous participation of people in many community-level activities. However, the developmental activities of the Government have resulted in the expansion of the individual sphere in the public space and, in the process, community participation has declined. The traditional social values of Arunachal Pradesh place an intrinsic value to equality, be it inter-district, inter-tribal or intra-tribal. Large-scale inequalities in economic opportunities, and unemployment, are not part of the community life and cannot be easily internalised by the people. The people (especially those who are unable to benefit from them) often look down on the institutions that promote these socially and culturally alien values. In order that the community reclaims the public space, various redistributive mechanisms in-built in the traditional socio-economic system, should be enlivened and operationalised by increasing the community participation in formulating, implementing, and monitoring of Government programmes.

Reducing human poverty

The prevalence of a high level of human poverty in the State demands urgent attention. There are two discernible drawbacks in the existing delivery systems in the State. The first concerns implementation; which needs substantial improvement. Existing Government programmes are unable to deliver results due to inadequate or iniquitous delivery. It follows, therefore, that programmes needs better monitoring. Secondly, many of the programmes that are implemented are not relevant to Arunachal. There is often a mismatch between the local needs, and the programme. A State-specific design of programmes is required, which factor in the special needs and objectives of

the State. The rigid contours of development programmes need to be modified for Arunachal, if development efforts are not to erase the unique ethnicity of the State. This is an extremely important aspect of the development process, and one that warrants serious attention both at the State level, and at the Centre.

While reiterating that the level of human poverty requires urgent intervention, the interventions need to be designed appropriately and sensitively, and be applied in a target- specific manner to be effective.

However, in general, there can be no argument over the fact that the low health status of the State manifested in the form of short lifespans, high infant, and child mortality rates, indicate the role of exogenous factors, which require to be controlled with both preventive and curative measures.

- In order to reduce educational deprivation, emphasis should be given on the establishment and monitoring of village *Aaganwadis* and *Sarva Shiksha Kendras,* so that children belonging to the interior and inaccessible villages can start going to school at the right age. For older children, inter-village boarding schools may be a viable option, considering the low population and the scattered villages. For schools, not easily accessible during the long rainy season, reworking the annual teaching calendar might turn out to be useful.

- A special effort is required to reduce adult illiteracy. The curriculum of this programme should be designed in such a way so as to cater to the day-to-day requirements of the people. An awareness of various health and childcare programmes and related precautions can form the backbone of this programme. Sanitation and hygiene measures, childcare practices, how to give supplementary food to young children, and knowledge of locally available nutritious foodstuff can all be imparted through an integrated programme, which has the potential to have a far-reaching impact.

- Inaccessibility is closely associated with overall deprivation. Hence, steps should be taken to increase access and connectivity of remote villages and habitations.

- A district-wise analysis of priority areas is required. Allocation of funds should be done according to the priorities identified. In Tawang, for example, attention should be given to the expansion of educational facilities, and the creation of awareness among the people, particularly among adult illiterates regarding child malnutrition. In West Kameng, the priority should be to improve nutritional standards and healthcare; mothers need to be educated and informed about scientific childcare, particularly supplementary feeding. In East Kameng, the areas that need most attention are illiteracy and nutrition. Thus, each district should focus on the area where its relative deprivation is highest, and move forward from there. Given the high degree of correlation between these aspects of the standard of living, a concentrated attempt to better one will lead to an improvement in other areas as well.

Chapter 8

Infrastructure: key to development

Infrastructure crucial for development

The critical role of infrastructure in economic development is well-recognised by both economists and planners. Lack of economic development is often associated with the inadequate availability of infrastructure. Developmental plans in India, and in other developing countries, have been concerned with the creation of infrastructure for economic development. However, since the 1990s, the development paradigm has gradually shifted its focus to human development, which regards enhancement of human capabilities as essential to the development process. The provisioning of educational facilities, hospitals and medical care, the availability of electricity, sanitation and, drinking water, the access to markets and technology, are therefore central to the issue of development.

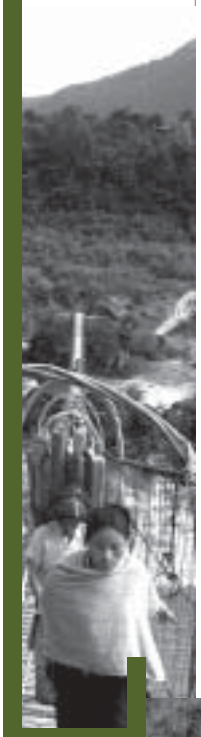
This chapter examines the close link between infrastructure development and human development in Arunachal Pradesh. It describes the availability of infrastructure in the region, traces the gradual growth, analyses the spread of this development, and points out areas where infrastructure development has been rather limited. Based on this analysis, it lists specific areas in every district that require attention.

A. The growth of administration and infrastructure since 1950s

At the time of Independence, Arunachal Pradesh was a little known area. The traditional communities that lived in its different valleys and mountains were largely isolated, although they did trade and exchange products, and produce with their neighbours in Assam, and with Tibet and Burma. Much of this trade was carried out on foot, using mules to carry goods, as there were barely any roads or vehicles. There were three main jeepable roads: (i) the Pasighat to Kobo Road, (ii) the Sadiya-Tezu-Denning Road, and (iii) the Stillwell Road.

In the 1950s, the Government concentrated on the expansion of regular administration across the Inner Line, in consonance with the Nehru-Elwin Policy of gradual integration (Das, 1995). This gradualist approach to development was followed till the Chinese aggression in 1962. The Indian reverses in the engagement with China led to a more active integration policy.

Since the 1990s, the development paradigm has gradually shifted its focus to human development, which regards enhancement of human capabilities as essential to the development process. The provisioning of educational facilities, hospitals and medical care, the availability of electricity, sanitation and, drinking water, the access to markets and technology, are therefore central to the issue of development.



Box 8.1

Contribution of infrastructure to State income

An attempt is made to estimate the contribution of infrastructure to the State income for the last three decades (see Table A 8.2 in the Appendix). The contribution of infrastructure to the Net State Domestic Product (NSDP) increased steadily from 7.64 per cent in 1970-71 to 22.40 per cent in 2001-2002. Under infrastructure, other Services (including health and education) were the most important contributors to income, accounting for 12.02 per cent of NSDP in 2001-2002. However, the relative contribution of other services to the infrastructure sector declined during 1970-71 to 2001-02. The contribution of infrastructure like transport and communication, and banking and insurance has increased very rapidly. However, the contribution of electricity, gas, and water supply to the NSDP was negative up to 1996-97. This is because, as the demand for power increases in Arunachal Pradesh, more power is purchased from outside, showing an overall negative contribution to the NSDP. In fact, 46.01 per cent of the State's power requirement in 2000-2001 was met by using diesel-generating sets, which is very expensive, and extremely inefficient. In contrast, the power tariff was relatively low, and it was revised only in 1996-97. As a result, the revenue earned by the Power Department increased from Rs.6.49 crore in 1997-98 to Rs.12.08 crore in 2001-02.

A techno-economic survey of NEFA was conducted by the National Council of Applied Economic Research (NCAER) in 1964. The report, which was published in 1967, recommended action in the following areas on a priority basis: (a) transport access both to and within the territory, (b) development of industry based on natural resources and, (c) improvement of social infrastructure. On the basis of these recommendations, the highest priority was given to infrastructure development, particularly to transport and communication, in subsequent Five-Year Plans.

As is evident from Table A 8.1 (in the Appendix), over 70 per cent of the Plan funds have been allocated for the development of infrastructure since the Fifth Five Year Plan. Economic infrastructure like transport and communication, power and irrigation, received higher priority than social infrastructure in the allocation of Plan funds and the ratio of allocation was 56:44 in the Fifth Plan. In the Tenth Five Year Plan, this ratio (the share of economic infrastructure to the social sectors) is at 60:40. Within economic infrastructure, the share of transport and communication has declined from 33.03 per cent in the Fifth Plan to 25.1 per cent in the Tenth Plan, and the share of power and irrigation has increased from 6.87 per cent in the Fifth Plan to 18.55 per cent in the Tenth Plan.

The following sections carry a brief account of the development of infrastructural facilities (sector wise) in Arunachal Pradesh for the period, 1961 to 2001.

B. Transport - road network limited but expanding

Roads are the only means of communication in the State. The construction of roads really began in the 1960s, and starting from only 500 km, the road length increased to more than 15,000 km in 2000-2001 (See Table 8.1).

However, despite the continuous efforts to extend the road network in the State, the road density is very low. It is 17.36 km per 100 sq km of area, against the all-India average of 82 km per 100 square km, in 2000-2001. The main reasons for this low density are the difficult topography and undulating terrain, the late start of the development process, and the high cost of construction in the remote areas.

Initially, preference was given to defence requirements compared to economic development, in the construction of road infrastructure. The emphasis was on constructing roads from Assam to the northern borders, owing to strategic reasons. As a result, the inter-district communication continues to be difficult and this is one reason for the slow economic growth. Even today, the State does not have lateral roads connecting districts, sub-divisions and circle headquarters, since roads run vertically, connecting places in Assam with districts or sub-divisions or with circle headquarters in Arunachal Pradesh. This has resulted in a high transportation cost and the prices of all commodities are higher in Arunachal than elsewhere in the country.

Table 8.1

Development of road transport in Arunachal Pradesh: (1960-61 to 2000-2001)

Year	Road Length (in km)
1960-61	505.54
1965-66	1,486.93
1970-71	2,315.13
1975-76	3,100.76
1980-81	3,572.42
1985-86	5,362.36
1990-91	8,344.77
1994-95	11,037.88
2000-2001	15,091.32

Source: Statistical Abstracts of Arunachal Pradesh.

Road density and surfaced roads

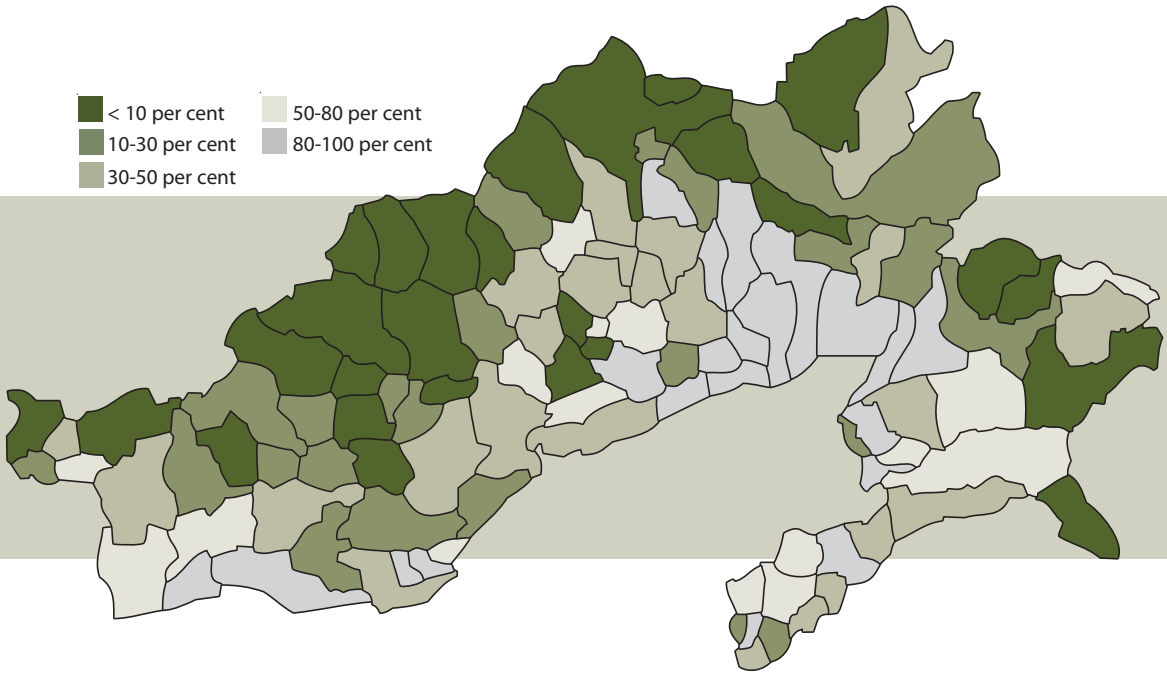
The district-wise percentage of surfaced roads and road density provides a detailed analysis of the roads in Arunachal (See Table A 8.3 in the Appendix). The Table shows that 49.63 per cent of roads in Arunachal Pradesh are surfaced. The road density for the State is 17.36 km per 100 sq km. There is considerable inter-district variation in the percentage of surfaced roads as well as in the density of roads. Some districts have high road density, but, a low percentage of surfaced roads. Districts like Tawang, Lower Subansiri, and Upper Siang have a relatively low percentage of surfaced roads (all less than 40 per cent). Tawang has a high density of roads per sq km (48.75 km per 100 sq km), but, has a low percentage of surfaced roads (30.56 per cent), and Dibang Valley (Old) with a low density of roads (only 6.32 km per 100 sq km) but, has a high percentage of surfaced roads (62.83 per cent).

Road density at the block level

The block level road density gives a clearer idea of the distribution of roads. The road density of the blocks of Arunachal Pradesh is classified into five categories: (i) Very High (more than 100 km of roads), (ii) High (50-100 km of roads), (iii) medium (30-50 km of roads), (iv) low (10-30 km of roads), and (v) Very Low (less than 10 km of roads). The data (Table A 8.9 in the Appendix) shows that there is only one block each under the categories 'Very High' and 'High'. Tawang block belongs to the 'Very High' category, and Niausa in Tirap belongs to the 'High'

Even today, the State does not have lateral roads connecting districts, sub-divisions and circle headquarters, since roads run vertically, connecting places in Assam with districts or sub-divisions or with circle headquarters in Arunachal Pradesh. This has resulted in a high transportation cost and the prices of all commodities are higher in Arunachal than elsewhere in the country.

Figure 8.1: Road connectivity status of different circles of Arunachal Pradesh, 1997



Source: Connectivity of Villages, Public Works Department, Government of Arunachal Pradesh, Itanagar, 1997.

category. There are 18 blocks which fall in the 'Very Low' category[74].

Road connectivity

An indicator like road density alone does not capture the poor communication network in Arunachal, because many of the villages are scattered and continue to remain unconnected. Therefore, the road connectivity status of the villages in Arunachal Pradesh needs to be considered. Villages falling within a radius of one km in hill terrain and five km in the plains, from a constructed road (*pucca* or *kutcha*) are considered as being connected by the Arunachal Pradesh Public Works Department (1997).

The data (Table A 8.5 in the Appendix) shows that only 38.53 per cent of the villages in Arunachal Pradesh were connected by road in 1997 (of which only 12.30 per cent of the villages were connected by *pucca* roads, and the rest by *kutcha* roads). Among the districts, villages in East Siang had the highest connectivity (73.68 per cent), followed by Lower Dibang Valley (66.96 per cent). Villages in Kurung Kumey had the lowest road connectivity (7.47 per cent).

While 38.53 per cent of the villages were connected, the percentage figures for the access enjoyed by the population were better. In rural Arunachal Pradesh, 46.51 per cent of the population had access to *pucca* roads, 26.93 per cent to *kutcha* roads, and 26.56 per cent had no connectivity at all.

In Kurung Kumey, only 1.35 per cent of the rural population had access to *pucca* roads, and 21.89 per cent had access to *kutcha*

[74] *These blocks are Bameng and Chayangtajo in East Kameng; Chambang, Koloriang, Damin, Tali and Raga in Lower Subansiri; Giba, Dumporijo and Nacho-Siyum in Upper Subansiri. Mechuka in West Siang; Jengging and Tuting in Upper Siang, Anini-Etalin in Dibang Valley; Hayuliang, Hawai and Wakro in Lohit; and Pongchau-Wakka in Tirap.*

roads (see Table A 8.6 in the Appendix). Within villages, the higher the population, the higher is the road connectivity. For example, 93.96 per cent of villages with more than 1,000 people were connected by *pucca* or *kutcha* roads. However, only 34.98 per cent of villages with less than 500 people, were connected by any type of road (see Table A 8.7 in the Appendix).

An examination of the connectivity of villages on a more disaggregate basis (circle level) shows that there is substantial variation in the connectivity status between circles. The circles of Arunachal Pradesh have been classified into five categories, as given in Table A 8.8 in the Appendix. For example, Papum Pare district, Itanagar and Naharlagun circles have 100 per cent connectivity but, in Mengio circle, less than 10 per cent of the villages have connectivity. Similarly, most of the circles of Kurung Kumey district fall in the 'Very Low' connectivity category.

Factors that determine road accessibility have been studied by Singh (1999) on the basis of various road accessibility classes, as given in Table 8.2. According to the study, as high as 45.38 per cent of the area of the State is inaccessible by road, and people living in these areas have to walk more than 15 km to reach an approach road.

Table 8.2

Area under different road accessibility classes

Category	Distance (in km)	Area (sq km)	Percentage of Total
Highly Accessible	(0-5)	18,968	22.65
Moderately Accessible	(5-10)	17,678	21.11
Remotely Accessible	(10 -15)	9,086	10.35
Inaccessible	(15 and above)	38,011	45.38

Source: A Resource Atlas of Arunachal Pradesh, Government of Arunachal Pradesh, Itanagar, 1999.

Thus, connectivity continues to be a major concern in more than half of the State. The development of road networks which connect different parts of the State with each other, on a lateral axis rather than on a north-south axis, is a critical requirement. This will require substantial allocation of funds for road construction in the coming years. It will also require revamping of the State Transport Corporation, which has been incurring substantial losses.

Box 8.2

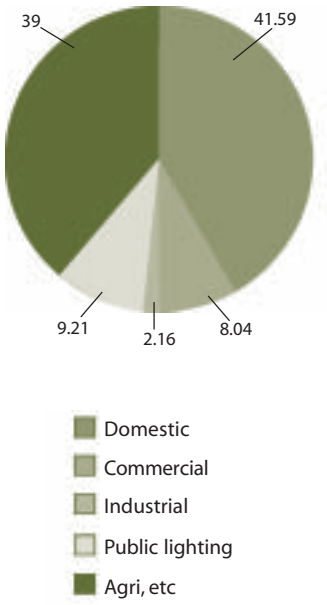
Financial performance of Arunachal Pradesh State Transport Corporation

The Fourth Economic Census Report of Arunachal Pradesh, 1998, highlights that there are 366 transport enterprises (employing 1,010 persons) engaged in air, water and land transportation activities. The Government has the major share (63.11 per cent) of the transportation services, with a fleet of 231 buses, covering 141 routes. The revenue receipt during 1998-99 was Rs. 5.45 crores but, operational expenditures amounted to Rs. 15.14 crores entailing a loss of Rs. 9.69 crores (See Table A8.10 in the Appendix). On an average, during the period 1998-99 to 2001-2002, 53.89 per cent of the annual expenditure of the State Transport Department consisted of purchase of goods and services and 34.31 per cent consisted largely of salary and wages.

C. Electricity and power – performance and potential

Power is an important element within the specific set of modern infrastructure components for overall development. In Arunachal Pradesh, the development of the power sector has assumed centre stage since the Sixth Five Year Plan when 12.82 per cent of the total Plan outlay was allocated to this sector (See Table A 8.1 in the Appendix). During the last two Five Year Plans, the efforts in this sector have intensified further. With its numerous rivers and streams, Arunachal has considerable potential for the development of hydroelectric power but, this has so far remained untapped. So much so that a State, which has the potential to supply a third of the total hydroelectric potential of the country[75], is buying power at present, and close to 46 per cent of its power requirements are being met by diesel-generating sets. The Government is conscious of the situation, and is taking urgent steps to realise the potential that exists.

Figure 8.2: Consumption of electric power by uses, 2000-01



Source: Statistical Abstract of Arunachal Pradesh, 2001

Performance of the power sector

The performance of the power sector in the State can be judged by examining four areas: (i) per capita consumption of electricity, (ii) main sectors of consumption, (iii) rural electrification and (iv) cost of production of electricity. The per capita consumption of electricity in Arunachal Pradesh was recorded as 86.9 kWh in 2001-02 against the all-India average of 335 kWh. This figure is lower than that in the other hill States of North-East India. The reasons for the low consumption rate are: low level of operational efficiency, low voltage operations, high operation costs, and irregular power supply in transmission lines. As far as the consumption of electricity in various sectors of the economy is concerned in 2000-2001, the largest share (41.59 percent) of electric power was for domestic purposes only (Figure 8.2). In recent decades, electrification in rural areas has advanced rapidly; in 1971-72 only 37 villages were electrified. The number of electrified villages rose to 340 by 1980-81, and then to 1,308 (35.76 per cent) by 1990-91 and to 2,506 (60.00 per cent) by March 2001, an increase of 24.24 percentage points in the number of electrified villages during the 1991-2001 period. However, the coverage of rural electrification varies widely among the districts, from 100 per cent in Tawang and Tirap, to 34 per cent in East Kameng (see Table A 8.29 in the Appendix).

Block-level data shows that the blocks of Tawang, Tirap, West Kameng and Changlang have a relatively high percentage of electrified villages. The reasons for the relatively high level of rural electrification in these areas may be (i) both Tirap and Changlang are close to the Digboi and Sivasagar oil fields of Upper Assam that supply petroleum for electricity generation and (ii) Tawang and West Kameng have a cluster pattern of housing within the villages, which minimises the cost of electrification. On the other hand, some blocks like Bameng (East Kameng), Damin and Tali (Kurung Kumey), Giba and Nacho-Siyum (Upper Subansiri), Mechuka (West Siang) and Hunli–Kronli (Dibang Valley) do not have any rural electrification. Inaccessibility and scatteredness of the settlements are reasons for poor electrification in some areas[76]. The generation and distribution of power in the State is managed by the Department of Power, Government of Arunachal Pradesh. In 2001-02, the cost of production per kW was Rs. 3.12, and the cost of distribution per kW was Rs. 3.03[77]. Against this, the average tariff charged from users was only Rs. 2.43. Thus, electricity consumption was subsidised by the State Government. At the same time, the transmission and distribution losses in the State increased from 30 per cent, in 1996-97,

[75] *The hydel potential of Arunachal Pradesh is estimated to be over 50,000 MW, which is about a third of the all-India potential (NEDFi, Data Bank, Quarterly, 2002).*
[76] *High positive correlation — the value of correlation coefficient being 0.67 — exists between road density, and rural electrification at the district level.*
[77] *Data from NEDFi Data Bank, Quarterly, 2002.*

to a high of 51 per cent, in 2001-02[78]. The reasons for such a high percentage of transmission and distribution losses are mismanagement, and inefficiencies in the distribution system.

The total installed capacity of the State has increased from 39.53 MW in 1994-95 to 58.95 MW in 2000-2001 (see Table A 8.11 in the Appendix). The share of diesel-generating sets, as a source of power, has increased over the period, even though it declined in 2000-2001. In 2000-2001, 46 per cent of the requirement of power was met from diesel-generating sets. (Diesel-generating sets are run by the Department to meet the power requirements of the State). The remaining 53.9 per cent of the power requirements was met by hydel projects.

Potential for hydropower

The Department of Power has commissioned 35 mini hydel projects in different parts of the State. Out of an installed capacity of 463.95 MW only 58.95 MW (12.71 per cent) has been developed so far in the State sector. In the Central sector, 405 MW (87.29 per cent) has been developed by the North East Electric Power Corporation (NEEPCO) by commissioning the Ranganadi Hydel Project. More than a dozen projects are under consideration and are at various stages, ranging from the investigation stage to the construction and commissioning stage, with capacities ranging from 10 MW in the Dikrong Project to 11,000 MW in the Siang Upper Project. (See Table A 8.11 and A 8.12 in the Appendix)

With the completion of the 405 MW Ranganadi Hydel Project, and the commissioning of other projects, the installed capacity in the State will be adequate to meet its power requirements, and Arunachal will be in a position to supply power to the rest of the States of North-East India and to neighbouring countries as well. However, the commensurate augmentation of transmission and distribution lines is crucial to ensure the optimal development of the power sector in the State.

Some measures have been taken to reform the power sector in the State. A Regulatory Commission is in the process of being established. The State Government, the various Central utilities, and the Central Government have to act in tandem to reduce the inefficiencies, curtail the losses and thefts, and promote financial efficiency in the sector. Only then, will the power sector be able to attract private sector participation, and the immense potential in the sector can be realised.

Given the precipitous topography, and the sparse spatial distribution of population, the conventional long-range generation-transmission network may not suit Arunachal. Therefore, the provision of stand-alone isolated small generation facilities (50 kW to 4 MW) allowing for limited distribution in the habitation areas, would perhaps be more useful for capacity-addition, economy, and to contain the huge transmission and distribution losses.

Notwithstanding the State's immense potential for harnessing hydroelectric power, in view of its geological structure, and the vulnerability of the State's unique biodiversity (due to submergence by giant hydropower stations), the power development strategy for the State requires to be crafted very carefully. Tailoring district-specific plans may be a feasible arrangement; for example, the improved design of waterwheels in Tawang, or the use of impulse turbines using high head in the rich catchment areas of Upper Siang, West Siang, and West Kameng, are options that need to be explored.

In order to reap quick returns from the ongoing power projects, the State will need to invest intensively, within a span of two- three years, rather than spreading its resources too thinly.

Given the precipitous topography, and the sparse spatial distribution of population, the conventional long-range generation-transmission network may not suit Arunachal. Therefore, the provision of stand-alone isolated small generation facilities (50 kW to 4 MW) allowing for limited distribution in the habitation areas, would perhaps be more useful for capacity-addition, economy, and to contain the huge transmission and distribution losses.

[78] *Source: NEDFi Data Bank, Quarterly, 2002.*

D. Postal and telecommunication services

There has been substantial increase in the number of post and telegraph offices since 1961. In March 2001, there were 303 post offices in the State, including one head post office, 46 sub-post offices, and 256 extra-departmental branch post offices. Telegraph facilities exist only in 31 post offices. (See Table A 8.13 in the Appendix)

Telecommunication facilities in the State have grown steadily over the years. At present, there are seven telephone subdivisions, and 89 telephone exchanges, with a total capacity of 51,732 connections. Now, mobile phones have come to the State, and a large part of Arunachal enjoys cellular connectivity.

The number of post offices has increased 13 times during the last 40 years, a development which resulted in the population as well as the area served per post office being reduced significantly. Even so, the area served by a post office in Arunachal Pradesh was 278.07 sq km in 2000 against 32.74 sq km in Mizoram, 45.99 sq km in Meghalaya and an All-India average of 21.26 sq km[79]. Most districts of Arunachal Pradesh (except Papum Pare and Tirap) do not have a single post office in a 100 sq km area.

Telecommunication facilities in the State have grown steadily over the years. At present, there are seven telephone subdivisions, and 89 telephone exchanges, with a total capacity of 51,732 connections. Now, mobile phones have come to the State, and a large part of Arunachal enjoys cellular connectivity.

E. Banking and finance

Banking in Arunachal Pradesh is comparatively new. The first branch of the State Bank of India was opened in Pasighat, in East Siang district, as late as 1971. The Arunachal Pradesh Rural Bank was established in 1983, under the sponsorship of the State Bank of India, to cater to the credit needs of the rural people. In 2000-2001, there were 99 bank offices with an average of 9.07 offices per 100,000 population (See Table A 8.17 in the Appendix).

There are only five nationalised banks operating in the State. These are Vijaya Bank (2 branches), UCO Bank (2 branches), United Bank of India (2 branches), and Central Bank of India (1 branch). The State Bank of India has 42 branches accounting for 42.42 per cent of all banks in the State, followed by the Arunachal Pradesh Cooperative Bank with 31 branches (31.31 per cent) and Arunachal Pradesh Rural Bank with 19 branches (19.19 per cent). The banks are mainly concentrated in Papum Pare and East Siang districts.

The credit-deposit ratio is only 17.25 per cent, which is the lowest among the States of North- East India. At the national level, the credit deposit ratio is 58.53 per cent (NEDFi Data Bank). The recovery rate in the industrial sector is only 30 per cent[80], which is a cause for concern. It appears that most of the loans, advanced by the banks, are either consumed or invested in unviable projects.

[79] *Basic Statistics of North-Eastern Region, 2002.*
[80] *Data from the State Level Bankers' Committee Meeting, Arunachal Pradesh, June 2001.*

F. Irrigation and water management

In Arunachal Pradesh, only minor irrigation systems have been developed through State participation, and by providing various incentives to farmers. The minor irrigation (MI) systems covered a command area of nearly 1,032 hectares in 1966-67, and this was extended to 12,300 hectares in 1995-96, and 24,980 hectares in 2000-01[81].

According to the Arunachal Pradesh Agricultural Census of 1990-91, only 21.50 per cent of the gross cropped area in the State was irrigated, the highest proportion in East Siang (38.98 per cent), and the lowest in West Kameng (1.96 per cent) (See Table A 8.26 in the Appendix). The State Government had taken up 734 projects till 1995-96 in about 20 per cent of the villages, especially in villages which are situated on the hill slopes of the main river valleys in East Siang, West Siang, Lohit, Dibang Valley, and the denuded areas of Changlang, and Tirap.

Substantial expenditure has been incurred in minor irrigation projects during the last three decades. The expenditure was Rs. 73.64 per hectare in 1966-67, which increased to Rs. 3,440.94 per hectare in 1979-80 (Singh, 1999). The expenditure has been increasing continuously on these projects and, in 2000-01, it was Rs. 26,000 per hectare[82].

There is a need for developing indigenous irrigation systems which are cost-effective, and suitable to specific areas. The water and farm management system of the Apatani Plateau is an example of an indigenous system of resource management, which can be replicated with suitable modifications to increase income and livelihood opportunities across the State.

Box 8.3

The Apatani water management system

As mentioned in Chapter 1, the Apatani people inhabit the Apatani Valley, and are concentrated near Ziro and Hapoli in the Lower Subansiri district. They have developed a unique water management system that allows them to cultivate paddy, and practise fish farming simultaneously.

The Apatanis use a multipurpose water management system, which integrates land, water, and farming systems by protecting soil, conserving water for irrigation and paddy-cum-fish culture. The terraces in the valley are quite broad, well-levelled, and have strong *bunds* made of soil and supported by bamboo or wooden chips. The well-managed irrigation system ensures that there is minimum soil erosion. The water management system is extremely scientific. Every stream, rising from the hilltops, is tapped soon after it emerges from the forest, channelised at the rim of the Valley, and diverted by a network of primary, secondary, and tertiary channels. The first diversion from the stream takes off at a short distance above the terraces. The feeder channel branches off at angles, which lead the water through a series of terraces, so that by blocking or opening the channels' ducts (*huburs*) any field can be flooded or drained as required.

To prevent the migration of fish, a semi-circular wooden/bamboo net is installed at the inlet, and to reduce the beating action of flowing water resulting in soil erosion, wooden sticks or planks are placed at the outlet. The *huburs* are installed about 15 to 25 cm above the bed level of the fields in order to maintain the proper water level. They are made of planks of pine tree trunks or from bamboo stems, of different diameters (Sinha 1995). The water from the terraces finally drains into the Kale River, which flows through the middle of the Valley.

Source: A Resource Atlas of Arunachal Pradesh.

[81] *Department of Irrigation and Flood Control, Government of Arunachal Pradesh.*
[82] *ibid.*

G. Educational infrastructure

The data shows that the gender ratio among students first increases from 787 girls per 1,000 boys at the Pre-primary level, to 830 girls at the Primary level, and then to 903 girls at the Middle School level. However, after Middle School, a rapid drop is observed and the gender ratio at the secondary and tertiary levels fall drastically, and there are only 222 girls for every 1,000 boys at the University level.

The availability of social infrastructure determines the quality of life, and the educational institutions form an important component of the social infrastructure of society. Educational infrastructure in Arunachal Pradesh has expanded substantially. (See Table A 8.18 in the Appendix). Schools at the primary and middle level have increased manifold during the last 40 years, but, this increase is greater in case of Secondary and Higher Secondary Schools[83]. According to the list of educational institutions, there is one University in Arunachal, there are seven Colleges, 68 Higher Secondary, 116 Secondary, 333 Middle, 1,303 Primary and 57 Pre-primary schools in 2000-2001 (see Table A 8.19 in the Appendix).

Efforts have been made to strengthen the educational set-up, particularly at the pre-primary and primary levels. The educational institutions now accommodate nearly 2 lakh students, of which 73.60 per cent are tribal. The data shows that the gender ratio among students first increases from 787 girls per 1,000 boys at the Pre-primary level, to 830 girls at the Primary level, and then to 903 girls at the Middle School level. However, after Middle School, a rapid drop is observed and the gender ratio at the secondary and tertiary levels fall drastically, and there are only 222 girls for every 1,000 boys at the University level. There is a need to make educational facilities easily available, particularly for girls, at the higher educational level together with motivating girls to attend school.

The number of students and educational institutions declines proportionately as one goes up the educational chain, from primary to the university level. However, there is a distortion in the sequence of the teacher-student ratio. In the hierarchy of institutions, the number of higher secondary schools is proportionately more (68 in 2000-2001) and the number of degree colleges is less (only seven in 2000-2001) which means that there is a low number of students per institution, as well as per teacher at the higher secondary level. On the other hand, the students per institution are highest (except at the pre-primary school level) at the college level. There is an obvious requirement for more degree colleges and vocational institutions.

Box 8.4

Location of educational institutions

Some of the locational features of the educational institutions are:

I. In general, the higher-level educational institutions are located in the main urban centres of the State. For example, the only university is located in Doimukh (around 7 km from the capital, Itanagar) and all the colleges are located in the urban centres. However, secondary and higher secondary schools generally follow dispersed patterns.

II. The road network influences the location of higher secondary and secondary schools. Most of the secondary schools are located along the main roads.

III. The middle schools are basically concentrated in areas where there is high density of population: Along (West Siang), Itanagar-Naharlagun (Papum Pare), Pasighat (East Siang), Roing (Dibang Valley), Namsai and Tezu (Lohit), Daporijo and Dumporijo (Upper Subansiri), Miao (Changlang) and Khonsa (Tirap) have high concentration of middle schools.

IV. Most of the villages with more than 200 people have a primary school. However, some blocks like Koloriang, Damin, Tali (Kurung Kumey), Nacho-Siyum (Upper Subansiri), Walong (Lohit), etc., have relatively low percentage of villages with educational institutions.

V. As high as 90.65 per cent of the schools are Government schools and only 9.35 per cent are private schools. The highest number of private schools are located in Papum Pare district (mostly in the capital, Itanagar).

[83] *In fact, the number of pre-primary and primary schools declined in 2000-2001 as compared to 1990-1991. This is because a number of primary schools have been converted to middle schools in Arunachal Pradesh.*

H. Health infrastructure: large urban-rural gaps

The health status of the people reflects the state of well-being enjoyed by the people. In Arunachal Pradesh, the health facilities have improved significantly during the last four decades since the State has made substantial progress in trying to provide healthcare for all. (See Table A 8.22 in the Appendix).

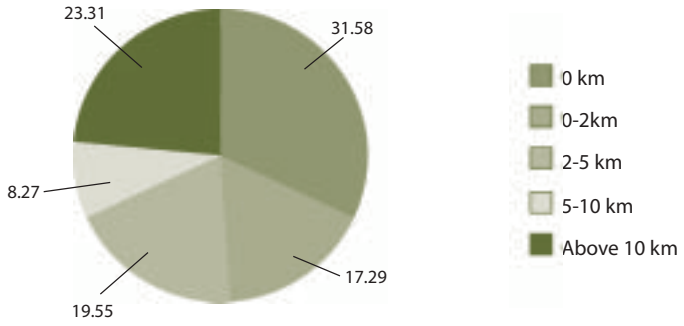
However, the major issue in providing healthcare facilities is the disparity between the rural and urban areas, as most of the facilities are concentrated in the urban areas. This is evident from the pattern of the existing infrastructure of allopathic medical institutions (See Table A 8.23 in the Appendix). There were only 16 General Hospitals and District Hospitals combined in 2000-01. Most of them (87.50 per cent) are in the urban areas. Even most of the Community Health Centres (CHCs) and Primary Health Centres (PHCs) are located in the urban areas. The majority of the rural population is served by the PHCs, and sub-centres, which are located in block and circle headquarters. Generally, the average distance of medical facilities from the rural users is very far and, hence, the people in the rural areas find it difficult to avail of these facilities.

There is a need for decentralising the medical facilities in the rural areas, minimising the distance between the villages and the primary health centres, and the sub-centres, and raising the standard of these facilities. The effective use and maintenance of expensive equipment, which is lying unutilised in several hospitals, are additional issues that need to be addressed.

I. Infrastructure facilities in the villages surveyed

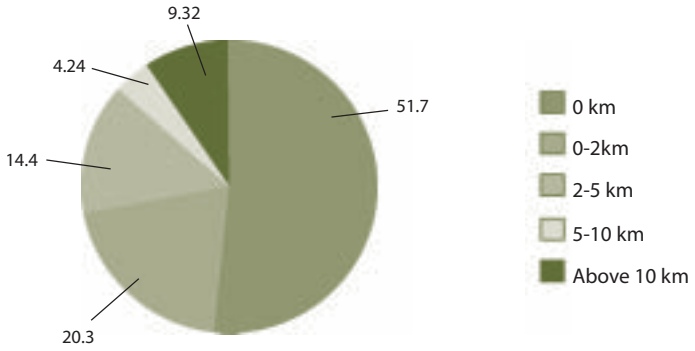
In this section, a brief profile of the infrastructure facilities in the surveyed villages is provided. Around 31.58 per cent of the villages surveyed are connected by *pucca* road, and 51.70 per cent by jeepable road (Figure 8.3 and 8.4).

Figure 8.3: Distance of surveyed villages from *pucca* road (percentage)



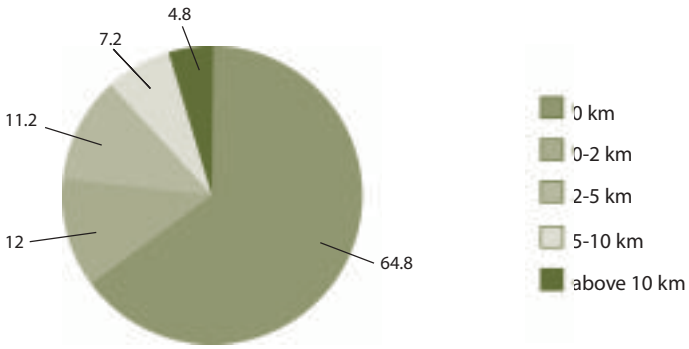
Source: SHDR Survey.

Figure 8.4: Distance of surveyed villages from jeepable road (percentage)



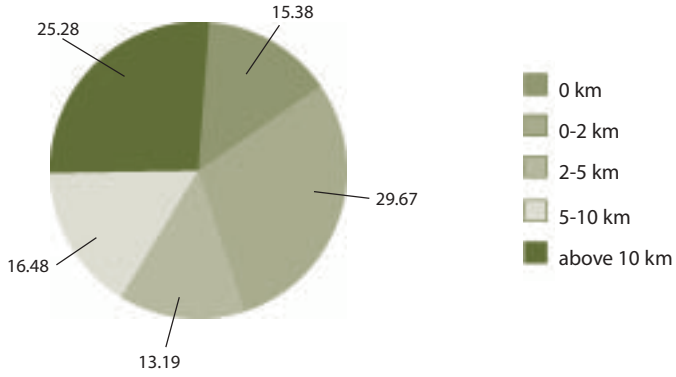
Source: SHDR Survey.

Figure 8.5: Distance of surveyed villages from a primary school (percentage)



Source: SHDR Survey

Figure 8.6: Distance of surveyed villages from primary health sub centres (percentage)

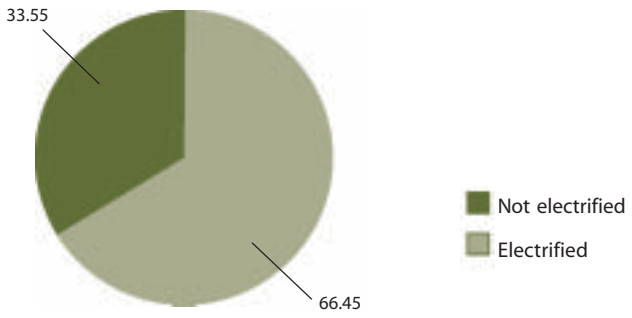


Source: SHDR Survey

Of all villages surveyed, 23.31 per cent are situated at a distance of more than 10 km from the *pucca* road and 9.32 per cent are 10 km away from a jeepable road. In fact, the average distance of the *pucca* road from the surveyed villages is 7.09 km (See Table A 8.27 in the Appendix). The average distance of the jeepable road from the surveyed villages is about 3.54 km. Around 11.03 per cent of the surveyed villages have post offices. On the other hand, in 33.09 per cent of the surveyed villages, people have to walk more than 10 km to post a letter.

In most of the surveyed villages (64.80 per cent), there is a primary school within the village. On the other hand, in a small proportion of the villages, (4.80 per cent of the surveyed villages), children have to walk more than 10 km to a primary school (Figure 8.5). The average distance of the Primary and Middle schools from the surveyed villages is 1.61 km, and 6.69 km respectively. However, the average distance of the Secondary and Higher secondary schools from the surveyed villages is 15.87 km, and 27.05 km respectively (Table A 8.27 in the Appendix).

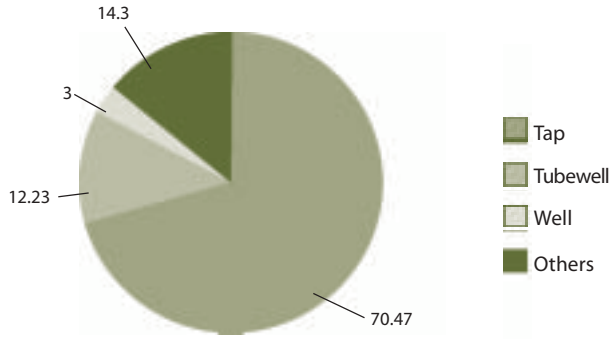
Figure 8.7: Availability of electricity in surveyed households (percentage)



Source: SHDR Survey

Access to electricity is a basic amenity today. In Arunachal Pradesh, successive Five-Year Plans have had specific targets for extending the coverage of electricity to households. According to the SHDR Survey data, 66.45 per cent of the households are electrified.

Figure 8.8: Source of drinking water in surveyed households (percentage)



Source: SHDR Survey

Health services in rural areas are provided through subcentres, PHCs and hospitals. Only 15.38 per cent of the surveyed villages have a primary health sub-centre within the village, and in 25.28 per cent of the surveyed villages, users have to walk more than 10 km to avail of the medical services of the primary health sub-centres (Figure 8.6).

Access to electricity is a basic amenity today. In Arunachal Pradesh, successive Five-Year Plans have had specific targets for extending the coverage of electricity to households. According to the SHDR Survey data, 66.45 per cent of the households are electrified. (Figure 8.7)

Access to safe sources of drinking water in rural areas is another important indicator of development. The surveyed households use multiple sources, and the sources of drinking water for the surveyed villages have been categorised as tap/pipe, tubewell, well and other sources (including spring water). Around 70.47 per cent of the surveyed villages have piped or tap water as the dominant source of drinking water, 12.23 per cent reported using tubewells, 3 per cent reported using wells, and 14.3 per cent use other sources like springs (Figure 8.8).

J. Composite index of infrastructure – An inter-district analysis and its relation to the Human Development Index

In this section, the composite index of infrastructure is constructed with the help of principal component analysis. The relationship between infrastructure and human development at the district level is thoroughly examined. The composite index of infrastructure development is based on the following indicators:

(i) Length of road per 100 square km (x_1)

(ii) Surfaced road as a percentage of total road length (x_2)

(iii) Percentage of villages having connectivity status of roads (x_3)

(iv) Percentage of gross irrigated area to total cropped area (x_4)

(v) Percentage of electrified villages to total villages (x_5)

(vi) No. of banks per 10,000 population (x_6)

(vii) No. of banks per 100 sq km (x_7)

(viii) Credit deposit ratio (per cent) (x_8)

(ix) No. of schools per 10,000 population (x_9)

(x) No. of schools per 100 sq km (x_{10})

(xi) No. of health centres/hospitals etc., per 10,000 population (x_{11})

(xii) No. of health centres/hospitals etc., per 100 sq km (x_{12})

(xiii) No. of medical technical personnel per 10,000 population (x_{13})

(xiv) No. of hospital beds per 10,000 population (x_{14})

(xv) No. of post and telegraph offices per 10,000 population (x_{15})

(xvi) No. of post and telegraph offices per 100 sq km (x_{16})

(xvii) No. of fair price shops and cooperative societies per 10,000 population (x_{17})

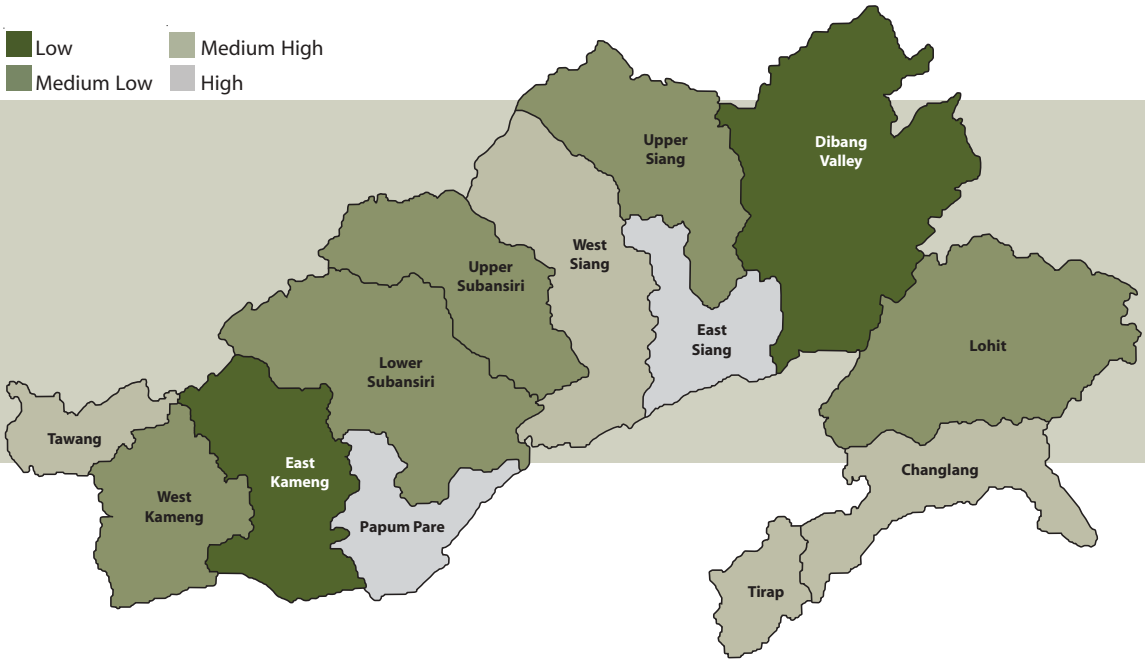
(xviii) No. of fair price shops and cooperative societies per 100 sq km (x_{18})

(xix) Percentage of villages to total villages fully covered by drinking water supply. (x_{19})

The composite indices for the different districts of Arunachal Pradesh have been obtained.[84] Finally, the districts have been classified into four categories i.e., High (H), Medium High (MH), Medium Low (ML) and Low (L). Table 8.3 shows classification of the different districts according to these levels of development. Papum Pare and East Siang district are in the 'High' category, which implies that they are relatively developed in terms of infrastructure. Four districts, Tawang, Tirap, Changlang, and West Siang fall in the 'Medium High' category. Five districts namely West Kameng, Lower Subansiri, Lohit, Upper Subansiri and Upper Siang are placed in the 'Medium Low' category. Finally, Dibang Valley, and East Kameng fall under

[84] *These have been estimated by applying the principal component method, which is also known as the method of maximising the sum of squared projections (Kundu, 1980).*

Figure 8.9: Classification of districts by levels of infrastructure development



the 'Low' category. With the exception of Tawang, all the districts that fall in the 'High' or 'Medium' category, are situated in the foothills bordering Assam. On the other hand, most of the districts of the northern (except Tawang) and eastern areas, bordering the high mountains, fall in the 'Medium Low' or 'Low' category. The regional disparity index is estimated as 35.48.

Table 8.3

Classification of districts of Arunachal Pradesh by Infrastructure Development Index, 2000-2001

Category	Name of the District
High	1. Papum Pare (4.96) 2. East Siang (4.04)
Medium High	1. Tawang (3.87) 2. Tirap (3.66) 3. Changlang (3.44) 4. West Siang (3.01)
Medium Low	1. West Kameng (2.76) 2. Lower Subansiri (2.56) 3. Lohit (2.17) 4. Upper Subansiri (2.16) 5. Upper Siang (2.10)
Low	1. Dibang Valley (1.69) 2. East Kameng (1.43)

K. The way forward

A proper balance between the need for expansion and creation of new facilities on the one hand, and the proper management and efficient running of the existing facilities on the other, needs to be achieved. Often, there is a tendency for emphasis on the former and neglect of the latter, as the creation of facilities is an easier task than the maintenance.

There has been a significant development of infrastructural facilities during the last 50 years, starting from a very low base. However, the facilities are inadequate and the infrastructure in the State is less than the national average. According to the CMIE Infrastructure Index, 1992-1993, Arunachal Pradesh scored 44 points with the all-India index at 100.

- The current situation reflects a wide gap between the facilities in urban and rural areas. There is also a wide gap between bigger and smaller villages (in terms of population). This is especially true in the case of roads, education, and health facilities. The cost of developing this infrastructure is quite high due to the scattered nature of the villages. The onus of the development of infrastructure, especially in the remote and inaccessible regions of the State, continues to be that of the Government. The Government will have to continue with high public investment expenditure in the infrastructure sector. At the same time, private investment, particularly in the provisioning of education and health infrastructure needs to be encouraged, together with community and local enterprise.

- Apart from the rural-urban disparities, there are also wide-ranging inter-district disparities in the availability of infrastructure facilities. For example, most of the districts of the northern and eastern border areas, with high mountains, are less well-serviced than the districts in the foothills of Arunachal Pradesh, which border Assam. As infrastructure is crucial to the process of economic development as well as human development, it is imperative that these facilities should be extended and consolidated in the hill districts. This will necessitate allocation of funds to these areas on a priority basis. Needless to say, different components of the infrastructure need strengthening in the different districts. Thus, a proper strategy of infrastructure development has to be framed keeping in mind the special circumstances of each district.

- A proper balance between the need for expansion and creation of new facilities on the one hand, and the proper management and efficient running of the existing facilities on the other, needs to be achieved. Often, there is a tendency for emphasis on the former and neglect of the latter, as the creation of facilities is an easier task than the maintenance. As a result of poor maintenance, transmission and distribution losses of electricity have been rising in Arunachal Pradesh. State Planners should give due attention to this aspect of the development process. Efficiency in the management of public utilities is a closely related issue. The losses incurred by the public sector undertakings point to inefficient management practices. (The State Transport Corporation of Arunachal Pradesh, for example, incurred losses of Rs. 10.26 crore per year during 1998-99 to 2000-01, on average). The establishment of

proper institutional facilities, which can support and make investment effective, is a pre-requisite to better management. These arrangements should accommodate local initiatives so that there is a commitment on the part of the local people. The Government needs to revive the community spirit of the local people and redefine the private sphere in the development process.

- There is a close relationship between the Human Development Index and the Infrastructure Development Index. In fact, a regression analysis (see Chapter 3) suggests that road connectivity is of singular importance as a determinant of life expectancy in Arunachal Pradesh. The first task of the Government should be to increase the road connectivity of those districts, which have a relatively low Human Development Index. An increase in road connectivity will lead to improved health, and better educational facilities, as well as to higher income earnings, and better human development.

- Adequate attention needs to be given to the provision of an institutional infrastructure, especially of market institutions. Institutional rigidities in Arunachal Pradesh often inhibit the emergence of factor markets. For example, since land is owned by the community, the growth of the labour and credit markets has been restricted. Institutions, especially legal institutions that guide economic contract, have not yet been standardised. The successful operation of the factor markets warrants that the legal-judicial infrastructure should be well-defined to protect the parties to the contract. Hence, it is necessary to develop the institutional infrastructure along with the economic and social infrastructure for rapid economic as well as human development of the State.

- On the programme design side, it is imperative to develop a 'feedback loop' in the development strategy, so that the appropriateness/relevance of the schemes is continually tested in the field and feedback generated in a systemic manner, which can then be incorporated in the scheme/ project/ programme through mid-course modifications

- Given the necessity of continuing Government interventions for the development of the State, convergence between departmental responsibilities has to be emphasised to reduce the truncated functioning at the cutting edge.

- Traditional water harvesting systems should be revived and integrated with piped water supply, so that the problem of drinking water availability is addressed in a sustainable manner.

- In the erection of public buildings such as schools and hospitals, appropriate technology should be used. The PWD should run an R&D cell in collaboration with NERIST for research on design and materials and, at the same time, encourage the use of local materials in construction.

- All developmental work should be subject to a concurrent audit. While development audit with a broad focus, such as the efficiency of a project or programme (including environment and economic issues) may be done internally by the Government department concerned, social audit may be introduced, with the consent and understanding of all stakeholders. This will help to enhance local governance and strengthen accountability and transparency. The issue of social impact will also come into sharp focus once a social audit is initiated.

Social audit may be introduced, with the consent and understanding of all stakeholders. This will help to enhance local governance and strengthen accountability and transparency. The issue of social impact will also come into sharp focus once a social audit is initiated.

Chapter 9

Biodiversity conservation and sustainable development

Biodiversity

conservation

Arunachal Pradesh is a vast land, blessed by Nature with extraordinary diversity, and is relatively sparsely populated. Its western and central regions represent the eastern extremity of the Himalayas; rising from the plains of Assam to 7,000 metres above the sea level. In the east, the lesser Himalayan ranges meet the tangled terrain of the Patkai Hills. Great rivers flow through the State. Forging and enriching as many as six river basins — the Kameng, Subansiri, Siang, Dibang, Lohit, and Tirap basins — all part of the Upper Brahmaputra river system. A little beyond the foothills of the State, the Siang and the Lohit meet, to form the mighty Brahmaputra. Marked by a remarkable range of topography, altitude, soil, rainfall, and climate, Arunachal Pradesh is one of the last bastions of diversity, and an exceptional heritage.

Several factors have contributed to the fact that this rich legacy has survived, and continues to sustain the land and the people. Nature has been bountiful, and it has provided the people of the State with unparalleled diversity and richness for generations. The remoteness and insularity of the area, till very recently, is a major contributory factor to this continuing legacy. Even today, access to larger centres of the manufacturing and processing industry, and to other forms of economic activity is difficult and constrained by an underdeveloped road and transportation system. The links are tenuous and, in any case, cover only the main administrative centres of the State. A 100 years ago, the nature of the economy and of societal structures created neither the need nor the incentive for large-scale extraction of forest products. The most important factor has, however, been the fact of strong systems of community, the fact that the environment around the people has been of utmost importance to them, in their lives, as a source of livelihood. In return, they have protected their environs, using what they need, and ensuring that it is available to them, and to future generations.

There is, therefore, a fundamental and strong bond between the people and the environment; for centuries, the forests and the land have given them all that they need. Thus, while animal food supplements the diet of the people, hunting, trapping and fishing are not done throughout the year, and the people observe certain taboo periods, when all such activities are restricted. Cutting of certain plant species is also forbidden, and a violation may lead to the imposition of a fine.

This relationship has been severely tested in the last few decades. Population pressure has grown; given the welcome fact of better healthcare and the growing economy, these can only be expected to continue to grow, at least for some time. Swidden agriculture has given way in some areas to more settled forms of cultivation. The great forests of the region have worked, providing valuable timber to the rest of the country; their progressive denudation only arrested by a judicially enforced ban on felling in the late 1990s. Road networks have linked the plains with the hills, and opened up, hitherto impenetrable regions. In the fragile and relatively young geological system of the

Box 9.1

Forest cover in Arunachal

The main forest types in Arunachal Pradesh are tropical, subtropical, coniferous, temperate, alpine grasslands and degraded forest.

Satellite data shows that the forest cover in the State is 68,847 sq km (December 1998 to February 1999). This constitutes 82.21 per cent of the geographical area. However, the recorded forest area is 51,540 sq km, which is about 61.50 per cent of the total geographical area. Of this, the classified forest area is 19,500 sq km.

There are two national parks and a dozen wildlife sanctuaries in Arunachal. The Namdhapa Tiger Reserve is also located here. Arunachal also has two biosphere reserves — the Dihang Dibang Valley Biosphere Reserve and the recently inaugurated Peace Park and Biosphere Reserve named after the Sixth Dalai Lama, His Holiness Tsanyang Gyatso. This park covers large parts of Tawang and West Kameng districts.

Eastern Himalayas, these have left scars on the countryside; the roads will take many years to stabilise, and the scars even more time to heal.

The State's biodiversity can serve as a treasure trove of germplasm for food plants, medicinal plants, bamboo and cane, orchids, wild animal species and other life forms. This can be Arunachal's gift to posterity, to science and knowledge, and to replenishing the earth.

Equally significant, there is the traditional knowledge of flora, fauna, the land and forests, that is in danger of being forgotten. This rich store of indigenous knowledge that has been handed down over generations, with the respect for nature that is at its core, should be documented and utilised in a sustainable manner.

It is, therefore, imperative that this great heritage, one of the last true bastions of biodiversity on earth, be protected and preserved. The State's biodiversity can serve as a treasure trove of germplasm for food plants, medicinal plants, bamboo and cane, orchids, wild animal species and other life forms. This can be Arunachal's gift to posterity, to science and knowledge, and to replenishing the earth.

A. The idea of sustainable development

The conservation of biodiversity is central to the idea of sustainable development. For human development to be sustainable, environmental issues and biodiversity conservation are critical. Can the rich biodiversity of the State continue to be protected, as development comes? Already, a price has been paid, the forest cover as well as the diversity in its highly rich flora and fauna has declined, but, it is one of the key biodiversity hot spots in the world. Can a development path be forged that is not destructive, but is environmentally sustainable? A path that recognises the lessons that people here have learnt and practised for centuries, evident in the indigenous management and harvesting of resources.

Is it possible to achieve high levels of human development, good education, access to medical care, adequate income, and develop Arunachal in a holistic, sustainable manner, without bringing into its almost pristine environs the inevitable accompaniments of development; pollution, slums, congestion, and environmental degradation? This is the challenge before Arunachal.

B. The flora and fauna of Arunachal

Arunachal has all the vegetation types: tropical, sub-tropical, temperate, and alpine. Bamboos grow along the foothills and grasslands of the riparian tracts. A great diversity is associated with tropical and subtropical vegetation types. All the useful plant species ranging from medicinal herbs to timber plants are closely linked with the economic life of the people. Arunachal is endowed with about a third (5,000 seed plants) of the 15,000 seed plants found in India, thousands of non-flowering plants, and about 500 exotic orchids. The State is rich in faunal wealth. Although it is difficult to get exact figures of animal diversity, there are believed to be more than a 100 species of mammals in its forests. These include four major cats (tiger, leopard, snow leopard, and clouded leopard), three antelopes (serow, goral, and takin) and the highly endangered hispid hare. The State is home to 8 out of 16 species of primates found in India. Bison or *Gaur* and *Mithun* (See Box 9.3) are two important mammals found in the State.

Box 9.2

Floral diversity of Arunachal Pradesh

Plant Species	Number of Species (approx)
Rhododendrons	52
Hedychium Species	18
Oaks	16
Gymnosperms	29
Bamboo	35
Canes	20
Orchids	550
Medicinal Plants	500
Pteridophytes	452
Bryophytes	60
Lichens	80

Sources: Arunachal Pradesh State Biodiversity Strategy and Action Plan, State Forest Research Institute, 2002.
Statistical Report- 1999-2000, Department of Environment and Forest, Arunachal Pradesh.

Additionally, at least six species of squirrels, mongoose, civet cat, are some of the smaller mammals found in the wild. There are four types of deer: sambar, hog deer, barking deer, and musk deer. Red panda, binturang, black bear, sun bear, sloth bear, wolf, wild boar are the other animal species found in the State. There are about 650 species of birds, including three species of hornbills and the endangered white winged duck and rare pheasants. In addition, there are 105 species of fishes, 42 species of amphibians, besides a large numbers of reptiles, butterflies, and other terrestrial mammals.

The forests are also rich in a wide variety of medicinal plants which have been used by the people for centuries to cure various diseases, from stomach ailments to blood pressure. More than 450 plants have been identified with medicinal properties. People in Lohit have bartered *Coptis teeta*[85] and Aconitum[86] plants with the people of Brahmaputra Valley, in exchange for essential items for centuries. Another item of barter during the old days was *Manjistha*[87], a dye- yielding plant.

Plant species, which are used as house-building and household materials, are abundant in the tropical and subtropical zones. Bamboo and cane species grow profusely in the phyto-geographical[88] regions. However, the overexploitation of certain cane species has meant their disappearance in recent years. Thatch grasses and wild bananas grow abundantly and, these are often used for roofing.

A remarkable feature of the plant diversity in the State is the occurrence of innumerable wild orchid species. Floriculture is now being promoted in the State and individual entrepreneurs have been quite successful in generating income from floriculture. Box 9.2 lists the major plants found in the State.

However, much of the forest wealth of the State is undocumented. A comprehensive Biodiversity Action Plan, beginning with an exhaustive listing of the important plant and animal species of economic value, as well as endangered and rare species, is the first step towards the conservation and sustainable use of this priceless heritage. The next stage is the development of appropriate technology, active community participation, and an extension of the available livelihood options in a manner that is efficient and sustainable.

Box 9.3

Mithuns in Arunachal

Endemic to North-East India's jungles, the *mithun* (*Bos frontalis*) is a rare bovine species. The highest population of *mithuns* is in Arunachal (124,730 in 1998).

The animal is an integral part of the socio-economic and cultural life of the people. The wealth of a person is often gauged by the number of *mithuns* he possesses. The *mithun* is regarded as a symbol of prestige and was traditionally used as a medium of exchange, a means to settle disputes, and as the bride price. *mithuns* determine social status. They also provide calories and protein, and are essential part of community feasts.

Yet, *mithuns* are reared in a free-range system. The owners leave the *mithuns* in the jungles to graze on natural fodder and, they are occasionally given a dose of common salt. The *mithuns* browse over a considerable range in search of fodder and, over two dozen species of trees, shrubs, tall grasses, and bamboos form their diet. To maintain these *mithuns*, the protection of the pristine forest is required, a task that is becoming increasingly difficult.

[85] Coptis teeta is the botanical name of what is referred to as Mishmi teeta, because the Mishmi people traded it. Teeta means bitter, and the perennial herb is bitter and is in demand because it is believed to be an effective cure for stomach ailments and indigestion.

[86] Aconitum is called Barbih in Assamese and literally means big poison. This is a perennial herb, which is poisonous, and the poison was used to coat arrows, which were used in war. It also has medicinal properties.

[87] Manjistha is Indian madder. Found in the colder regions of the State, it is used to produce a red dye.

[88] Phyto-geographic regions refer to geographical regions classified on the basis of the distribution of specific plant species. Thus, a particular phyto-geographic region reflects the geographic condition in its plant species.

C. Agro-horticultural diversity

The people in Arunachal practise both shifting and settled cultivation, and cultivate mainly rice, maize, and millets as major crops. Out of the total geographical area of 8.37 million hectares, the cultivated area is about 200,000 hectares. Of this *jhum*/shifting cultivation is practised in 110, 000 hectares, and 90,000 hectares is under settled cultivation (1999-2000). Wide diversity is evident in the traditional *jhum* fields where cereal crops and other food plants are grown. A large number of land races[89] and wild relatives of cereals, legumes, fruits, oilseeds, species, and other plants are found in Arunachal. Traditional farmers perpetuate many local cultivars[90] of cereals and other food plants like yams, taros[91], and leafy vegetables. Minor forest produce like wild leafy vegetables, fruits and seeds, tubers, yams and resins, are sometimes sold by the villagers in the nearby towns and this provides cash income. Ginger is another crop that is grown quite extensively. The recent introduction of fruit crops like kiwi and apples in some districts (Tawang and West Kameng) has proved to be very successful. The oranges of Siang, and of Wakro area, are famous.

Box 9.4

Shortening *jhum* cycles and the use of traditional ecological knowledge

The dominant agricultural practice in much of North-East India continues to be *jhum* cultivation or shifting agriculture. This land use system capitalises on the inherent soil fertility, built up over a period of time, when the land lies fallow. In the past, this may have extended to between 30-40 years but, in more recent times, it has fallen to about 10 years or less.

Increasing pressure of population, and limited access to forest areas to practice *jhum*, have led to a shortening of the cycle (the extent of time that the land lies fallow between two crops on the same site) to about three- four years in some areas. This system was sustainable when population pressure was limited, and land was abundant. Today, however, *jhum* cultivation has meant degradation of land, and the shortened cycle makes *jhum* cultivation much less sustainable. While the Government has been trying to persuade the people to shift from *jhum* to settled agriculture, it has not been very successful in its attempts. This is because the people perceive sedentary agriculture as demanding very high inputs in terms of fertilisers and pesticides.

Ramakrishna (1992, 2002) has pointed out how biodiversity-linked traditional ecological knowledge is used for soil fertility management by the people of Arunachal. Traditional tribal societies organise nutrient-use efficient crop species on the top of the slope, and less efficient species along the bottom, to match the soil fertility gradient on the slope. Emphasis is given to tuber and vegetable crops in comparison to cereals, and mixed cropping is followed. Weed biomass is used as a nutrient. Elaborate water management techniques also alter the soil's biological processes, and increase fertility.

An indigenous land use system needs to be developed combining the rich traditional ecological knowledge with appropriate scientific inputs, so that the people can benefit. The *Jhum* Redevelopment Plan for Nagaland, being implemented by the Nagaland Government through the Village Development Boards (VDBs), is an example of such an initiative. In this initiative, over 1,000 villages have been organised under the VDBs for the specific purpose of rural development. Traditional systems have been combined with new agro-forestry practices to revitalise agriculture, which has been operating at subsistence or less than the subsistence level, due to the shortening of the *jhum* cycle, and deforestation.

Sources: P. S Ramakrishnan: shifting Agriculture and Sustainable Development: an inter-disciplinary study from north-eastern India, (Wiley Eastern, New Delhi, 1992). P. S Ramakrishnan: land use Dynamics and Sustainable Development in Arunachal Pradesh: environmental Planning and Sustainable Development, Himvikas, Occasional Publication, 2002.

[89] A land race refers to an economically useful plant species confined to a particular geographical area. Land race refers to both cultivated and wild plants.

[90] A cultivar is a subset of a land race and consists of those species which are cultivated in the field by the farmers, generation after generation.

[91] The botanical name for taros is colocasia. It refers to large leafy foliage, which is often edible.

D. Indigenous Knowledge Systems and Intellectual Property Rights regime

The floral and faunal diversities of the State, and the dependence of people on natural bioresources for sustenance, have resulted in a rich Indigenous Knowledge System (IKS). A contributing factor to this richness in the IKS is the ethnic and cultural diversity associated with the demography of the State. These systems have played a pivotal role in the conservation of the unique biodiversity over the centuries. The complete dependence of the tribal groups on bioresources for their livelihood has helped them to use such resources more efficiently, and to the fullest. It is imperative that this ethno-medicinal knowledge base of the ethnic groups in Arunachal is documented. Scientific exploitation of some of this rich biodiversity may hold the key to the development of the State.

Both the State's biodiversity, and its rich IKS are under threat due to the ineffective Intellectual Property Rights (IPR) regime that exists currently. Owing to Arunachal's strategic location in the eastern Himalayan range, the rich biodiversity can be harnessed for the development of the State. The present IPR regime is inadequate to provide economic support and benefit to the communities that hold the precious IKS. The State has a rich germplasm pool of cereals and other crops associated with the traditional agricultural system. Even though they are the custodians and perpetuators of the many varieties of useful crop species, the farmers and growers have no right over their rich germplasm pool. The Government has to ensure adequate protection to the community rights over wide varieties of crops, useful plants and animal species as well as adequate protection for the traditional knowledge base relating to the use of these life forms.

E. Major threats to the State's biodiversity

In recent years, the State's rich biodiversity has increasingly come under threat. The hastening pace of developmental activities in the last three decades, and the improvement in the communication network, has meant increased access. Road building has established communication but, the blasting process involved has meant the loss of valuable habitat. The rapid monetisation of the barter economies has meant increased trade in timber.

A number of hydropower projects have been commissioned, and these projects are at various stages of progress. The urbanisation process has meant the destruction of the forest cover adjacent to the new townships that have come up. Another significant threat to the fragile ecosystem and biodiversity of the State is the shortening of the *jhum* cycle, and introduction of commercial plantation. All these developments have put pressure on the State's bioresources as development is wont to do.

In addition, there is the illegal trade of forest products such as timber, medicinal plants, orchids, animal hide, musk gland, and birds, which are smuggled out of the State by poachers. Biopiracy is a new challenge manifested in a number of ways. Sometimes, the operators enter the State develop contacts, and smuggle out valuable species, mainly of flora, without the knowledge of the Government. Given their highly sophisticated methods of operation, this type of biopiracy is very difficult to detect. The creation of public consciousness, apart from the enhanced vigilance of the Government, can help to control this problem.

Box 9.5

Medicinal plants under threat in the State

At a conference in Guwahati, experts from the State Forest Research Institute, Itanagar, Botanical Survey of India, and the G.B. Pant Institute of Himalayan Environment and Development, Itanagar, made an assessment of 47 candidate taxa of important plants of Arunachal. Out of the 47 plant species assessed, five are threatened at the global level, and are red listed by the International Union for Conservation of Nature (IUCN). These endemic species include *Amentotaxus assamica*, *Coptis teeta*, *Gymnocladus assamicus*, *Piper pedicellatum*, and *P. Peepuloides*. Species like *Gymnocladus assamicus*, *Amentotaxus assamica*, *Aquilaria malaecensis*, *Dienia muscifera*, *Rauvolfia serpentina,* and *Smilax glabra* are reported to be critically endangered. While trade is a potential cause of threat to the majority of species studied, habitat loss is a common threat to all species. Some plant species were threatened by natural calamities.

Threat Category	No. of Taxa Evaluated	Percentage
Critically Endangered	6	12.8
Endangered	12	25.5
Vulnerable	17	36.2
Near Threatened	9	19.1
Least Threatened	3	6.4
Total	47	100.0

Source: Proceedings of workshop on Conservation, Assessment and Management Prioritisation for the Medicinal Plants of Arunachal Pradesh, Assam, Meghalaya and Sikkim, organised by the Foundation for the Revitalisation of Local Health Tradition, Bangalore, 27 February-1 March, 2003

Road building has established communication but, the blasting process involved has meant the loss of valuable habitat. The rapid monetisation of the barter economies has meant increased trade in timber.

F. Biodiversity conservation and sustainable development

One area that has substantial potential is bamboo — there are a number of species that grow in Arunachal — and this resource can be used in a variety of applications to generate livelihood in the State.

The rich biodiversity of the State presents unlimited opportunities and challenges. The conflict between the development process and protecting the biodiversity of the State is becoming increasingly more apparent. Arunachal has a unique opportunity to map out a development path that is sustainable and ecologically sound, a chance to develop without the accompanying hazards that rapid and unthinking development have caused in many other parts of the country. However, to do this, the State Government will have to take the initiative, and will also have to take the people into confidence.

This biodiversity can be used imaginatively and effectively to generate income and employment in the State. Keeping in view the rich bioresources, region-specific development plans need to be drawn up to make best use of local inputs, conditions, and expertise. Some of the areas that can be looked at are:

- The altitudinal variations in Arunachal give a distinct character to the different forests of the State. Temperate and alpine zones, with their lush forest cover, make the landscape extremely attractive at all times of the year. Ecotourism, trekking holidays, and specialist vacations can be encouraged, which will generate employment, and income opportunities for the people.

- To reduce pressure on the forest cover, more and more areas of the State should be covered under plantation crops like tea, coffee, and rubber. Cultivation of cash crops like ginger and spices should be encouraged on degraded land. Simultaneously, efforts should be made to establish food-processing facilities in the State as, in their absence, distress sales and /or wastage of quality fruits, is common. Such facilities will, however, have to be set up on Public- Private Partnership (PPP) basis, as, in the past, the experience with Government-run centres has not been very successful.

- Joint Forest Management, especially in the regeneration of forests on degraded land, should be encouraged with sharing of the benefits. This has already begun and, at least 10 Village Forest Management Committees (VFMCs) are managing about 5,285 hectares of forest land. Under the law, areas offered by the local communities are declared as Anchal Reserve Forest (ARF)/ Village Reserve Forest (VRF) and, plantations in these areas are undertaken at Government expense. The income from the plantations is shared between the Government and the communities. The scheme for sharing the benefits gives 25 per cent to the individuals, 25 per cent to

the committee, and 50 per cent goes to the State. There has been some headway as the benefits have started flowing into the hands of the local people in community-managed forests in Changlang and Tirap districts of the State. Taking a cue from the Namsai-Borduria forest management in Khonsa, the local committee or the Government could consider ensuring utilising the usufruct rights for local development in the health and education sectors, thus providing further fillip to the joint forest management efforts.

- The experience of the Apatani Valley in the Lower Subansiri district, and in other parts of the country, where the empowerment and involvement of women's bodies as major stakeholders in the management of bioresources has been extremely successful, can be used to initiate programmes involving women as partners in the development process.

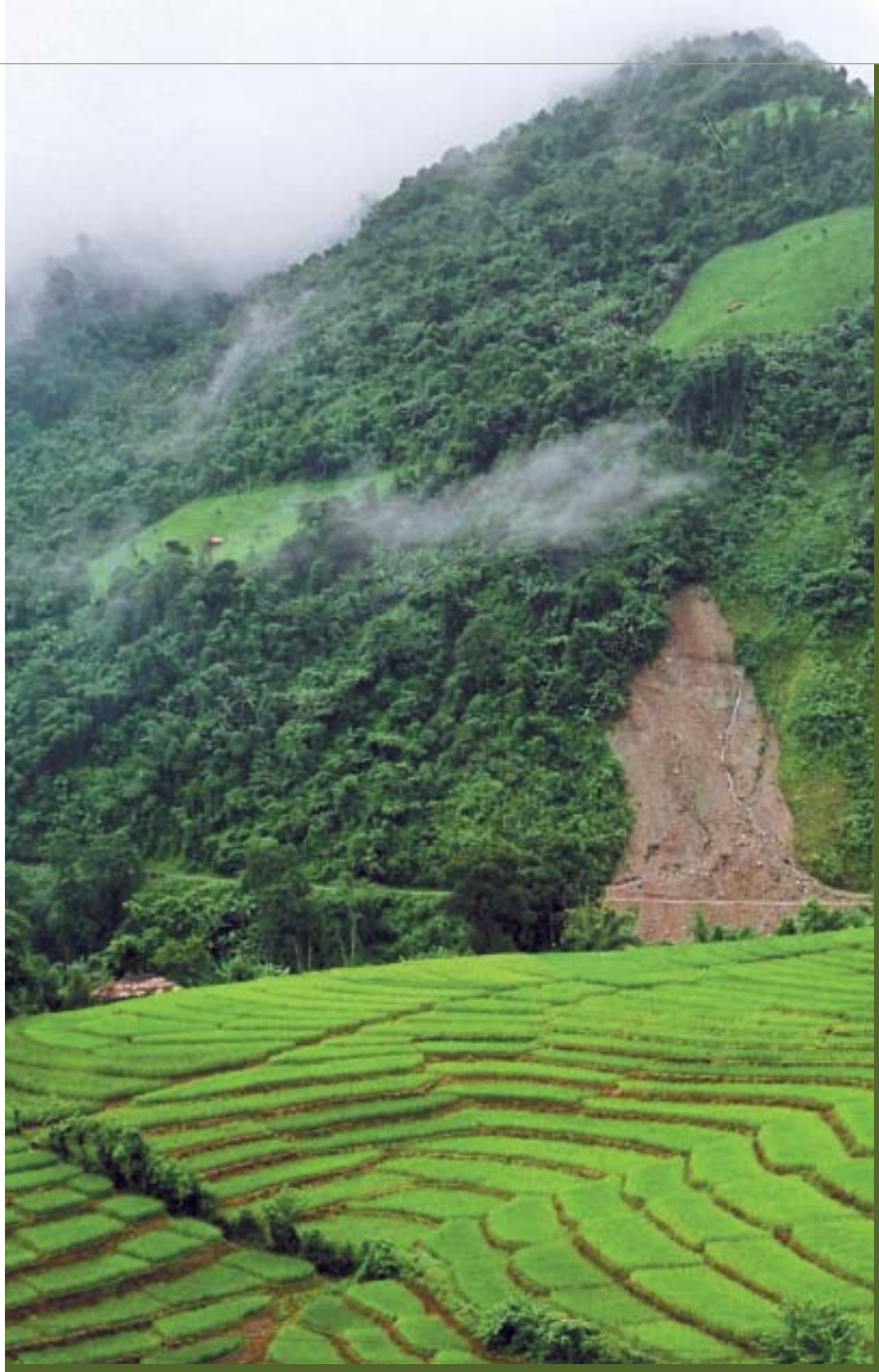
- The establishment of small-scale industries, based on minor forest produce, where there is the possibility of the replenishment of the forest, so as to ensure a regular flow of such produce, is another area which can be encouraged. The setting up of these small-scale industries can provide livelihood opportunities. One area that has substantial potential is bamboo — there are a number of species that grow in Arunachal — and this resource can be used in a variety of applications to generate livelihood in the State.

- The conservation and sustainable utilisation of medicinal plants/herbs through community participation is another area that deserves attention. A sustainable management plan for this sector is essential. The plan must analyse the status of medicinal plants/herbs in the State, and identify the threats and opportunities, barriers to markets and investments, recognise indigenous knowledge and practices, and help to preserve sacred groves, with the effective use of biotechnology.

- Resource mapping must constitute an integral part of the biodiversity conservation strategy, with a view to identifying endemic species, and threats to biological diversity. This can help to evolve a protected area management plan. The involvement of the local community and school students in documenting indigenous knowledge for posterity can go a long way in creating awareness and protecting the biodiversity.

In view of the real threats to biodiversity by natural disasters, a State-specific Disaster Mitigation and Management Plan is needed, where resource planning, forward and backward linkages for prevention and precaution, can be detailed out, and efficacious water and forest management practices could be dovetailed together.

Resource mapping must constitute an integral part of the biodiversity conservation strategy, with a view to identifying endemic species, and threats to biological diversity. This can help to evolve a protected area management plan.



Annexures

Chapter 3: Regressions

Determinants of inter-district variation in Life Expectancy at Birth

The regression of Life Expectancy at Birth (E) on literacy rate (L), per capita income (Y), hospital beds per 10,000 population (H), and percentage of rural population not connected by road (R), is as follows:

$$E = 41.01 + 0.28\ L + 0.0004\ Y - 0.17\ H - 0.19\ R \quad \text{.....(1)}$$
$$(3.6) \quad (1.8) \quad (1.6) \quad (0.90) \quad (2.1)$$

$R^2 = 0.84$ adjusted $R^2 = 0.73$ $n = 13$

The figures in parentheses are t-values, n is the number of observations (districts). All the explanatory variables have the expected sign, except 'hospital beds' (H). However, the coefficient of H is statistically insignificant. If the variable hospital beds per 10,000 population, is dropped, the estimated equation becomes:

$$E = 40.52 + 0.23\ L + 0.0004\ Y - 0.20\ R \quad \text{.....(2)}$$
$$(3.6) \quad (1.6) \quad (1.5) \quad (2.2)$$

$R^2 = 0.82$ adjusted $R^2 = 0.74$ $n = 13$

Thus if we take out 'hospital beds', it has very little effect upon the explanatory power of the equation. If, only literacy and percentage of the rural population not connected by road, are retained, the result is:

$$E = 49.8 + 0.18\ L - 0.22\ R \quad \text{.....(3)}$$
$$(4.9) \quad (1.2) \quad (2.2)$$

$R^2 = 0.75$ adjusted $R^2 = 0.69$ $n = 13$

R^2 has now fallen, but its value is still high at 0.75, indicating the strong influence exerted by these two variables upon life expectancy. Of these two factors, the percentage of rural population not connected by road is more important than the literacy rate. In a specification with literacy rate and income as the two explanatory variables, income pales into insignificance, as shown below:

$$E = 31.37 + 0.39\ L + 0.00007\ Y \quad \text{.....(4)}$$
$$(4.5) \quad (3.5) \quad (0.3)$$

$R^2 = 0.55$ adjusted $R^2 = 0.46$ $n = 13$

If literacy rate is replaced by the percentage of rural population not connected by road, the outcome is:

$$E = 56.959 + 0.0003\ Y - 0.30\ R \quad \text{.....(5)}$$
$$(11.7) \quad (1.1) \quad (4.8)$$

$R^2 = 0.75$ adjusted $R^2 = 0.68$ $n = 13$

The high value of R^2 in equation (5) compared with its value in equation (4) is indicative of the singular importance of road connectivity as a determinant of life expectancy. A comparison of equations (3) and (5), shows that literacy is at least as important as income as a reason for inter-district variation in Life Expectancy at Birth.

Determinants of Total Fertility Rate

When Total Fertility Rate (TFR) is regressed on literacy rate (L), the percentage of rural people not connected by road (R), the percentage of women using contraceptive (C), and IMR, the result is:

$$TFR = 5.18 - 0.026\ L - 0.004\ C - 0.006\ R + 0.013\ (IMR) \quad \ldots\ldots\ldots (1)$$
$$\qquad\quad (3.7) \quad (1.3) \qquad (0.2) \qquad (0.6) \qquad (1.4)$$

$R^2 = 0.70$ adjusted $R^2 = 0.50$ $n = 13$

(The figures in parentheses are t-values). All the coefficients are insignificant at 10 per cent level. A specification with literacy, urbanisation level (U), and IMR as the explanatory variables yields the following estimated equation:

$$TFR = 4.95 - 0.018\ L - 0.011\ U + 0.011\ (IMR) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$
$$\qquad\quad (5.5) \quad (1.7) \qquad (1.7) \qquad (1.7)$$

$R^2 = 0.73$ adjusted $R^2 = 0.64$ $n = 13$

None of the coefficients is significant at 10 per cent level but, all of them are significant at the 13 per cent level. If the TFR is regressed on the IMR, literacy and contraceptive use, the outcome is:

$$TFR = 5.30 + 0.008\ (IMR) - 0.019\ L - 0.011\ C \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$
$$\qquad\quad (5.3) \quad (1.1) \qquad\quad (1.4) \qquad (0.7)$$

$R^2 = 0.66$ adjusted $R^2 = 0.54$ $n = 13$

In this case, none of the coefficients are significant. When TFR is regressed on literacy and IMR, the coefficient of literacy becomes significant but, not the coefficient of IMR. Similarly, when only literacy and urbanisation are the explanatory variables, literacy becomes significant, but, not urbanisation. A regression of TFR on contraceptive use and literacy yields an estimated equation which shows the insignificance of both the explanatory variables at the 10 per cent level. Of course, a high multi-collinearity exists between the use of contraceptive and literacy — the simple correlation between them is 0.76. So, it is literacy which has primacy in the determination of inter-district variation in fertility, as shown below:

$$TFR = 6.41 - 0.033\ L \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$
$$\qquad\quad (13.9) - (3.9)$$

$R^2 = 0.57$ adjusted $R^2 = 0.54$ $n = 13$

As high as 57 per cent of the inter-district variation in the Total Fertility Rate is explained by the literacy rate alone.

Factors determining inter-district variation in IMR

The set of variables which can explain the inter-district variations in Life Expectancy at Birth cannot explain the inter-district variation in IMR. The variable which occupies the most important position in the explanation of inter-district variation of IMR is the percentage of children immunised. Thus, when IMR is regressed on the percentage of children immunised (V), the result is:

$$IMR = 193.52 - 1.61\ V \quad \text{.....(1)}$$
$$\qquad\quad (6.9) \quad (4.1)$$

$R^2 = 0.60$ adjusted $R^2 = 0.56$ n = 13 (number of districts)

Immunisation alone can explain 60 per cent of the inter-district variation in IMR. If to equation (1) literacy rate (L) is added, the outcome is:

$$IMR = 192.25 - 1.38\ V - 0.28\ L \quad \text{.....(2)}$$
$$\qquad\quad (6.7) \quad (2.7) \quad (0.8)$$

$R^2 = 0.62$ adjusted $R^2 = 0.55$ n = 13

As evident in equation (2), literacy makes little difference to the explanation of inter-district variation in IMR. The addition of income (Y) to equation (2) reduces R^2 from 0.55 to 0.50:

$$IMR = 192.30 - 1.42\ V - 0.27\ L + 0.0001\ Y \quad \text{.....(3)}$$
$$\qquad\quad (6.4) \quad (2.5) \quad (0.7) \quad (0.2)$$

$R^2 = 0.62$ adjusted $R^2 = 0.50$ n = 13

The sign of coefficient of Y is unexpected and insignificant. The addition of the percentage of the rural people not connected by road (R) does not improve the R^2:

$$IMR = 164.05 - 1.12\ V - 0.19\ L + 0.00005\ Y - 0.22\ R \quad \text{.....(4)}$$
$$\qquad\quad (3.1) \quad (1.4) \quad (0.3) \quad (0.04) \quad (0.2)$$

$R^2 = 0.62$ adjusted $R^2 = 0.50$ n = 13

Except income, all variables have the expected sign, but, none of them is significant even at the 20 per cent level.

Chapter 4: Regressions

The time path of the inflow of funds from the Centre

The regression of inflow of funds from the Centre on time is as follows:

$$\log y = 10.56 + 0.0255\ t \quad \text{.....(1)}$$

$R^2 = 0.69$ n=17

where y is the inflow at constant prices of 1993-94, t is time measured in years, with origin at 1985-86, and the period covered is 1986-87 to 2001-03, giving 17 observations (value of n). The annual average growth rate, 2.55 per cent, is statistically significant at the 1 per cent level. The inflow as a percentage of State income (NSDP) regressed on time yields the following:

$$y_1 = 86.80 - 2.15\ t \quad \text{.....(2)}$$

$R^2 = 0.73$ $n = 17$

where y_1 is the percentage of inflow to NSDP, and other symbols have the same meanings as in equation (1). The annual average fall of y_1 is 2.15 percentage points, which is significant statistically at the 1 per cent level. The inflow as a percentage of the State revenue, including loans, shows trendlessness:

$$y_2 = 81.548 - 0.220\ t \quad \text{.....(3)}$$

$R^2 = 0.06$ $n = 17$

where y_2 is the percentage of inflow to total State revenue. The coefficient of time is statistically insignificant.

District Profiles

District: Tawang

SN	Characteristics	Values
1.	Area	2,172 sq km (2.59% of the State)
2.	Cultivable land (1995-96 Agriculture Census)	4,746 hectares
3.	Population (2001 Census)	38,924 (3.55% of State)
4.	Male	21,846
5.	Female	17,078
6.	Population growth (Annual) during 1991-2001	3.76%
7.	Per capita Gross District Domestic product (at current prices) in 2000-2001	Rs. 21,706
8.	Literacy rate (2001 Census)	47.3%
9.	Literacy rate (Male) (2001 Census)	60.3%
10.	Literacy rate (Female) (2001 Census)	30%
11.	Adult literacy rate (Estimated for 2000-2001)	37.98%
12.	Adult literacy rate (Male) (Estimated for 2000-2001)	48.87%
13.	Adult literacy rate (Female) (Estimated for 2000-2001)	25.72%
14.	Gross Enrolment Ratio (6-22 years) Estimated for 2000-2001	46.87%
15.	Gross Enrolment Ratio (Male) (6-22 years) Estimated for 2000-2001	51.47%
16.	Gross Enrolment Ratio (Female) (6-22 years) Estimated for 2000-2001	42.43%
17.	Gross Enrolment Ratio, primary (Estimated for 2000-2001)	98.50%
18.	Gross Enrolment Ratio, upper primary (Estimated for 2000-2001)	54.38%
19.	Life Expectancy at Birth (2000-2001)	49.79 years
20.	Life Expectancy at Birth (Male) (2001)	49.75 years
21.	Life Expectancy at Birth (Female) (2001)	50.01 years
22.	Infant Mortality Rate (2000-2001)	98
23.	Infant Mortality Rate (Male) (2000-2001)	100
24.	Infant Mortality Rate (Female) (2000-2001)	95
25.	Under-Five Mortality Rate (2000-2001)	176
26.	Under-Five Mortality Rate (Male) (2000-2001)	168
27.	Under-Five Mortality Rate (Female) (2000-2001)	185
28.	Number of hospitals including PHCs, and health sub-centres (2000-2001)	23
29.	Number of doctors (2000-2001)	17
30.	Number of hospital beds (2000-2001)	54
31.	Number of primary schools (2000-2001)	55
32.	Teacher-pupil ratio, pre-primary/primary	1:24
33.	Teacher-pupil ratio, upper primary (2000-2001)	1:20
34.	Human Development Index (HDI) (2001)	0.555
35.	HDI Rank in the State (2001)	6
36.	Human Poverty Index (HPI) (2001)	43.45
37.	HPI Rank in the State (2001)	10
38.	Gender-related Development Index (GDI) (2001)	0.538
39.	Infrastructural development index (2000-2001)	3.87
40.	Percentage of villages connected by roads (1997)	25.66

Note: For data sources please refer to page 200.

District: West Kameng

SN	Characteristics	Values
1.	Area	7,422 sq km (8.86% of the State)
2.	Cultivable land (1995-96 Agriculture Census)	9,799 hectares
3.	Population (2001 Census)	74,599 (6.79% of State)
4.	Male	42,542
5.	Female	32,052
6.	Population growth (Annual) during 1991-2001	3.22%
7.	Per capita Gross District Domestic Product (at current price) in 2000-2001	Rs. 19,645
8.	Literacy rate (2001 Census)	60.8%
9.	Literacy rate (Male) (2001 Census)	70.3%
10.	Literacy rate (Female) (2001 Census)	47.5%
11.	Adult literacy rate (Estimated for 2000-2001)	54.11%
12.	Adult literacy rate (Male) (Estimated for 2000-2001)	63.94%
13.	Adult literacy rate (Female) (Estimated for 2000-2001)	40.23%
14.	Gross Enrolment Ratio (6-22 years) Estimated for 2000-2001	48.22%
15.	Gross Enrolment Ratio (Male) (6-22 years) Estimated for 2000-2001	48.41%
16.	Gross Enrolment Ratio (Female) (6-22 years) Estimated for 2000-2001	48.00%
17.	Gross Enrolment Ratio, primary (Estimated for 2000-2001)	92.62%
18.	Gross Enrolment Ratio, upper primary (Estimated for 2000-2001)	46.14%
19.	Life Expectancy at Birth (2000-2001)	53.35 years
20.	Life Expectancy at Birth (Male) (2000-2001)	53.04 years
21.	Life Expectancy at Birth (Female) (2000-2001)	53.51 years
22.	Infant Mortality Rate (2000-2001)	88
23.	Infant Mortality Rate (Male) (2000-2001)	91
24.	Infant Mortality Rate (Female) (2000-2001)	87
25.	Under-Five Mortality Rate (20000-2001)	151
26.	Under-Five Mortality Rate (Male) (2000-2001)	156
27.	Under-Five Mortality Rate (Female) (2000-2001)	145
28.	Number of hospitals including PHCs, and health sub-centres (2000-2001)	36
29.	Number of doctors (2000-2001)	24
30.	Number of hospital beds (2000-2001)	143
31.	Number of primary schools (2000-2001)	110
32.	Teacher-pupil ratio, pre-primary/primary	1:19
33.	Teacher-pupil ratio, upper primary (2000-2001)	1:19
34.	Human Development Index (HDI) (2001)	0.573
35.	HDI Rank in the State (2001)	3
36.	Human Poverty Index (HPI) (2001)	36.11
37.	HPI Rank (2001)	4
38.	Gender-related Development Index (GDI) (2001)	0.424
39.	Infrastructural development index (2000-01)	2.76
40.	Percentage of villages connected by roads (1997)	46.97

District: East Kameng

SN	Characteristics	Values
1.	Area	4,134 sq km (4.94% of the State)
2.	Cultivable land (1995-96 Agriculture Census)	21,047 hectares
3.	Population (2001 Census)	57,179 (5.21% of State)
4.	Male	28,802
5.	Female	28,377
6.	Population growth (Annual) during 1991-2001	1.35%
7.	Per capita Gross District Domestic Product (at current price) in 2000-01	Rs. 13,349
8.	Literacy rate (2001 Census)	40.6%
9.	Literacy rate (Male) (2001 Census)	52.4%
10.	Literacy rate (Female) (2001 Census)	28.6%
11.	Adult literacy rate (Estimated for 2000-2001)	34.47%
12.	Adult literacy rate (Male) (Estimated for 2000-2001)	43.90%
13.	Adult literacy rate (Female) (Estimated for 2000-2001)	24.85%
14.	Gross Enrolment Ratio (6-22 years) Estimated for 2000-2001	65.45%
15.	Gross Enrolment Ratio (Male) (6-22 years) Estimated for 2000-2001	75.90%
16.	Gross Enrolment Ratio (Female) (6-22 years) Estimated for 2000-2001	54.57%
17.	Gross Enrolment Ratio, primary (Estimated for 2000-2001)	110.58%
18.	Gross Enrolment Ratio, upper primary (Estimated for 2000-2001)	81.64%
19.	Life Expectancy at Birth (2000-2001)	43.36 years
20.	Life Expectancy at Birth (Male) (2000-2001)	43.86 years
21.	Life Expectancy at Birth (Female) (2000-2001)	42.47 years
22.	Infant Mortality Rate (2000-2001)	97
23.	Infant Mortality Rate (Male) (2000-2001)	95
24.	Infant Mortality Rate (Female) (2000-2001)	98
25.	Under-Five Mortality Rate (2000-2001)	197
26.	Under-Five Mortality Rate (Male) (2000-2001)	191
27.	Under-Five Mortality Rate (Female) (2000-2001)	202
28.	Number of hospitals including PHCs, and health sub-centres (2000-2001)	30
29.	Number of doctors (2000-2001)	19
30.	Number of hospital beds (2000-2001)	140
31.	Number of primary schools (2000-2001)	107
32.	Teacher-pupil ratio, pre-primary/primary	1:61
33.	Teacher-pupil ratio, upper primary (2000-2001)	1:40
34.	Human Development Index (HDI) (2001)	0.362
35.	HDI Rank in the State (2001)	13
36.	Human Poverty Index (HPI) (2001)	49.27
37.	HPI Rank (2001)	13
38.	Gender-related Development Index (GDI) (2001)	0.400
39.	Infrastructural development index (2000-2001)	1.43
40.	Percentage of villages connected by roads (1997)	26.52

District: Papum Pare

SN	Characteristics	Values
1.	Area	2,875 sq km (3.43% of the State)
2.	Cultivable land (1995-96 Agriculture Census)	20,374 hectares
3.	Population (2001 Census)	122,003 (11.11% of State)
4.	Male	64,184
5.	Female	57,819
6.	Population growth (Annual) during 1991-2001	6.76%
7.	Per capita Gross District Domestic Product (at current prices) in 2000-2001	Rs. 14,534
8.	Literacy rate (2001 Census)	69.3%
9.	Literacy rate (Male) (2001 Census)	77.30%
10.	Literacy rate (Female) (2001 Census)	60.4%
11.	Adult literacy rate (Estimated for 2000-2001)	64.19%
12.	Adult literacy rate (Male) (Estimated for 2000-2001)	72.97%
13.	Adult literacy rate (Female) (Estimated for 2000-2001)	54.06%
14.	Gross Enrolment Ratio (6-22 years) Estimated for 2000-2001	79.96%
15.	Gross Enrolment Ratio (Male) (6-22 years) Estimated for 2000-2001	87.51%
16.	Gross Enrolment ratio (Female) (6-22 years) estimated for 2000-2001	71.71%
17.	Gross Enrolment Ratio, primary (Estimated for 2000-2001)	123.07%
18.	Gross Enrolment Ratio, upper primary (Estimated for 2000-2001)	100.01%
19.	Life Expectancy at Birth (2000-2001)	61.80 years
20.	Life Expectancy at Birth (Male) (2000-2001)	60.92 years
21.	Life Expectancy at Birth (Female) (2000-2001)	62.45 years
22.	Infant Mortality Rate (2000-2001)	67
23.	Infant Mortality Rate (Male) (2000-2001)	71
24.	Infant Mortality Rate (Female) (2000-2001)	64
25.	Under-Five Mortality Rate (2000-2001)	115
26.	Under-Five Mortality Rate (Male) (2000-2001)	120
27.	Under-Five mortality rate (Female) (2000-2001)	109
28.	Number of hospitals including PHCs, and health sub-centres (2000-2001)	29
29.	Number of doctors (2000-2001)	56
30.	Number of hospital beds (2000-2001)	362
31.	Number of primary schools (2000-2001)	76
32.	Teacher-pupil ratio, pre-primary/primary	1:46
33.	Teacher-pupil ratio, upper primary (2000-2001)	1:41
34.	Human Development Index (HDI) (2001)	0.573
35.	HDI Rank in the State (2001)	3
36.	Human Poverty Index (HPI) (2001)	33.08
37.	HPI Rank (2001)	2
38.	Gender-related Development Index (GDI) (2001)	0.611
39.	Infrastructural development index (2000-2001)	4.96
40.	Percentage of villages connected by roads (1997)	43.02

District: Lower Subansiri

SN	Characteristics	Values
1.	Area	10,135 sq km (12.1% of the State)
2.	Cultivable land (1995-96 Agriculture Census)	36,934 hectares
3.	Population (2001 Census)	98,244 (8.95% of State)
4.	Male	49,542
5.	Female	48,702
6.	Population growth (Annual) during 1991-2001	1.81%
7.	Per capita Gross District Domestic Product (at current price) in 2000-2001	Rs. 12,091
8.	Literacy rate (2001 Census)	44.8%
9.	Literacy rate (Male) (2001 Census)	53.4%
10.	Literacy rate (Female) (2001 Census)	36.0%
11.	Adult literacy rate (Estimated for 2000-2001)	38.31%
12.	Adult literacy rate (Male) (Estimated for 2000-2001)	47.65%
13.	Adult literacy rate (Female) (Estimated for 2000-2001)	28.53%
14.	Gross Enrolment Ratio (6-22 years) Estimated for 2000-2001	98.27%
15.	Gross Enrolment Ratio (Male) (6-22 years) Estimated for 2000-2001	108.02%
16.	Gross Enrolment Ratio (Female) (6-22 years) Estimated for 2000-2001	88.41%
17.	Gross Enrolment Ratio, primary (Estimated for 2000-2001)	180.11%
18.	Gross Enrolment Ratio, upper primary (Estimated for 2000-2001)	95.48%
19.	Life Expectancy at Birth (2000-2001)	52.41 years
20.	Life Expectancy at Birth (Male) (2000-2001)	52.19 years
21.	Life Expectancy at Birth (Female) (2000-2001)	52.71 years
22.	Infant Mortality Rate (2000-2001)	72
23.	Infant Mortality Rate (Male) (2000-2001)	64
24.	Infant Mortality Rate (Female) (2000-2001)	78
25.	Under-Five Mortality Rate (2000-2001)	145
26.	Under-Five Mortality Rate (Male) (2000-2001)	131
27.	Under-Five Mortality Rate (Female) (2000-2001)	154
28.	Number of hospitals including PHCs, and health sub-centres (2000-2001)	78
29.	Number of doctors (2000-2001)	43
30.	Number of hospital beds (2000-2001)	162
31.	Number of primary schools (2000-01)	115
32.	Teacher-pupil ratio, pre-primary/primary	1:50
33.	Teacher-pupil ratio, upper primary (2000-2001)	1:22
34.	Human Development Index (HDI) (2001)	0.425
35.	HDI Rank in the State (2001)	11
36.	Human Poverty Index (HPI) (2001)	45.46
37.	HPI Rank in the State (2001)	11
38.	Gender-related Development Index (GDI) (2001)	0.483
39.	Infrastructural Development Index (2000-01)	2.56
40.	Percentage of villages connected by roads (1997)	33.17

Note: Refers to Undivided district of Lower Subansiri (including Kurung Kumey)

District: Upper Subansiri

SN	Characteristics	Values
1.	Area	7,032 sq km (8.40% of the State)
2.	Cultivable land (1995-96 Agriculture Census)	32,720 hectares
3.	Population (2001 Census)	55,346 (5.04% of State)
4.	Male	28,240
5.	Female	27,106
6.	Population growth (Annual) during 1991-2001	1.05%
7.	Per capita Gross District Domestic Product (at current price) in 2000-2001	Rs. 14,995
8.	Literacy rate (2001 Census)	50.3%
9.	Literacy rate (Male) (2001 Census)	59.5%
10.	Literacy rate (Female) (2001 Census)	40.7%
11.	Adult literacy rate (Estimated for 2000-2001)	41.99%
12.	Adult literacy rate (Male) (Estimated for 2000-2001)	49.56%
13.	Adult literacy rate (Female) (Estimated for 2000-2001)	34.70%
14.	Gross Enrolment Ratio (6-22 years) Estimated for 2000-2001	64.82%
15.	Gross Enrolment Ratio (Male) (6-22 years) Estimated for 2000-2001	70.23%
16.	Gross Enrolment Ratio (Female) (6-22 years) Estimated for 2000-2001	59.38%
17.	Gross Enrolment Ratio, primary (Estimated for 2000-2001)	131.53%
18.	Gross Enrolment Ratio, upper primary (Estimated for 2000-2001)	73.20%
19.	Life Expectancy at Birth (2000-2001)	46.34 years
20.	Life Expectancy at Birth (Male) (2000-2001)	45.50 years
21.	Life Expectancy at Birth (Female) (2000-2001)	47.22 years
22.	Infant Mortality Rate (2000-2001)	97
23.	Infant Mortality Rate (Male) (2000-2001)	98
24.	Infant Mortality Rate (Female) (2000-2001)	95
25.	Under-Five Mortality Rate (2000-2001)	160
26.	Under-Five Mortality Rate (Male) (2000-2001)	157
27.	Under-Five Mortality Rate (Female) (2000-2001)	164
28.	Number of hospitals including PHCs, and health sub-centres (2000-2001)	40
29.	Number of doctors (2000-2001)	24
30.	Number of hospital beds (2000-2001)	114
31.	Number of primary schools (2000-2001)	96
32.	Teacher-pupil ratio, pre-primary/primary	1:37
33.	Teacher-pupil ratio, upper primary (2000-2001)	1:31
34.	Human Development Index (HDI) (2001)	0.438
35.	HDI Rank in the State (2001)	10
36.	Human Poverty Index (HPI) (2001)	42.06
37.	HPI Rank (2001)	8
38.	Gender-related Development Index (GDI) (2001)	0.471
39.	Infrastructural development index (2000-2001)	2.16
40.	Percentage of villages connected by roads (1997)	28.18

District: West Siang

SN	Characteristics	Values
1.	Area	7,643 sq km (9.13% of the State)
2.	Cultivable land (1995-96 Agriculture Census)	65,712 hectares
3.	Population (2001 Census)	103,918 (9.46% of State)
4.	Male	54,349
5.	Female	49,569
6.	Population growth (Annual) during 1991-2001	1.55%
7.	Per capita Gross District Domestic Product (at current price) in 2000-2001	Rs. 15,907
8.	Literacy rate (2001 Census)	59.5%
9.	Literacy rate (Male) (2001 Census)	66.6%
10.	Literacy rate (Female) (2001 Census)	51.6%
11.	Adult literacy rate (estimated for 2000-2001)	53.03%
12.	Adult literacy rate (Male) (Estimated for 2000-2001)	60.32%
13.	Adult literacy rate (Female) (Estimated for 2000-2001)	44.95%
14.	Gross Enrolment Ratio (6-22 years) Estimated for 2000-2001	91.45%
15.	Gross Enrolment Ratio (Male) (6-22 years) Estimated for 2000-2001	93.32%
16.	Gross Enrolment Ratio (Female) (6-22 years) Estimated for 2000-2001	89.20%
17.	Gross Enrolment Ratio, primary (Estimated for 2000-2001)	141.67%
18.	Gross Enrolment Ratio, upper primary (Estimated for 2000-2001)	143.85%
19.	Life Expectancy at Birth (2000-2001)	55.37 years
20.	Life Expectancy at Birth (Male) (2000-2001)	56.30 years
21.	Life Expectancy at Birth (Female) (2000-2001)	54.36 years
22.	Infant Mortality Rate (2000-2001)	85
23.	Infant Mortality Rate (Male) (2000-2001)	85
24.	Infant Mortality Rate (Female) (2000-2001)	87
25.	Under-Five Mortality Rate (2000-2001)	159
26.	Under-Five Mortality Rate (Male) (2000-2001)	154
27.	Under-Five Mortality Rate (Female) (2000-2001)	165
28.	Number of hospitals including PHCs, and health sub-centres (2000-2001)	55
29.	Number of doctors (2000-2001)	50
30.	Number of hospital beds (2000-2001)	237
31.	Number of primary schools (2000-2001)	171
32.	Teacher-pupil ratio, pre-primary/primary	1:36
33.	Teacher-pupil ratio, upper primary (2000-2001)	1:26
34.	Human Development Index (HDI) (2001)	0.558
35.	HDI Rank in the State (2001)	5
36.	Human Poverty Index (HPI) (2001)	34.69
37.	HPI Rank (2001)	3
38.	Gender-related Development Index (GDI) (2001)	0.585
39.	Infrastructural development index (2000-2001)	3.01
40.	Percentage of villages connected by roads (1997)	45.72

District: East Siang

SN	Characteristics	Values
1.	Area	4,687 sq km (5.60% of the State)
2.	Cultivable land (1995-96 Agriculture Census)	38,101 hectares
3.	Population (2001 Census)	87,397 (7.96% of State)
4.	Male	45,265
5.	Female	42,132
6.	Population growth (Annual) during 1991-2001	2.16%
7.	Per capita Gross District Domestic Product (at current price) in 2000-2001	Rs. 20,624
8.	Literacy rate (2001 Census)	60.7%
9.	Literacy rate (Male) (2001 Census)	68.4.%
10.	Literacy rate (Female) (2001 Census)	52.4%
11.	Adult literacy rate (Estimated for 2000-2001)	53.52%
12.	Adult literacy rate (Male) (Estimated for 2000-2001)	63.79%
13.	Adult literacy rate (Female) (Estimated for 2000-2001)	44.17%
14.	Gross Enrolment Ratio (6-22 years) Estimated for 2000-2001	78.31%
15.	Gross Enrolment Ratio (Male) (6-22 years) Estimated for 2000-2001	84.88%
16.	Gross Enrolment Ratio (Female) (6-22 years) Estimated for 2000-2001	71.59%
17.	Gross Enrolment Ratio, primary (Estimated for 2000-2001)	120.64%
18.	Gross Enrolment Ratio, upper primary (Estimated for 2000-2001)	120.54%
19.	Life Expectancy at Birth (2000-2001)	60.08 years
20.	Life Expectancy at Birth (Male) (2000-2001)	59.06 years
21.	Life Expectancy at Birth (Female) (2000-2001)	61.43 years
22.	Infant Mortality Rate (2000-2001)	57
23.	Infant Mortality Rate (Male) (2000-2001)	59
24.	Infant Mortality Rate (Female) (2000-2001)	55
25.	Under-Five Mortality Rate (2000-2001)	92
26.	Under-Five Mortality Rate (Male) (2000-2001)	93
27.	Under-Five Mortality Rate (Female) (2000-2001)	94
28.	Number of hospitals including PHCs, and health sub-centres (2000-2001)	41
29.	Number of doctors (2000-2001)	53
30.	Number of hospital beds (2000-2001)	221
31.	Number of primary schools (2000-2001)	101
32.	Teacher-pupil ratio, pre-primary/primary	1:22
33.	Teacher-pupil ratio, upper primary (2000-01)	1:23
34.	Human Development Index (HDI) (2001)	0.660
35.	HDI Rank in the State (2001)	1
36.	Human Poverty Index (HPI) (2001)	31.07
37.	HPI Rank (2001)	1
38.	Gender-related Development Index - (GDI) (2001)	0.654
39.	Infrastructural development index 2000-2001)	4.04
40.	Percentage of villages connected by roads (1997)	73.68

District: Upper Siang

SN	Characteristics	Values
1.	Area	6,188 sq km (7.39% of the State)
2.	Cultivable land (1995-96 Agriculture Census)	19,096 hectares
3.	Population (2001 Census)	33,363 (3.04% of State)
4.	Male	18,057
5.	Female	15,306
6.	Population growth (Annual) during 1991-2001	2.01%
7.	Per capita Gross District Domestic Product (at current price) in 2000-2001	Rs. 17,394
8.	Literacy rate (2001 Census)	49.80%
9.	Literacy rate (Male) (2001 Census)	58.7%
10.	Literacy rate (Female) (2001 Census)	38.8%
11.	Adult literacy rate (Estimated for 2000-2001)	42.10%
12.	Adult literacy rate (Male) (Estimated for 2000-2001)	53.41%
13.	Adult literacy rate (Female) (Estimated for 2000-2001)	30.39%
14.	Gross Enrolment Ratio (6-22 years) Estimated for 2000-2001	59.94%
15.	Gross Enrolment Ratio (Male) (6-22 years) Estimated for 2000-2001	61.62%
16.	Gross Enrolment Ratio (Female) (6-22 years) Estimated for 2000-2001	58.15%
17.	Gross Enrolment Ratio, primary (Estimated for 2000-2001)	109.13%
18.	Gross Enrolment Ratio, upper primary (Estimated for 2000-2001)	82.07%
19.	Life Expectancy at Birth (2000-2001)	54.02 years
20.	Life Expectancy at Birth (Male) (2000-2001)	55.59 years
21.	Life Expectancy at Birth (Female) (2000-2001)	52.50 years
22.	Infant Mortality Rate (2000-2001)	87
23.	Infant Mortality Rate (Male) (2000-2001)	96
24.	Infant Mortality Rate (Female) (2000-2001)	80
25.	Under-Five Mortality Rate (2000-2001)	143
26.	Under-Five Mortality Rate (Male) (2000-2001)	141
27.	Under-Five Mortality Rate (Female) (2000-2001)	152
28.	Number of hospitals including PHCs, and health sub-centres (2000-2001)	20
29.	Number of doctors (2000-2001)	24
30.	Number of hospital beds (2000-2001)	78
31.	Number of primary schools (2000-2001)	49
32.	Teacher-pupil ratio, pre-primary/primary	1:37
33.	Teacher-pupil ratio, upper primary (2000-2001)	1:25
34.	Human Development Index (HDI) (2001)	0.524
35.	HDI Rank in the State (2001)	7
36.	Human Poverty Index (HPI) (2001)	42.46
37.	HPI Rank (2001)	9
38.	Gender-related Development Index (GDI) (2001)	0.539
39.	Infrastructural development index (2000-2001)	2.10
40.	Percentage of villages connected by roads (1997)	56.00

District: Dibang Valley

SN	Characteristics	Values
1.	Area	13,029 sq km (15.56% of the State)
2.	Cultivable land (1995-96 Agriculture Census)	7,218 hectares
3.	Population (2001 Census)	57,720 (5.26% of State)
4.	Male	31,442
5.	Female	26,278
6.	Population growth (Annual) during 1991-2001	3.40%
7.	Per capita Gross District Domestic Product (at current price) in 2000-2001	Rs. 25,482
8.	Literacy rate (2001 Census)	58.9%
9.	Literacy rate (Male) (2001 Census)	67.2%
10.	Literacy rate (Female) (2001 Census)	48.7%
11.	Adult literacy rate (Estimated for 2000-2001)	53.89%
12.	Adult literacy rate (Male) (Estimated for 2000-2001)	62.32%
13.	Adult literacy rate (Female) (Estimated for 2000-2001)	41.67%
14.	Gross Enrolment Ratio (6-22 years) Estimated for 2000-2001	53.73%
15.	Gross Enrolment Ratio (Male) (6-22 years) Estimated for 2000-2001	59.47%
16.	Gross Enrolment Ratio (Female) (6-22 years) Estimated for 2000-2001	49.08%
17.	Gross Enrolment Ratio, primary (Estimated for 2000-2001)	80.72%
18.	Gross Enrolment Ratio, upper primary (Estimated for 2000-2001)	78.15%
19.	Life Expectancy at Birth (2000-2001)	52.90 years
20.	Life Expectancy at Birth (Male) (2000-2001)	52.49 years
21.	Life Expectancy at Birth (Female) (2000-2001)	53.56 years
22.	Infant Mortality Rate (2000-2001)	70
23.	Infant Mortality Rate (Male) (2000-2001)	75
24.	Infant Mortality Rate (Female) (2000-2001)	66
25.	Under-Five Mortality Rate (2000-2001)	128
26.	Under-Five Mortality Rate (Male) (2000-2001)	134
27.	Under-Five Mortality Rate (Female) (2000-2001)	122
28.	Number of hospitals including PHCs, and health sub-centres (2000-2001)	37
29.	Number of doctors (2000-2001)	17
30.	Number of hospital beds (2000-2001)	130
31.	Number of primary schools (2000-2001)	34
32.	Teacher-pupil ratio, pre-primary/primary	1:26
33.	Teacher-pupil ratio, upper primary (2000-2001)	1:29
34.	Human Development Index (HDI) (2001)	0.659
35.	HDI Rank in the State (2001)	2
36.	Human Poverty Index (HPI) (2001)	38.66
37.	HPI Rank (2001)	6
38.	Gender-related Development Index (GDI) (2001)	0.627
39.	Infrastructural development index (2000-2001)	1.69
40.	Percentage of villages connected by roads (1997)	23.58

Note: Refers to old district of Dibang Valley [including Lower Dibang Valley and Dibang Valley (New)]

District: Lohit

SN	Characteristics	Values
1.	Area	11,402 sq km (13.62% of the State)
2.	Cultivable land (1995-96 Agriculture Census)	34,852 hectares
3.	Population (2001 Census)	143,527 (13.15% of State)
4.	Male	77,314
5.	Female	66,213
6.	Population growth (Annual) during 1991-2001	3.08%
7.	Per capita Gross District Domestic Product (at current price) in 2000-2001	Rs. 16,934
8.	Literacy rate (2001 Census)	56.1%
9.	Literacy rate (Male) (2001 Census)	65.7%
10.	Literacy rate (Female) (2001 Census)	44.5%
11.	Adult literacy rate (Estimated for 2000-2001)	50.18%
12.	Adult literacy rate (Male) (Estimated for 2000-2001)	60.31%
13.	Adult literacy rate (Female) (Estimated for 2000-2001)	37.28%
14.	Gross Enrolment Ratio (6-22 years) Estimated for 2000-2001	38.89%
15.	Gross Enrolment Ratio (Male) (6-22 years) Estimated for 2000-2001	42.76%
16.	Gross Enrolment Ratio (Female) (6-22 years) Estimated for 2000-2001	34.45%
17.	Gross Enrolment Ratio, primary (Estimated for 2000-2001)	62.41%
18.	Gross Enrolment Ratio, upper primary (estimated for 2000-2001)	53.62%
19.	Life Expectancy at Birth (2000-2001)	56.30 years
20.	Life Expectancy at Birth (Male) (2000-2001)	55.51 years
21.	Life Expectancy at Birth (Female) (2000-2001)	57.67 years
22.	Infant Mortality Rate (2000-2001)	72
23.	Infant Mortality Rate (Male) (2000-2001)	77
24.	Infant Mortality Rate (Female) (2000-2001)	65
25.	Under-Five Mortality Rate (2000-2001)	110
26.	Under-Five Mortality Rate (Male) (2000-2001)	113
27.	Under-Five Mortality Rate (Female) (2000-2001)	105
28.	Number of hospitals including PHCs, and health sub-centres (2000-2001)	59
29.	Number of doctors (2000-2001)	55
30.	Number of hospital beds (2000-2001)	255
31.	Number of primary schools (2000-2001)	129
32.	Teacher-pupil ratio, pre-primary/primary	1:31
33.	Teacher-pupil ratio, upper primary (2000-2001)	1:28
34.	Human Development Index (HDI) (2001)	0..518
35.	HDI Rank in the State (2001)	8
36.	Human Poverty Index (HPI) (2001)	38.50
37.	HPI Rank (2001)	5
38.	Gender-related Development Index (GDI) (2001)	0.538
39.	Infrastructural development index (2000-2001)	2.17
40.	Percentage of villages connected by roads (1997)	40.70

District: Changlang

SN	Characteristics	Values
1.	Area	4,662 sq km (5.56% of the State)
2.	Cultivable land (1995-96 Agriculture Census)	28,732 hectares
3.	Population (2001 Census)	125,086 (11.42% of State)
4.	Male	65,821
5.	Female	59,601
6.	Population growth (Annual) during 1991-2001	3.13%
7.	Per capita Gross District Domestic Product (at current price) in 2000-2001	Rs. 14,462
8.	Literacy rate (2001 Census)	51.3%
9.	Literacy rate (Male) (2001 Census)	62.1%
10.	Literacy rate (Female) (2001 Census)	39.2%
11.	Adult literacy rate (Estimated for 2000-2001)	48.77%
12.	Adult literacy rate (Male) (Estimated for 2000-2001)	61.13%
13.	Adult literacy rate (Female) (Estimated for 2000-2001)	34.11%
14.	Gross Enrolment Ratio (6-22 years) Estimated for 2000-2001	39.30%
15.	Gross Enrolment Ratio (Male) (6-22 years) Estimated for 2000-2001	46.04%
16.	Gross Enrolment Ratio (Female) (6-22 years) Estimated for 2000-2001	35.67%
17.	Gross Enrolment Ratio, primary (Estimated for 2000-2001)	64.88%
18.	Gross Enrolment Ratio, upper primary (Estimated for 2000-2001)	54.92%
19.	Life Expectancy at Birth (2000-2001)	55.50 years
20.	Life Expectancy at Birth (Male) (2000-2001)	54.72 years
21.	Life Expectancy at Birth (Female) (2000-2001)	56.62 years
22.	Infant Mortality Rate (2000-2001)	62
23.	Infant Mortality Rate (Male) (2000-2001)	61
24.	Infant Mortality Rate (Female) (2000-2001)	63
25.	Under-Five Mortality Rate (2000-2001)	116
26.	Under-Five Mortality Rate (Male) (2000-2001)	96
27.	Under-Five Mortality Rate (Female) (2000-2001)	136
28.	Number of hospitals including PHCs, and health sub-centres (2000-2001)	40
29.	Number of doctors (2000-2001)	41
30.	Number of hospital beds (2000-2001)	135
31.	Number of primary schools (2000-2001)	136
32.	Teacher-pupil ratio, pre-primary/primary	1:35
33.	Teacher-pupil ratio, upper primary (2000-2001)	1:26
34.	Human Development Index (HDI) (2001)	0.452
35.	HDI Rank in the State (2001)	9
36.	Human Poverty Index (HPI) (2001)	41.74
37.	HPI Rank (2001)	7
38.	Gender-related Development Index (GDI) (2001)	0.490
39.	Infrastructural development index (2000-2001)	3.44
40.	Percentage of villages connected by roads (1997)	59.57

District: Tirap

SN	Characteristics	Values
1.	Area	2,362 sq km (2.82% of the State)
2.	Cultivable land (1995-96 Agriculture Census)	56,561 hectares
3.	Population (2001 Census)	100,326 (9.14% of State)
4.	Male	52,537
5.	Female	47,789
6.	Population growth (Annual) during 1991-2001	1.73%
7.	Per capita Gross District Domestic Product (at current price) in 2000-2001	Rs. 13,488
8.	Literacy rate (2001 Census)	41.7%
9.	Literacy rate (Male) (2001 Census)	53.4%
10.	Literacy rate (Female) (2001 Census)	28.8%
11.	Adult literacy rate (Estimated for 2000-2001)	37.90%
12.	Adult literacy rate (Male) (Estimated for 2000-2001)	49.88%
13.	Adult literacy rate (Female) (Estimated for 2000-2001)	24.48%
14.	Gross Enrolment Ratio (6-22 years) Estimated for 2000-2001	44.82%
15.	Gross Enrolment Ratio (Male) (6-22 years) Estimated for 2000-2001	46.04%
16.	Gross Enrolment Ratio (Female) (6-22 years) Estimated for 2000-2001	35.67%
17.	Gross Enrolment Ratio, primary (Estimated for 2000-2001)	74.47%
18.	Gross Enrolment Ratio, upper primary (Estimated for 2000-2001)	66.50%
19.	Life Expectancy at Birth (2000-2001)	52.66 years
20.	Life Expectancy at Birth (Male) (2000-2001)	54.36 years
21.	Life Expectancy at Birth (Female) (2000-2001)	50.51 years
22.	Infant Mortality Rate (2000-2001)	92
23.	Infant Mortality Rate (Male) (2000-2001)	89
24.	Infant Mortality Rate (Female) (2000-2001)	94
25.	Under-Five Mortality Rate (2000-2001)	157
26.	Under-Five Mortality Rate (Male) (2000-2001)	152
27.	Under-Five Mortality Rate (Female) (2000-2001)	161
28.	Number of hospitals including PHCs, and health sub-centres (2000-2001)	46
29.	Number of doctors (2000-2001)	41
30.	Number of hospital beds (2000-2001)	187
31.	Number of primary schools (2000-2001)	124
32.	Teacher-pupil ratio, pre-primary/primary	1:30
33.	Teacher-pupil ratio, upper primary (2000-2001)	1:31
34.	Human Development Index (HDI) (2001)	0.397
35.	HDI Rank in the State (2001)	12
36.	Human Poverty Index HPI (2001)	47.45
37.	HPI Rank (2001)	12
38.	Gender-related Development Index (GDI) (2001)	0.432
39.	Infrastructural development index (2000-2001)	3.66
40.	Percentage of villages connected by roads (1997)	57.23

Selected Indicators: New Districts

SN	Characteristics	Lower Dibang Valley	Dibang Valley (New)	Lower Subansiri (New)	Kurung Kumey
1	Life Expectancy at Birth (2000-2001)	58.56	43.20	55.65	42.50
2	Life Expectancy at Birth (Male) (2000-2001)	56.95	43.55	54.91	42.83
3	Life Expectancy at Birth (Female) (2000-2001)	59.05	42.46	56.33	42.30
4	Infant Mortality Rate (2000-2001)	53	98	59	113
5	Infant Mortality Rate (Male) (2000-2001)	57	100	58	108
6	Infant Mortality Rate (Female) (2000-2001)	53	95	60	114
7	Under-Five Mortality Rate (2000-2001)	106	166	118	234
8	Under-Five Mortality Rate (Male) (2000-2001)	110	173	109	220
9	Under-Five Mortality Rate (Female) (2000-2001)	104	159	127	246

District Profile Sources:

1. *Statistical Abstract of Arunachal Pradesh, Directorate of Economics and Statistics, Government of Arunachal Pradesh, different years.*
2. *Estimates of District Domestic Product, Arunachal Pradesh, 1993-94 to 1998-99, and 2000-2001, Directorate of Economics and Statistics, Government of Arunachal Pradesh.*
3. *Censuses of India, 1971, 1981, 1991, and 2001, Arunachal Pradesh.*
4. *SHDR Survey.*

Technical Notes

Rationale for measurement

One of the objectives of a State HDR is to show the States' achievements in various dimensions of human development.

The estimation of a relative position, based on more than one variable, requires the use of an index. In the measurement of human development, gender disparity, human poverty, and other indices for Arunachal Pradesh and its districts, the United Nations Development Programme (UNDP) methodology has been followed as far as possible.

Human Development Index (HDI)

This index is the arithmetic mean of indices of three variables: Life Expectancy at Birth (LEB), education, and income. A variable is transformed into its index as follows:

$$\textbf{Index} = \frac{\text{Actual value - Minimum value}}{\text{Maximum value - Minimum value}}$$

where 'Actual value' is the value of the variable included in the HDI; Minimum and Maximum values are its global Minimum and Maximum. The distance between the actual value of the variable, and its global minimum, is divided by the global range of the variable yielding the index, whose domain is all rational numbers in the unit interval, [0,1].

Indices of the three variables composing HDI are obtained as follows:

(a) **Life expectancy index** = $\frac{\text{Actual life expectancy} - 25}{85 - 25}$

The highest Life Expectancy at Birth is taken to be 85, and the lowest, 25.

(b) **Education index** = 2/3 (literacy index) + 1/3 (Gross Enrolment Index)

$$\text{Literacy index} = \frac{\text{Actual literacy rate} - 0}{100 - 0}$$

$$\text{Combined Gross Enrolment Index} = \frac{\text{Actual Gross Enrolment Ratio} - 0}{100 - 0}$$

For Arunachal Pradesh, the Gross Enrolment Ratio (GER) has been calculated for the age group 6-22.

(c) **Income (GDP) index**. For per capita income for a district we take per capita District Domestic Product (DDP). We use the data on DDP estimated by the Directorate of Economics and Statistics, Government of Arunachal Pradesh, Itanagar. The maximum and minimum values are the maximum and minimum observed in the range.

$$\textbf{Y index} = \frac{\log(\text{Actual value of Y}) - \log(10{,}000)}{\log(27{,}000) - \log(10{,}000)}$$

where Y is DDP

While comparing Arunachal Pradesh with other States of India, the variables used are Life Expectancy at Birth (with maximum value 85 and minimum value 25), adult literacy rate, gross enrolment ratio at primary and upper primary schools (with maximum value 100 and minimum value 0) and per capita Gross State Domestic Product (GSDP) converted into purchasing power parity (ppp) US$ (with maximum value 40,000 and minimum value 0).

Gender-related Development Index (GDI)

The GDI uses the same measures as the HDI, but, adjusts it downward to reflect the inequalities between men and women. The UNDP methodology for calculating the GDI has been used.

To calculate the equally distributed life expectancy index, we first calculate separate indices for female and male achievements in life expectancy using the formula:

$$\text{Life expectancy index for males} = \frac{\text{Actual value} - 22.5}{82.5 - 22.5}$$

$$\text{Life expectancy index for females} = \frac{\text{Actual value} - 27.5}{87.5 - 27.5}$$

For males, the highest value of Life Expectancy at Birth is taken to be 82.5 years, and lowest 22.5 years. For females, the highest value of Life Expectancy at Birth is taken to be 87.5 years, and lowest 27.5 years. Next, the female and male indices are combined in a way that penalises differences in achievements between men and women. The equally distributed life expectancy index is computed as follows:

$$\text{Equally distributed life expectancy index} = \{\text{Female population share (female life expectancy index)}^{-1} + \text{male population share* (male life expectancy index)}^{-1}\}^{-1}$$

The literacy rate index and the enrolment rate index for males and females is calculated in a similar manner using a minimum value 0 and maximum value of 100. Literacy rate index with two-third weight and enrolment rate index with one-third weight are combined to calculate the education index for males and females. The equally distributed education index is then computed as follows:

$$\text{The equally distributed education index} = \{\text{Female population share (female education index)}^{-1} + \text{male population share (male education index)}^{-1}\}^{-1}$$

To calculate the equally distributed income index, male and female-earned income is estimated. The share of female wage bill is estimated using the ratio of female agricultural wage to male agricultural wage, which, according to the SHDR Survey, is 0.70.

$$\text{Female share of wage bill } (S_f) = \frac{(W_f / W_m)\, EA_f}{[(W_f / W_m)\, EA_f] + EA_m},$$

where

W_f / W_m = Ratio of female to male agricultural wage

EA_f = Female percentage share of economically active population

EA_m = Male percentage share of economically active population

The female and male-earned incomes are estimated by the following formula:

$$\text{Estimated female-earned income} = \frac{S_f(Y)}{N_f}$$

and

$$\text{Estimated male-earned income} = \{Y - S_f(Y)\} / N_m$$

where

Y= Gross Domestic Product;

N_f = Female population and;

N_m = Male population.

The next step is to calculate the income index for males and females separately. This is calculated using the usual formula.

Equally distributed income index = {[Female population share (female income index)$^{-1}$] + [male population share (male income index) $^{-1}$]}$^{-1}$

The GDI is then calculated as the arithmetic mean of the three component indices – the equally distributed life expectancy index, the equally distributed education index, and the equally distributed income index.

Human Poverty Index (HPI)

HPI includes deprivation in health, education, and overall economic provisioning. It is estimated as:

$$HPI = [1/3 \ (P_1^3 + P_2^3 + P_3^3)^{1/3}] ,$$

where

P_1 = Probability at birth of not surviving to age 40 (times 100),

P_2 = Illiteracy rate in percentage,

$P_3 = (P_{31} + P_{32})/2$, and

P_{31}= Percentage of people not using improved water supply,

P_{32} = Percentage of underweight children under five.

Infrastructural Development Index

To calculate the infrastructural development index for the districts of Arunachal Pradesh, we have used the Principal Component Method. After arranging the districts in descending order, according to the composite index of infrastructure, the arithmetic mean ($\bar{X}$) is taken, thus dividing the districts to above and below the arithmetic mean. Then arithmetic mean ($\bar{X}_1$) is taken for the districts falling above the mean. The districts falling within the highest value, and the arithmetic mean ($\bar{X}_1$), are classified as 'High' and the districts between two arithmetic means ($\bar{X}$ and $\bar{X}_1$) as 'Medium High'. The same procedure is followed for classifying districts below the arithmetic mean as 'Medium Low' and 'Low' respectively.

A note on the data

Since secondary data for some variables was not available, a large-scale survey was conducted to meet the data deficiency. A total of 5,257 households with 30,762 people, from the existing 15 districts, were surveyed. The household, the unit of the sample, was defined in such a way that it could capture the condition of the population. In Arunachal Pradesh, migrants from other States of the country constitute around 34.78 per cent of the population. A significant proportion of these migrants, especially those who work in the interior areas, do not bring their families with them. This makes the proportion of the working age population higher in the total population higher than that in the autochthonous (local) population. Since inter-state migrants in Arunachal Pradesh are temporary, and their concentration is in areas with relatively large population sizes, giving equal weight to them in sampling, will make mortality and other measures unrepresentative of Arunachal Pradesh. In order to avoid this bias in the sample, the universe was defined as consisting of those households which are not single-member households. A separate sample was taken from the single-member households in order to study poverty and other characteristics.

The total sample was distributed among the districts according to the size of their population. The district population was then stratified into two categories, urban and rural. The sample was divided between the urban and rural areas in proportion to the distribution of households. The next step was to further divide both the urban and rural areas. The urban areas were

divided into rich and poor sections, from each of which households were selected randomly. The distribution of the sample between the rich and poor urban areas was done on the basis of the relative size of the number of households in each category. In the rural areas, all circles were stratified into different categories mainly on the basis of their accessibility. Efforts were made to select the circles from the remote areas so as to get a representative picture of the rural areas. Once the circles were selected, the next step was to select the villages. The selection of the villages was based on accessibility, stressing the need to get proper representation of the inaccessible areas. In Arunachal Pradesh, the size of the village, especially in relatively inaccessible areas, is small – sometimes very small. In case of the small villages, all the households were selected, and, in case of the large villages, the sample was divided between the rich and poor strata based on their relative size, and, from each stratum, 80 per cent was selected.

The field investigators were trained so that they could collect accurate information. Structured questionnaires were constructed for the survey. In case of stock variables, the position on the day of survey was collected, but, in case of flow variables, the information of varying periods was taken. The data on production, income, etc., were collected for the year preceding the day of survey. The mortality data was collected for the last four years, ending on the day of survey. The overall quality of the data was good.

Mortality data

The Sample Registration System (SRS) of the country collects the mortality data of different States and Union Territories regularly, and publishes them in its monthly bulletin. Death rates estimated by SRS were 5.5 for the whole of Arunachal Pradesh, 5.9 for rural, and 2.3 for its urban areas during 2001 (Registrar General, India, 2002). The SRS mortality data relating to Arunachal Pradesh appears to be understated.

These rates are lower in Arunachal Pradesh than in Kerala, and in any of the 15 major States of the country. Given the clear underestimation of mortality in SRS, mortality data from the Survey has been used (referred to as the SHDR Survey). However, for other States of the country, SRS data has been used. According to the SHDR Survey, the Crude Death Rate (CDR) in Arunachal Pradesh was 11.57 during 2000-01, a rate that is more than double the rate estimated by SRS. The Infant Mortality Rate (IMR) from the SHDR Survey is 77 per 1,000 live births, which is again almost the double of the SRS estimate of 39.

The use of data from different sources – for Arunachal Pradesh from our own survey (SHDR Survey) and for other States from SRS – raises the question of data comparability. True that the exercise would have appeared more consistent, had we used data from the same source (SRS); but, maintaining a consistency of this nature would involve committing a serious mistake. All available evidence, such as growth of the ST population, the incidence of morbidity, the use of contraceptives, etc., are indicative of a demographic regime in Arunachal Pradesh in which both fertility, and mortality, are expected to be much higher than what appears in the SRS estimates. To drive this point home, take the SRS estimate of the urban death rate in Arunachal Pradesh. The rate is 2.3. This appears to be unusually low.

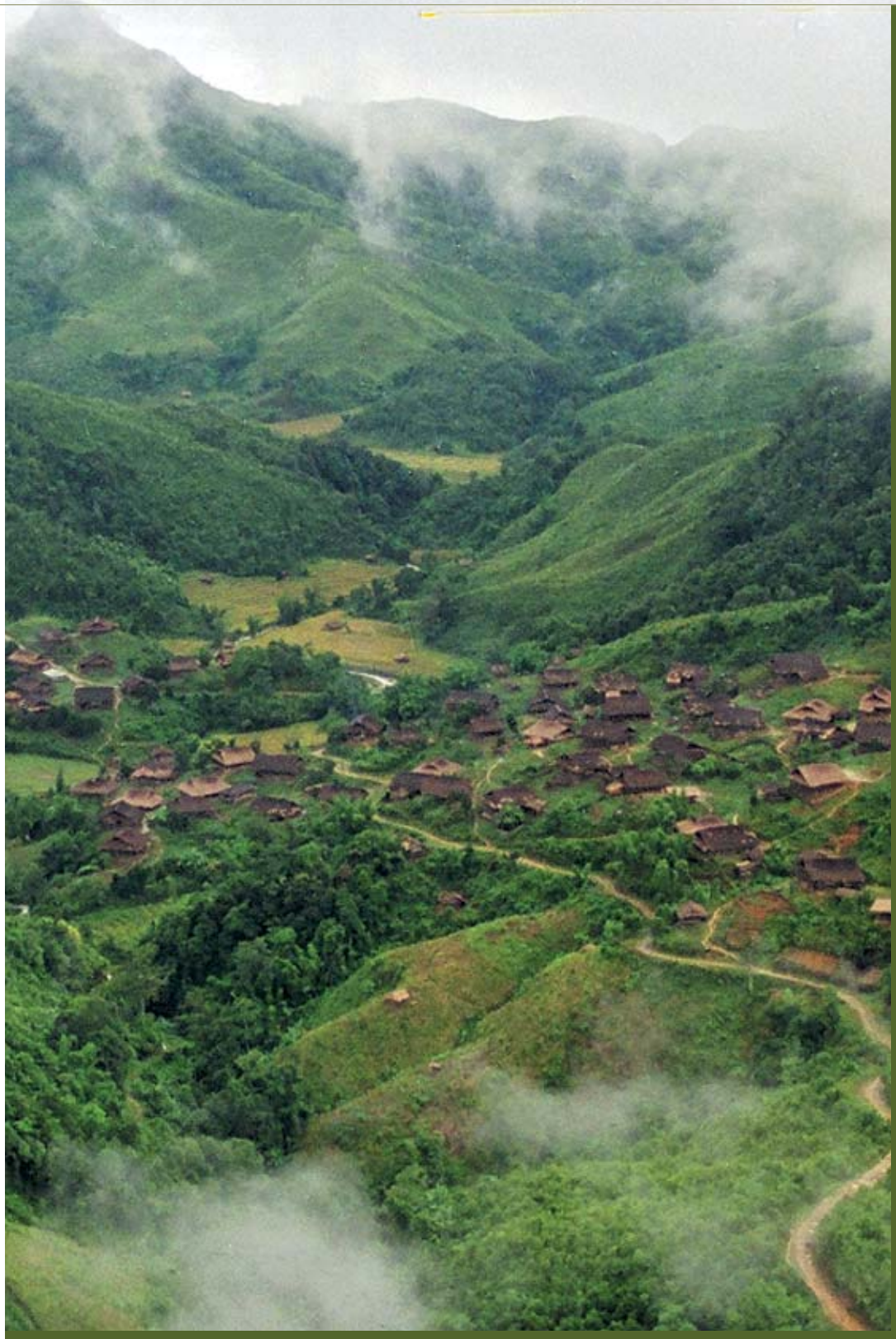
As pointed out, the non-ST population in Arunachal Pradesh constitutes 34.78 per cent of the total. These people, mainly workers or their dependents, with no permanent residential status in this State, reside largely in the urban areas, and constitute 57 per cent of its urban

population. The remaining 43 per cent of the urban population belong to different tribes of Arunachal Pradesh, the overwhelming majority being migrants from the rural areas. So, in urban Arunachal Pradesh, the working age group is disproportionately high. The urban population being a non-random sample of an actual population, the mortality rate estimated from it would be an underestimate of what is true of the underlying population. In Arunachal Pradesh, the major indicators of health — and also of human development — vary systematically over the extent of inaccessibility. In general, people living in the accessible areas are better-off than those living in the inaccessible areas. Since the 1950s, people from the inaccessible areas have been migrating slowly to the accessible areas, especially in the urban and suburban areas. If a sample is dominated by persons from the accessible areas, there is an in-built bias, and the SRS sample even from the rural areas appears to suffer from this bias.

Based on our own survey (the SHDR Survey) and other substantive evidence, we gather that the SRS data on fertility and mortality in Arunachal Pradesh suffer from a good measure of underestimation. But, we have no evidence to gather that the SRS demographic data for other States, especially the ones in the plains, suffer from underestimation. The SRS data are, in our view, reliable for other States forming the domain of our comparison.

Income data

Both macro and micro-level data on income are used in this Report. The macro-level data — the Gross and Net Domestic Product for Arunachal Pradesh and its districts — are taken from the Directorate of Economics and Statistics, Government of Arunachal Pradesh. The income data of other States are taken from the Economic Survey 2002-03, Government of India. The micro-level data — those on household income — are taken from the SHDR Survey. The estimation of household income in rural Arunachal Pradesh is a complex problem in view of the fact that a substantial portion of the household income and consumption comes from the forests (Common Pool Resources), and no market exists for many of these resources in rural areas. In order to arrive at an accurate estimate, the imputed value of all edibles, fuels, and other produce obtained from the forests, must be added to the household income. The data on quantities of different items gathered from the forests is dependable; the problem is the non-availability of their village-level prices. Some of these forest products are, no doubt, locally bartered, but, the exchange rate in barter does not reveal the absolute price, which is necessary to arrive at the value. Under these circumstances, we used the prices of these products available in the nearest market. The same principle has been used in estimating the value of crop production, dairy output, etc., when the output is consumed at home and the village-level price is not available.



Appendix

Table A 2.1 (a)

Literacy Rate 7+ (all areas)

(In per cent)

Districts	1981* Male	1981* Female	1981* All	1991 Male	1991 Female	1991 All
Tawang	-	-	-	40.41	16.83	29.80
West Kameng	34.53	15.36	25.84	55.03	35.22	46.31
East Kameng	14.80	3.52	9.39	37.69	14.02	26.20
Lower Subansiri	33.88	12.24	23.88	51.10	30.70	41.57
Upper Subansiri	24.60	6.48	15.75	47.58	27.24	38.31
West Siang	37.95	16.78	28.03	53.86	35.85	45.64
East Siang	41.98	19.28	31.81	52.49	34.43	44.30
Dibang Valley	40.83	17.10	31.85	56.94	33.27	46.88
Lohit	44.36	22.06	34.94	59.02	36.21	49.21
Changlang	-	-	-	54.44	29.64	43.20
Tirap	34.01	12.11	24.03	43.44	18.52	32.06
Arunachal Pradesh	**35.12**	**14.02**	**25.55**	**51.45**	**29.69**	**41.59**
All-India	56.38	29.76	43.57	64.13	39.29	52.21

Note: Dash means data not available.

** In the 1981 Census, the literacy rate refers to the 6 + population. However, to ensure comparability of data between Census years, the literacy rate has been estimated for the 7+ population.*

Source: Censuses of India, Arunachal Pradesh, 1981 & 1991, Age, Sex and Level of Education, Table C-2, Directorate of Censuses Operations, Arunachal Pradesh. For All-India figures the source is, National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2.1 (b)

Literacy rate 7 + (rural)

(In per cent)

Districts	1981** Male	1981** Female	1981** All	1991 Male	1991 Female	1991 All
Tawang	-	-	-	40.41	16.83	29.80
West Kameng	32.02	13.67	23.63	52.43	32.42	43.56
East Kameng	14.80	3.52	9.39	37.69	14.02	26.20
Lower Subansiri	27.12	7.96	17.96	41.40	21.68	31.95
Upper Subansiri	24.60	6.48	15.75	47.58	27.24	38.31
West Siang	33.38	13.85	23.86	47.83	31.50	40.14
East Siang	36.65	14.97	26.70	48.72	30.56	40.35
Dibang Valley	40.83	17.10	31.85	51.79	27.06	41.10
Lohit	41.06	19.09	31.68	53.33	29.96	42.98
Changlang	-	-	-	54.44	29.64	43.20
Tirap	34.01	12.11	24.03	38.15	13.59	26.76
Arunachal Pradesh	**32.12**	**11.89**	**22.81**	**47.00**	**25.31**	**37.02**
All-India	49.59	21.70	36.01	57.87	30.62	44.69

Note: Dash means data not available.

***In the 1981 Census, the literacy rate refers to the 6 + population. However, to ensure comparability of data between the Census years, the literacy rate has been estimated for the 7+ population.*

Source: Censuses of India, Arunachal Pradesh, 1981 & 1991, Age, Sex and Level of Education, Table C-2, Directorate of Censuses Operations, Arunachal Pradesh. For All-India figures the source is, National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2.1 (c)

Literacy rate 7 + (urban)⊕

(In per cent)

Districts	1981β Male	1981β Female	1981β All	1991 Male	1991 Female	1991 All
Tawang	-	-	-	-	-	-
West Kameng	68.51	44.29	58.83	76.10	60.79	69.75
East Kameng	-	-	-	-	-	-
Lower Subansiri	70.97	51.25	63.96	77.02	59.74	69.54
Upper Subansiri	-	-	-	-	-	-
West Siang	65.14	51.83	60.87	81.78	65.63	75.70
East Siang	72.71	54.12	65.71	71.71	58.49	66.26
Dibang Valley	-	-	-	80.31	66.71	75.00
Lohit	74.34	55.3	67.17	77.10	61.42	71.06
Changlang	-	-	-	-	-	-
Tirap	-	-	-	89.83	78.40	85.43
Arunachal Pradesh	**70.42**	**51.94**	**63.75**	**77.99**	**62.23**	**71.59**

Note: Dash means there was no urban centre in the district.

Source: Censuses of India, Arunachal Pradesh, 1981 & 1991, Age, Sex, and Level of Education, Table C-2, Directorate of Censuses Operations, Arunachal Pradesh.

⊕ Only 5 districts had any urban area in 1981, hence, the urban literacy rate is available only for those 5 districts.
β In the 1981 Census, the literacy rate refers to the 6 + population. However, to ensure comparability of data between Census years, the literacy rate has been estimated for the 7+ population.

Table A 2. 2. (a)

Literacy rate (7+) (all) (2001)

(In per cent)

Districts	Male	Female	All
Tawang	60.32	30.04	47.32
West Kameng	70.29	47.46	60.76
East Kameng	52.36	28.59	40.64
Papum Pare	77.27	60.35	69.32
Kurung Kumey	34.08	17.45	25.74
Lower Subansiri	67.82	50.59	59.40
Upper Subansiri	59.55	40.70	50.35
West Siang	66.63	51.56	59.47
East Siang	68.42	52.42	60.73
Upper Siang	58.71	38.79	49.78
Lower Dibang Valley	68.50	49.40	59.78
Dibang Valley (New)	59.44	43.27	52.96
Lohit	65.74	44.54	56.07
Changlang	62.13	39.23	51.32
Tirap	53.36	28.84	41.73
Arunachal Pradesh	**63.83**	**43.53**	**54.34**
All-India	75.20	53.70	64.80

Source: Censuses of India, 2001, District Demographic Profile, (Arunachal Pradesh). Figures for All-India are from Census of India, 2001, Primary Census Abstract, Total Population, Table A-5.

Table A 2. 2. (b)

Literacy rate (7+) (rural) (2001)

(In per cent)

Districts	Male	Female	All
Tawang	44.9	25.00	35.1
West Kameng	69.0	44.8	58.9
East Kameng	41.8	20.8	31.3
Papum Pare	68.3	49.0	59
Kurung Kumey	34.08	17.45	25.74
Lower Subansiri	63.03	45.33	54.23
Upper Subansiri	50.5	32.5	41.5
West Siang	60.7	46.7	53.9
East Siang	63.5	47.5	55.7
Upper Siang	58.7	38.8	49.8
Lower Dibang Valley	62.53	42.35	53.17
Dibang Valley (New)	52.96	59.44	43.27
Lohit	61.3	38.80	51.0
Changlang	58.7	35.4	47.6
Tirap	46.2	21.2	34.2
Arunachal Pradesh	**57.7**	**36.9**	**47.8**
All-India	71.18	46.58	59.21

Source: Censuses of India, 2001, District Demographic Profile, (Arunachal Pradesh).

Table A 2. 2. (c)

Literacy rate (7+) (urban) (2001)

(In per cent)

Districts	Male	Female	All
Tawang	93.1	66.6	87.2
West Kameng	84.2	71.3	78.3
East Kameng	79.9	52.7	67.4
Papum Pare	85.4	71.3	78.9
Kurung Kumey	-	-	-
Lower Subansiri	83.6	69.1	77.1
Upper Subansiri	80.5	63.0	72.5
West Siang	86.7	73.0	80.9
East Siang	81.9	67.2	75.1
Upper Siang	-	-	-
Lower Dibang Valley	89.4	78.1	84.5
Dibang Valley (New)	-	-	-
Lohit	83.4	69.3	77.2
Changlang	89.0	75.4	83.2
Tirap	87.9	73.1	81.4
Arunachal Pradesh	**85.2**	**69.5**	**78.3**
All-India	86.42	72.99	80.06

Note: Dash means there is no urban centre in the district.

Source: Censuses of India 2001, District Demographic Profile, (Arunachal Pradesh).

Table A 2. 3 (a)

7 – 14 Literacy rate (all)

(In per cent)

Districts	1981 Boys	1981 Girls	1981 All Children	1991 Boys	1991 Girls	1991 All Children
Tawang	-	-	-	51.49	35.48	43.22
West Kameng	35.87	23.56	29.73	66.13	52.35	59.46
East Kameng	20.28	6.11	13.41	60.77	31.03	47.01
Lower Subansiri	35.28	19.14	27.62	55.12	47.65	51.54
Upper Subansiri	32.05	12.18	22.50	65.96	49.85	58.21
West Siang	42.62	24.55	33.91	61.21	55.58	58.46
East Siang	51.23	35.66	43.69	64.53	54.44	59.51
Dibang Valley	43.47	26.09	35.29	64.28	51.12	58.27
Lohit	46.54	32.63	39.95	67.68	53.46	60.98
Changlang	-	-	-	59.13	43.06	51.29
Tirap	37.31	21.49	29.87	53.8	32.98	44.02
Arunachal Pradesh	**38.89**	**23.06**	**31.31**	**60.84**	**47.60**	**54.47**
All-India	60.58	41.57	51.49	71.44	56.23	64.16

Note: Dash means data not available.

Source: Censuses of India, Arunachal Pradesh, 1981 & 1991, Age, Sex, and Level of Education, Table C-2, Directorate of Censuses Operations, Arunachal Pradesh. For All-India figures the source is, National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2.3 (b)

7 – 14 Literacy rate (rural)

(In per cent)

Districts	1981 Boys	1981 Girls	1981 All Children	1991 Boys	1991 Girls	1991 All Children
Tawang	-	-	-	51.49	35.48	43.22
West Kameng	33.67	21.29	27.51	64.85	50.20	57.76
East Kameng	20.28	6.11	13.41	60.77	31.03	47.01
Lower Subansiri	31.89	15.44	24.08	48.59	40.61	44.78
Upper Subansiri	32.04	12.18	22.50	65.96	49.85	58.21
West Siang	38.13	21.27	29.86	56.57	52.31	54.46
East Siang	47.23	30.81	39.27	61.43	51.27	56.37
Dibang Valley	43.47	26.09	35.29	57.64	45.51	51.93
Lohit	44.36	30.17	37.66	63.91	48.11	56.36
Changlang	-	-	-	59.13	43.06	51.29
Tirap	37.31	21.49	29.87	49.93	24.96	38.43
Arunachal Pradesh	**36.68**	**20.80**	**29.07**	**57.70**	**43.69**	**50.94**

Note: Dash means data not available.

Source: Censuses of India, Arunachal Pradesh, 1981 & 1991, Age, Sex, and Level of Education, Table C-2, Directorate of Censuses Operations, Arunachal Pradesh.

Table A 2. 3 (c)

7 – 14 Literacy rate (urban)

(In per cent)

Districts	1981 Boys	1981 Girls	1981 All Children	1991 Boys	1991 Girls	1991 All Children
Tawang		-	-	-	-	-
West Kameng	71.66	57.69	64.42	77.89	71.86	74.95
East Kameng	-	-	-	-	-	-
Lower Subansiri	68.62	54.87	62.03	75.73	69.34	72.64
Upper Subansiri	-	-	-	-	-	-
West Siang	80.96	66.54	75.31	87.09	77.92	83.00
East Siang	78.39	69.6	74.19	81.12	71.90	76.59
Dibang Valley	-	-	-	89.80	80.39	86.05
Lohit	70.22	56.94	63.65	81.29	5.56	78.74
Changlang	-	-	-	-	-	-
Tirap	-	-	-	94.29	91.72	92.88
Arunachal Pradesh	**74.37**	**61.15**	**68.19**	**81.49**	**74.59**	**78.25**

Note: Dash means there was no urban centre in the district.

Source: Censuses of India, Arunachal Pradesh, 1981 & 1991, Age, Sex and Level of Education, Table C-2, Directorate of Censuses Operations, Arunachal Pradesh.

Table A 2.4 (a)

Adult literacy rate (all areas) (1981)

(In per cent)

Districts	Male	Female	Total
West Kameng	34.19	12.80	24.76
East Kameng	13.10	2.76	8.16
Lower Subansiri	33.47	10.03	22.72
Upper Subansiri	22.25	4.76	13.66
West Siang	36.33	13.88	25.92
East Siang	39.40	13.80	28.21
Dibang Valley	40.31	14.25	31.03
Lohit	43.75	18.19	33.37
Tirap	32.95	8.85	22.08
Arunachal Pradesh	**34.02**	**11.01**	**23.77**
All-India	54.92	25.72	40.83

Source: Censuses of India, Arunachal Pradesh, 1981, Age, Sex, and Level of Education, Table C-2, Directorate of Census Operations, Arunachal Pradesh. For All-India figures the source is, National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2.4 (b)

Adult literacy rate (rural) (1981)

(In per cent)

Districts	Male	Female	Total
West Kameng	31.61	11.32	22.56
East Kameng	13.10	2.76	8.16
Lower Subansiri	25.55	5.54	15.96
Upper Subansiri	22.25	4.76	13.66
West Siang	33.63	12.31	23.33
East Siang	33.62	9.79	22.87
Dibang Valley	40.31	14.25	31.03
Lohit	40.13	15.10	29.79
Tirap	32.95	8.85	22.08
Arunachal Pradesh	**30.75**	**8.93**	**20.84**
All-India	47.39	17.60	32.79

Source: Censuses of India, Arunachal Pradesh, 1981, Age, Sex and Level of Education, Table C-2, Directorate of Census Operations, Arunachal Pradesh.

For All-India figures: National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2.4 (c)

Adult literacy rate (urban) 1981

(Percentage)

Districts	Male	Female	Total
West Kameng	67.86	39.34	57.34
Lower Subansiri	71.34	50.16	64.35
West Siang	50.83	29.77	43.86
East Siang	71.39	48.02	63.27
Lohit	75.23	54.60	68.18
Arunachal Pradesh	**69.61**	**48.66**	**62.63**
All-India	76.29	51.90	65.11

Source: Censuses of India, Arunachal Pradesh, 1981, Age, Sex and Level of Education, Table C-2, Directorate of Census Operations, Arunachal Pradesh.

For All-India figures: National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2.5 (a)

Adult literacy rate (all areas) (1991)

(In per cent)

Districts	Male	Female	All
Tawang	38.26	11.81	26.76
West Kameng	51.97	29.27	42.29
East Kameng	30.81	9.50	20.33
Lower Subansiri	49.85	25.11	38.38
Upper Subansiri	42.51	20.11	32.48
West Siang	51.40	27.97	40.98
East Siang	49.34	27.87	39.88
Dibang Valley	54.72	26.86	43.17
Lohit	56.46	29.86	45.38
Changlang	52.85	24.13	40.20
Tirap	40.61	14.30	28.69
Arunachal Pradesh	**48.69**	**23.59**	**37.53**
All-India	61.89	34.09	48.55

Source: Censuses of India, Arunachal Pradesh, 1991, Age, Sex, and Level of Education, Table C-2, Directorate of Census Operations, Arunachal Pradesh.

For All-India figures: National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2.5 (b)

Adult literacy rate (rural) (1991)

(Percentage)

Districts	Male	Female	All
Tawang	38.26	11.81	26.76
West Kameng	48.96	26.25	39.18
East Kameng	30.81	9.50	20.33
Lower Subansiri	39.04	15.53	27.76
Upper Subansiri	42.51	20.11	32.48
West Siang	44.80	23.18	34.82
East Siang	45.37	23.51	35.72
Dibang Valley	50.09	20.47	37.66
Lohit	50.08	23.23	38.50
Changlang	52.85	24.13	40.2
Tirap	34.87	10.47	23.53
Arunachal Pradesh	**43.80**	**19.13**	**32.61**
All-India	54.89	24.92	40.34

Source: Censuses of India, Arunachal Pradesh, 1991, Age, Sex, and Level of Education, Table C-2, Directorate of Census Operations, Arunachal Pradesh.

For All-India figures: National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2.5 (c)

Adult literacy rate (urban) 1991

(Percentage)

Districts	Male	Female	All
Tawang	-	-	-
West Kameng	75.67	56.91	68.28
East Kameng	-	-	-
Lower Subansiri	77.35	56.43	68.61
Upper Subansiri	-	-	-
West Siang	80.34	60.71	73.38
East Siang	69.38	53.46	63.18
Dibang Valley	76.89	61.62	70.95
Lohit	76.01	56.35	68.78
Changlang	-	-	-
Tirap	88.83	71.00	82.95
Arunachal Pradesh	**77.07**	**57.64**	**69.55**
All-India	80.14	59.86	70.68

Note: Dash means there was no urban centre in the district.

Source: Censuses of India, Arunachal Pradesh, 1991, Age, Sex, and Level of Education, Table C-2, Directorate of Censuses Operations, Arunachal Pradesh.

For All-India figures: National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2.6 (a)

Age-Specific Enrolment Ratios: (combined)
Age Group (6 to 10)

(Percentage)

Districts	Age Group (6 to 10) 1981			Age Group (6 to 10) 1991		
	Boys	Girls	All Children	Boys	Girls	All Children
Tawang	-	-	-	38.18	27.19	32.48
West Kameng	41.86	29.82	35.82	47.95	38.92	43.52
East Kameng	27.15	9.04	18.46	44.80	25.50	35.34
Lower Subansiri	34.93	18.52	27.03	39.40	34.40	37.00
Upper Subansiri	25.31	9.29	17.48	43.59	35.47	39.59
West Siang	40.98	24.89	33.08	40.79	35.95	38.45
East Siang	44.84	31.31	38.14	44.16	35.46	39.84
Dibang Valley	47.33	30.83	39.47	47.10	37.75	42.75
Lohit	46.73	35.31	41.25	49.36	38.39	44.20
Changlang	-	-	-	40.63	29.68	35.21
Tirap	40.14	22.89	31.98	35.32	23.61	29.74
Arunachal Pradesh	**39.20**	**24.10**	**31.90**	**42.60**	**33.40**	**38.10**
All-India	55.30	38.50	47.20	56.60	45.40	51.20

Note: Age-Specific Enrolment Ratio = (Estimated enrolment in an age group/Estimated child population in that age group) 100.*

Dash means data not available.

Source: Censuses of India, Arunachal Pradesh, 1981 & 1991, Table C-4: Population (Ages 5-19) by single year of age, School attendance, and Economic Activity, Directorate of Censuses Operations, Arunachal Pradesh. For All-India figures the source is, National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2.6 (b)

Age-Specific Enrolment Ratios: (combined)
Age group (11 to 13)

(Percentage)

Districts	Age Group (11 to 13)1981			Age Group (11to13)1991		
	Boys	Girls	All Children	Boys	Girls	All Children
Tawang	-	-	-	53.19	37.93	45.65
West Kameng	48.98	31.69	40.40	68.06	53.53	61.20
East Kameng	35.34	9.18	22.20	73.02	38.83	58.13
Lower Subansiri	48.30	23.00	36.53	63.70	53.45	58.81
Upper Subansiri	46.72	16.43	32.38	77.43	60.04	69.25
West Siang	62.49	38.49	51.10	74.91	68.53	71.71
East Siang	68.41	47.89	58.91	72.22	63.91	68.08
Dibang Valley	56.62	35.62	46.98	70.24	52.75	62.35
Lohit	57.55	36.70	47.90	70.57	54.37	62.93
Changlang	-	-	-	64.06	46.96	55.88
Tirap	53.92	27.95	41.72	67.21	39.07	53.95
Arunachal Pradesh	**54.20**	**30.00**	**42.80**	**68.70**	**53.70**	**61.50**
All-India	62.00	36.70	50.00	71.10	52.20	62.10

Note: Age-Specific Enrolment Ratio = (Estimated enrolment in an age group/Estimated child population in that age group) 100*

Dash means data not available.

Source: Censuses of India, Arunachal Pradesh, 1981 & 1991, Table C-4: Population (Ages 5-19) by single year of age, School attendance, and Economic Activity, Directorate of Censuses Operations, Arunachal Pradesh. For All-India figures, the source is, National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2.6 (c)

Age-Specific Enrolment Ratios: (rural)
Age group (6 to 10)

(Percentage)

Districts	Age Group (6 to 10) 1981			Age Group (6 to 10) 1991		
	Boys	Girls	All Children	Boys	Girls	All Children
Tawang	-	-	-	38.18	27.19	32.48
West Kameng	40.48	28.33	34.41	47.43	38.18	42.91
East Kameng	27.15	9.05	18.46	44.80	25.50	35.34
Lower Subansiri	31.44	15.91	23.99	33.98	28.44	31.32
Upper Subansiri	25.31	9.29	17.48	43.59	35.47	39.58
West Siang	36.28	21.43	28.88	36.42	32.71	34.61
East Siang	41.94	27.34	34.69	41.25	32.39	36.85
Dibang Valley	47.33	30.83	39.47	41.17	33.20	37.39
Lohit	44.91	33.25	39.35	45.56	34.15	40.14
Changlang	-	-	-	40.63	29.68	35.21
Tirap	40.13	22.89	31.98	32.82	18.45	26.08
Arunachal Pradesh	**37.40**	**22.10**	**30.00**	**39.80**	**30.30**	**35.20**
All-India	50.60	31.40	41.30	52.30	39.30	46.00

Note: Age-Specific Enrolment Ratio = (Estimated enrolment in an age group/Estimated child population in that age group) 100*

Dash means data not available.

Source: Censuses of India, Arunachal Pradesh, 1981 & 1991, Table C-4: Population (Ages 5-19) by single year of age, School attendance and Economic Activity, Directorate of Censuses Operations, Arunachal Pradesh. For All-India figures the source is, National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2.6 (d)

Age-Specific Enrolment Ratios: (rural)
Age group (11 to 13)

(Percentage)

Districts	Age Group (11 to 13) 1981			Age Group (11 to 13) 1991		
	Boys	Girls	All Children	Boys	Girls	All Children
Tawang	-	-	-	53.19	37.93	45.65
West Kameng	49.47	29.47	39.66	66.70	52.45	59.96
East Kameng	35.34	9.18	22.21	73.02	38.83	58.13
Lower Subansiri	46.30	20.06	34.03	58.25	47.54	53.19
Upper Subansiri	46.72	16.41	32.39	77.43	60.04	69.25
West Siang	59.67	35.53	48.02	71.42	66.13	68.69
East Siang	65.82	44.77	56.03	70.22	62.18	66.22
Dibang Valley	56.62	35.62	46.98	62.95	46.15	55.04
Lohit	55.09	33.76	45.21	67.59	49.27	58.85
Changlang	-	-	-	64.06	46.96	55.88
Tirap	53.92	27.94	41.72	64.21	30.34	48.67
Arunachal Pradesh	**52.70**	**28.00**	**40.90**	**66.30**	**50.30**	**58.60**
All-India	57.60	28.10	43.70	67.60	44.40	56.70

Note: Age-Specific Enrolment Ratio = (Estimated enrolment in an age group/Estimated child population in that age group) 100.*

Dash means data not available.

Source: Censuses of India, Arunachal Pradesh, 1981 & 1991, Table C-4: Population (Ages 5-19) by single year of age, School attendance, and Economic Activity, Directorate of Censuses Operations, Arunachal Pradesh. For All-India figures, the source is, National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2. 6 (e)

Age-Specific Enrolment Ratio (urban)
Age group (6 to 10)

(Percentage)

Districts	Age Group (6 to 10) 1981			Age Group (6 to 10) 1991		
	Boys	Girls	All Children	Boys	Girls	All Children
Tawang	-	-	-	-	-	-
West Kameng	67.30	52.23	59.17	53.56	46.39	49.92
East Kameng	-	-	-			
Lower Subansiri	70.28	56.60	63.55	56.97	53.57	55.34
Upper Subansiri	-	-	-			
West Siang	81.46	66.82	75.34	70.58	60.72	66.05
East Siang	65.94	61.31	63.67	62.30	54.57	58.45
Dibang Valley	-	-	-	75.42	64.50	70.81
Lohit	68.41	57.08	62.59	65.11	58.15	62.00
Changlang	-	-	-	-	-	-
Tirap	-	-	-	76.04	79.16	77.83
Arunachal Pradesh	**70.40**	**59.10**	**65.00**	**63.3**	**57.60**	**60.60**
All-India	72.80	64.90	69.00	70.70	65.80	68.30

Note: Age-Specific Enrolment Ratio = (Estimated enrolment in an age group/Estimated child population in that age group) 100.*

Dash means there was no urban centre in the district.

Source: Censuses of India, Arunachal Pradesh, 1981 & 1991, Table C-4: Population (Ages 5-19) by single year of age, School attendance and Economic Activity, Directorate of Censuses Operations, Arunachal Pradesh. For All-India figures, the source is, National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2.6 (f)

Age-Specific Enrolment Ratio (urban)
Age group (11 to 13)

(Percentage)

Districts	Age Group (11 to 13) 1981			Age Group (11 to 13) 1991		
	Boys	Girls	All Children	Boys	Girls	All Children
Tawang	-	-	-	-	-	-
West Kameng	77.14	66.66	71.91	79.12	62.71	71.54
East Kameng	-	-	-	-	-	-
Lower Subansiri	66.87	53.41	60.75	80.49	70.54	75.63
Upper Subansiri	-	-	-	-	-	-
West Siang	87.96	78.26	84.24	90.13	84.36	87.75
East Siang	83.70	66.79	76.03	81.97	72.04	76.94
Dibang Valley	-	-	-	92.33	81.86	88.36
Lohit	79.91	64.25	72.77	80.53	73.12	77.17
Changlang	-	-	-	-	-	-
Tirap	-	-	-	92.65	88.96	90.59
Arunachal Pradesh	**77.20**	**64.70**	**71.60**	**83.10**	**75.10**	**79.30**
All-India	76.60	65.50	70.80	81.00	73.60	77.50

Note: Age-Specific Enrolment Ratio = (Estimated enrolment in an age group/Estimated child population in that age group) 100.*

Dash means there was no urban centre.

Source: Censuses of India, Arunachal Pradesh, 1981 & 1991, Table C-4: Population (Ages 5-19) by single year of age, School attendance, and Economic Activity, Directorate of Censuses Operations, Arunachal Pradesh. For All-India figures, the source is, National Human Development Report, 2001, Planning Commission, Government of India, March 2002.

Table A 2.7 (a)

Percentage of 'out-of-school' children who are working (in the age group 6 – 10)

(Percentage)

	1981		1991	
Districts	**Boys**	**Girls**	**Boys**	**Girls**
Tawang	-	-	8.36	7.34
West Kameng	3.44	2.30	3.32	3.07
East Kameng	4.00	5.01	5.01	4.23
Lower Subansiri	8.34	8.71	4.25	4.63
Upper Subansiri	3.15	4.79	3.29	2.71
West Siang	3.18	4.49	1.27	1.81
East Siang	3.86	6.22	2.03	2.29
Dibang Valley	6.00	7.11	3.11	2.01
Lohit	3.56	3.47	3.09	3.10
Changlang	-	-	2.96	3.19
Tirap	3.14	4.68	1.40	2.76
Arunachal Pradesh	**4.45**	**5.40**	**3.05**	**3.24**

Note: Dash means data not available.

Source: Censuses of India, Arunachal Pradesh, 1981 & 1991, Table C-4: Population (Ages 5-19) by single year of age, School attendance, and Economic Activity, Directorate of Census Operations, Arunachal Pradesh.

Table A 2.7 (b)

Percentage of 'out-of-school' children who are working (in the age group 11 - 13)

(Percentage)

Districts	1981		1991	
	Boys	Girls	Boys	Girls
Tawang	-	-	36.20	36.61
West Kameng	40.70	38.01	28.74	28.06
East Kameng	48.09	50.37	32.20	39.97
Lower Subansiri	52.70	56.03	31.15	32.19
Upper Subansiri	32.40	35.54	19.46	23.06
West Siang	35.56	41.53	18.79	24.13
East Siang	41.29	41.96	26.90	24.88
Dibang Valley	50.84	51.88	35.31	32.18
Lohit	41.03	33.36	29.41	27.05
Changlang	-	-	34.14	36.21
Tirap	41.18	43.40	18.00	33.10
Arunachal Pradesh	**43.18**	**44.33**	**28.58**	**30.87**

Note: Dash means data not available.

Source: Censuses of India, Arunachal Pradesh, 1981 & 1991, Table C-4: Population (Ages 5-19) by single year of age, School attendance, and Economic Activity, Directorate of Census Operations, Arunachal Pradesh.

Table A 2. 8 (a)

Pupil-teacher ratio (1990-91)

Districts	Pre-primary	Primary	Middle	Secondary	Higher Secondary
Tawang	34:1	26:1	11:1	9:1	6:1
West Kameng	38:1	28:1	14:1	12:1	1:1
East Kameng	36:1	30:1	15:1	16:1	10:1
Lower Subansiri	61:1	24:1	20:1	15:1	10:1
Upper Subansiri	50:1	36:1	25:1	19:1	14:1
West Siang	61:1	26:1	15:1	13:1	12:1
East Siang	45:1	28:1	25:1	19:1	10:1
Dibang Valley	66:1	27:1	15:1	15:1	7:1
Lohit	47:1	29:1	21:1	16:1	10:1
Changlang	61:1	46:1	19:1	13:1	6:1
Tirap	60:1	30:1	22:1	16:1	9:1
Arunachal Pradesh	**50:1**	**29:1**	**20:1**	**15:1**	**10:1**

Source: Statistical Abstract of Arunachal Pradesh, 1991, p. 42.

Table A 2.8 (b)

Pupil-teacher ratio (2000-01)

Districts	Pre-primary/Primary	Middle	Secondary	Higher Secondary
Tawang	24:1	20:1	23:1	19:1
West Kameng	19:1	19:1	25:1	30:1
East Kameng	61:1	40:1	38:1	22:1
Papum Pare	46:1	41:1	35:1	40:1
Lower Subansiri	50:1	22:1	28:1	33:1
Upper Subansiri	37:1	31:1	25:1	44:1
West Siang	36:1	26:1	24:1	29:1
East Siang	22:1	23:1	20:1	27:1
Upper Siang	37:1	25:1	33:1	37:1
Dibang Valley	26:1	29:1	28:1	24:1
Lohit	31:1	28:1	16:1	25:1
Changlang	35:1	26:1	31:1	25:1
Tirap	30:1	31:1	19:1	21:1
Arunachal Pradesh	**34:1**	**27:1**	**24:1**	**30:1**

Source: Statistical Abstract of Arunachal Pradesh, 2001, p. 36.

Table A 3.1

Life expectancy in different States of India: (2000) (adjusted)

State	Life Expectancy			Life Expectancy Index		
	Male	Female	Persons	Male	Female	Persons
Andhra Pradesh	62.58	66.53	64.66	0.668	0.650	0.661
Assam	57.74	59.77	58.61	0.587	0.538	0.560
Arunachal Pradesh	53.66	54.51	54.05	0.519	0.450	0.484
Bihar	61.96	61.46	61.94	0.658	0.566	0.616
Gujarat	62.27	66.00	64.03	0.663	0.642	0.650
Haryana	65.26	67.90	66.53	0.713	0.673	0.692
Karnataka	62.89	68.11	65.59	0.673	0.677	0.676
Kerala	72.26	80.05	76.23	0.829	0.876	0.854
Madhya Pradesh	56.71	57.76	57.25	0.570	0.504	0.537
Maharashtra	65.67	69.91	67.99	0.719	0.707	0.716
Orissa	58.57	59.77	59.17	0.601	0.538	0.569
Punjab	68.34	72.44	70.29	0.764	0.749	0.755
Rajasthan	60.32	62.94	62.05	0.630	0.591	0.617
Tamil Nadu	64.64	68.43	66.43	0.702	0.682	0.690
Uttar Pradesh	59.39	59.56	59.47	0.615	0.534	0.574
West Bengal	63.61	66.64	65.07	0.685	0.652	0.668
All-India	61.86	64.84	63.30	0.656	0.622	0.638

Source: Data of life expectancy of all the States, except Arunachal Pradesh, relating to the period 1992-96 are taken from the National Human Development Report, 2001, and adjusted for the year 2000. Life expectancy in Arunachal Pradesh has been calculated from the SHDR Survey data.

Table A 3.2

The index of Life Expectancy at Birth in the districts of Arunachal Pradesh: (2000- 2001)

Districts	Life Expectancy		Rank
	Years	Index	
Tawang	49.79	0.413	11
West Kameng	53.35	0.473	9
East Kameng	43.36	0.306	13
Papum Pare	61.80	0.613	1
Kurung Kumey	42.50	0.292	15
Lower Subansiri	55.65	0.511	6
Upper Subansiri	46.34	0.356	12
West Siang	55.37	0.506	7
East Siang	60.08	0.585	2
Upper Siang	54.02	0.484	8
Lower Dibang Valley	58.56	0.559	3
Dibang Valley (New)	43.20	0.303	14
Lohit	56.30	0.522	4
Changlang	55.70	0.512	5
Tirap	52.66	0.461	10
Arunachal Pradesh	**54.05**	**0.484**	**-**

Source: Computed from SHDR Survey data.

Table A 3.3

IMR in the districts of Arunachal Pradesh

Districts	IMR	Rank
Tawang	98	13
West Kameng	88	9
East Kameng	97	12
Papum Pare	67	5
Kurung Kumey	113	15
Lower Subansiri	59	3
Upper Subansiri	97	11
West Siang	85	7
East Siang	57	2
Upper Siang	87	8
Lower Dibang Valley	53	1
Dibang Valley (New)	98	14
Lohit	72	6
Changlang	62	4
Tirap	92	10
Arunachal Pradesh	**77**	

Note: IMR means Infant Mortality Rate.

Source: SHDR Survey and Sample Registration System Bulletin, April 2002.

Table A 3.4

Causes of death

Diseases	Arunachal Pradesh As a Percentage of Total Deaths		India As a Percentage of Total Deaths
	Survey Data	Secondary Data	
Dysentery/diarrhoea/ Gastro-enteritis	11.22	6.65	2.41
Tuberculosis	5.41	4.29	3.38
Tetanus	0.09	0.75	0.40
Measles	1.88	0.00	0.23
Malaria	12.20	3.97	1.60
Influenza	7.45	0.11	0.74
Cancer	3.93	0.21	2.06
Jaundice	2.70	0.11	0.56
Anaemia	0.33	2.25	0.91
Heart Diseases/Attack	5.24	14.48	7.72
Pneumonia	0.74	2.15	1.13
Paralysis (Cerebrovascular)	1.31	0	2.29
Bronchitis/Asthma	1.31	0.75	3.83
Chronic Liver Diseases & Cirrhosis	0.49	0.54	0.54
Ulcer of Stomach & Duodenum	0.82	0.21	0.53
Senility	6.31	2.25	13.29
Suicide	1.39	0.97	0.64
Fall and Drowning	0.33	1.18	0.39
Transport Accident (Rail/Road/ Board/Aircraft/Motor & Other Vehicles)	2.62	2.47	1.06
Complications Related to Pregnancy, Childbirth & Puerperium	1.39	0.33	0.40
Others not Classified	32.84	56.33	55.89
Total	100.00	100.00	100.00

Source: Survey data is from the SHDR Survey. Secondary data on Arunachal Pradesh and the data on India are from Vital Statistics of India, 1991, based on the Civil Registration System.

Table A 3.5

Expansion of health services in the districts of Arunachal Pradesh: (1989-90 to 2000-01)

Districts	Growth of		No. of People per Doctor		No. of People per Hospital Bed	
	Doctor	Hospital Beds	Level	Growth	Level	Growth
Tawang	0.70	-1.21	2041	-195.33	643	29.90
West Kameng	0.33	1.84	3108	28.80	522	9.10
East Kameng	0.80	3.56	3003	-349.35	408	-13.37
Papum Pare	9.60	16.50	2174	-619.50	336	0.50
Lower Subansiri	8.10	1.80	2270	-1048.5	603	2.90
Upper Subansiri	0.74	-0.84	2291	-159.95	482	10.47
West Siang	2.02	-6.00	2072	-184.62	437	18.77
East Siang	6.90	-57.00	1650	-322.00	396	58.50
Upper Siang	3.90	7.50	1381	-435.50	425	-49.10
Dibang Valley	0.21	-2.99	3385	50.47	443	25.78
Lohit	0.88	8.15	2609	51.82	563	-31.85
Changlang	1.86	-1.54	3049	-307.80	926	39.68
Tirap	1.64	1.89	2445	-223.53	536	0.22
Arunachal Pradesh	**37.68**	**-28.34**	**2421.39**	**-3714.99**	**516.92**	**101.5**

Note: Level means number of people per doctor/per hospital bed in 2000-01. Growth is average annual absolute growth. Papum Pare and Upper Siang data refer to the period 1996-97 to 2000-01.

Sources: Estimated on the basis of data from the Statistical Abstracts of Arunachal Pradesh.

Table A 3.6

Male and female Life Expectancy at Birth in the districts of Arunachal Pradesh: (2000-2001)

Districts	Life Expectancy			Life Expectancy Index		
	Male	Female	Total	Male	Female	Total
Tawang	49.75	50.01	49.79	0.454	0.375	0.413
West Kameng	53.04	53.51	53.35	0.509	0.434	0.473
East Kameng	43.86	42.47	43.36	0.356	0.250	0.306
Papum Pare	60.92	62.45	61.80	0.640	0.583	0.613
Kurung Kumey	42.83	42.30	42.50	0.339	0.247	0.292
Lower Subansiri	54.91	56.33	55.65	0.540	0.481	0.511
Upper Subansiri	45.50	47.22	46.34	0.383	0.329	0.356
West Siang	56.30	54.36	55.37	0.563	0.448	0.506
East Siang	59.06	61.43	60.08	0.609	0.566	0.585
Upper Siang	55.59	52.50	54.02	0.552	0.417	0.484
Lower Dibang Valley	56.95	59.05	58.56	0.574	0.526	0.559
Dibang Valley (New)	43.55	42.46	43.20	0.351	0.249	0.303
Lohit	55.51	57.67	56.30	0.550	0.503	0.522
Changlang	54.72	56.62	55.70	0.537	0.485	0.512
Tirap	54.36	50.51	52.66	0.531	0.384	0.461
Arunachal Pradesh	**53.66**	**54.51**	**54.05**	**0.519**	**0.450**	**0.484**

Source: Computed from SHDR Survey data.

Table A 3.7

Life table of Arunachal Pradesh: (2000-2001) (male)

X	nPx	nDx	nMx	nqx	Lx	ndx	nLx	Tx	ex
0	338	27.42	0.0811	0.078	1,00,000	7,796.196	94,543	53,66,291	53.66
1	370	12.91	0.0349	0.0343	92,203.8	3,162.001	90,307	52,71,749	57.17
2	3,474	22.24	0.0064	0.0499	89,041.8	4,446.392	6,94,549	51,81,442	58.19
10	3,898	16.21	0.0042	0.0407	84,595.41	3,446.279	8,28,723	44,86,893	53.04
20	2,528	12.17	0.0048	0.047	81,149.13	3,814.763	7,92,418	36,58,170	45.08
30	1,848	13.58	0.0073	0.0709	77,334.37	5,481.501	7,45,936	28,65,753	37.06
40	1,364	16.54	0.0121	0.1143	71,852.87	8,214.878	6,77,454	21,19,817	29.5
50	908	17.5	0.0193	0.1758	63,637.99	11,186.99	5,80,445	14,42,362	22.67
60	619	19.08	0.0308	0.2671	52,451	14,008.47	4,54,468	8,61,917	16.43
70	338	31.89	0.0943	0.6411	38,442.53	24,644.33	4,07,450	4,07,450	10.6

Meaning of Symbols:
x *is exact age;* $_nP_x$ *is the number of observed people between x and x+n; n is the age interval;* $_nD_x$ *is the number of (adjusted) deaths between x and x+n;* $_nM_x$ *is the mortality rate between x and x+n;* $_nq_x$ *is the probability of dying between x and x+n;* l_x *is the number of survivors at x;* $_nd_x$ *is the number of life table deaths between x and x+n;* $_nL_x$ *is the person years lived between x and x+n;* T_x *is the total person years lived after x and* e_x *is the expectation of life at x.*

Source: Computed from SHDR Survey data.

Table A 3.8

Life table of Arunachal Pradesh: (2000-2001) (female)

x	Px	ndx	nMx	nqx	Lx	ndx	nLx	Tx	ex
0	358	28.23	0.0789	0.0759	1,00,000	7,586.364	94,690	54,51,251	54.51
1	304	11.92	0.0392	0.0385	92,413.64	3,553.912	90,281	53,56,562	57.96
2	3,279	23.43	0.0071	0.0556	88,859.72	4,938.408	6,91,124	52,66,280	59.27
10	3,926	17.46	0.0044	0.0435	83,921.32	3,651.026	8,20,958	45,75,156	54.52
20	2,687	11.94	0.0044	0.0435	80,270.29	3,489.377	7,85,256	37,54,198	46.77
30	1,809	11.71	0.0065	0.0627	76,780.91	4,814.353	7,43,737	29,68,942	38.67
40	1,199	11.77	0.0098	0.0936	71,966.56	6,734.081	6,85,995	22,25,205	30.92
50	762	12.9	0.0169	0.1561	65,232.48	10,181.48	6,01,417	15,39,210	23.6
60	503	14.69	0.0292	0.2548	55,051	14,028.96	4,80,365	9,37,792.2	17.03
70	250	22.42	0.0897	0.6192	41,022.05	25,399.45	4,57,427	4,57,426.9	11.15

Meaning of Symbols:
x *is exact age;* $_nP_x$ *is the number of observed people between x and x+n; n is the age interval;* $_nD_x$ *is the number of (adjusted) deaths between x and x+n;* $_nM_x$ *is the mortality rate between x and x+n;* $_nq_x$ *is the probability of dying between x and x+n;* l_x *is the number of survivors at x;* $_nd_x$ *is the number of life table deaths between x and x+n;* $_nL_x$ *is the person years lived between x and x+n;* T_x *is the total person years lived after x, and* e_x *is the expectation of life at x.*

Source: Computed from SHDR Survey data.

Table A 3.9

Life table of Arunachal Pradesh: (2000-2001)
(all population)

x	Px	ndx	nMx	nqx	Lx	ndx	nLx	Tx	ex
0	696	55.65	0.08	0.0769	1,00,000	7,688.322	94,618	54,04,628	54.05
1	674	24.83	0.0368	0.0362	92,311.68	3,339.232	90,308	53,10,010	57.52
2	6,753	45.67	0.0068	0.0527	88,972.45	4,686.919	6,93,032	52,19,702	58.67
10	7,824	33.67	0.0043	0.0421	84,285.53	3,550.762	8,25,101	45,26,670	53.71
20	5,215	24.11	0.0046	0.0452	80,734.76	3,648.20	7,89,107	37,01,568	45.85
30	3,657	25.29	0.0069	0.0668	77,086.56	5,152.755	7,45,102	29,12,462	37.78
40	2,563	28.31	0.011	0.1047	71,933.81	7,529.704	6,81,690	21,67,360	30.13
50	1,670	30.4	0.0182	0.1668	64,404.1	10,745.8	5,90,312	14,85,670	23.07
60	1,122	33.77	0.0301	0.2616	53,658.3	14,037.58	4,66,395	8,95,358	16.69
70	588	54.31	0.0924	0.6318	39,620.73	25,034.05	4,28,963	4,28,963	10.83

Meaning of Symbols:
x *is exact age;* $_nP_x$ *is the number of observed people between x and x+n; n is the age interval;* $_nD_x$ *is the number of (adjusted) deaths between x and x+n;* $_nM_x$ *is the mortality rate between x and x+n;* $_nq_x$ *is the probability of dying between x and x+n;* l_x *is the number of survivors at x;* $_nd_x$ *is the number of life table deaths between x and x+n;* $_nL_x$ *is the person years lived between x and x+n;* T_x *is the total person years lived after x, and* e_x *is the expectation of life at x.*

Source: Computed from SHDR Survey data.

Table A 3.10

Fertility, mortality and contraceptive prevalence rates in Arunachal Pradesh

Districts	CBR	TFR	CDR	NG	Contra
Tawang	36.00	4.64	15.06	2.09	15.89
West Kameng	32.86	4.57	11.63	2.12	21.70
East Kameng	39.04	5.12	17.33	2.17	17.24
Papum Pare	31.17	3.81	8.17	2.30	41.60
Kurung Kumey	37.80	5.34	19.47	1.83	13.04
Lower Subansiri	35.54	4.80	10.71	2.48	27.61
Upper Subansiri	38.05	5.18	16.08	2.20	21.56
West Siang	33.73	4.38	9.17	2.46	27.52
East Siang	33.82	4.22	8.86	2.50	27.33
Upper Siang	34.12	5.23	12.68	2.14	22.22
Lower Dibang Valley	34.51	4.64	11.02	2.35	21.95
Dibang Valley (New)	38.79	4.41	18.51	2.03	15.12
Lohit	34.67	4.52	10.40	2.43	38.16
Changlang	33.32	4.43	11.03	2.23	23.50
Tirap	35.12	4.89	13.47	2.17	16.47
Arunachal Pradesh	**34.62**	**4.56**	**11.57**	**2.30**	**26.71**

Source: SHDR Survey.

*Note: **CBR** is Crude Birth Rate, **CDR** is Crude Death Rate, **TFR** is the Total Fertility Rate, **NG** is the natural growth of the population, and **Contra** is the percentage of women in the reproductive age group 15-49 using contraceptives.*

Table A 4.1

Change in the structure of the economy of Arunachal

Industry	Sectoral Contribution (in %) to NSDP						Changes
	1970-71	1980-81	1990-91	1999-00	2000-01	2001-02	
Agriculture	38.33	36.91	35.09	32.84	31.16	28.89	-9.44
Forestry & Logging	20.72	10.23	9.58	4.94	3.64	4.09	-16.63
Fishing	0.04	0.08	0.72	1.16	1.06	1.10	1.06
Mining & Quarrying	0.11	0.06	0.79	0.75	1.04	0.58	0.47
Primary Sector	**59.19**	**47.28**	**46.19**	**39.69**	**36.89**	**34.67**	**-24.52**
Manufacturing	0.85	6.51	6.04	4.74	4.43	4.51	3.66
Construction	19.58	18.69	17.98	9.69	15.58	16.85	-2.73
Electricity, etc	-0.10	-2.99	-2.47	2.37	2.14	2.29	2.39
Secondary Sector	**20.33**	**22.21**	**21.56**	**16.81**	**22.16**	**23.65**	**3.32**
Transport, Storage, etc	1.55	0.36	0.65	6.22	5.89	6.03	4.48
Trade, Hotel, etc	1.96	4.42	4.95	5.30	4.79	4.85	2.89
Banking & Insurance	0.11	0.60	1.49	2.08	1.78	2.06	1.96
Real Estate, etc	0.79	7.79	5.29	2.61	2.46	2.62	1.83
Public Administration	9.98	10.36	8.17	15.09	13.80	14.09	4.11
Other Services	6.09	6.98	11.72	12.21	12.23	12.04	5.95
Tertiary Sectors	**20.48**	**30.51**	**32.25**	**43.50**	**40.96**	**41.68**	**21.21**
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**0.00**

Note: Changes in percentage points are over the period 1970-71 to 2001-02.

Source: Estimates of Domestic Product, Arunachal Pradesh, Directorate of Economics and Statistics, Itanagar, 2002

Table A 4.2

Change in the sectoral distribution of workers in Arunachal Pradesh

Sectors	Number of Workers		
	1971	1981	1991
A. Primary (1+2+3+4)	2,16,823	2,35,948	2,63,666
1. Cultivators	2,11,160	2,23,358	2,35,987
2. Agricultural Labourers	5,292	7,796	20,054
3. Livestock/Forestry/Fishing/Hunting	366	4,744	6,917
4. Mining and Quarrying	5	50	708
B. Secondary Sector (1+2+3)	1,196	27,960	33,859
1. Manufacturing, Processing, Servicing, and Repairing in the Household Industry	830	995	742
2. Manufacturing, Processing, Servicing, and Repairing other than in the Household Industry	103	5,134	9,725
3. Construction	263	21,831	23,392
C. Tertiary Sector (1+2+3)	51,523	49,525	93,451
1. Trade and Commerce	1,551	6,950	12,923
2. Transport, Storage & Communication	11	1,295	4,417
3. Other Services	49,961	41,280	76,111
Total (A+B+C)	**2,69,542**	**3,13,433**	**3,90,976**

Sources: Census of India (Arunachal Pradesh) 1971, 1981 and 1991 Economic Tables.

Table A 4.3

Sectoral contribution (%) to NSDP growth in Arunachal Pradesh

Sectors	1971-2002	1971-1980	1981-90	1991-2002	1994-2001
Agriculture	32.08	35.56	41.95	19.89	24.59
Forestry & Logging	4.87	0.82	5.45	-12.00	-49.47
Fishing	1.32	0.16	1.30	1.89	2.04
Mining & Quarrying	1.65	0.25	5.66	0.24	0.37
Primary Sector	**39.92**	**36.79**	**54.36**	**10.02**	**-22.47**
Manufacturing	6.51	2.91	5.93	2.02	9.30
Construction	16.43	21.53	12.51	10.20	-28.18
Electricity, Gas & Water Supply	-1.16	-0.52	0.00	13.46	26.67
Secondary Sector	**21.78**	**23.92**	**18.44**	**25.68**	**7.79**
Transport, Storage & Communication	1.99	2.66	0.79	14.44	19.43
Trade, Hotel & Restaurant	5.86	9.40	5.43	4.04	1.61
Banking & Insurance	2.64	1.09	3.30	3.22	5.93
Real Estate, Ownership of Dwellings & Business Services	5.59	0.37	3.57	-0.93	5.13
Public Administration	11.15	17.54	5.63	28.11	42.19
Other Services	11.07	8.23	8.48	15.42	40.39
Tertiary Sector	**38.30**	**39.29**	**27.20**	**64.30**	**114.68**
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Source: Calculated from Estimates of Domestic Product, Arunachal Pradesh, Directorate of Economics and Statistics, Itanagar, 2002.

Note: Sectoral contribution to NSDP growth is defined as: sectoral share of NSDP x sectoral growth rate. The figure so obtained for different sectors is added and, then, the contribution of each sector is expressed as the percentage of this sum.

Table A 4.4

Growth of income in the districts of Arunachal Pradesh: 1993-94 to 2000-2001

Districts	NSDP Growth	Rank	Per Capita NSDP	Rank
Tawang	3.46	3	1.17	3
West Kameng	1.69	10	-1.19	12
East Kameng	0.61	13	-0.9	11
Papum Pare	4.30	2	-0.34	8
Lower Subansiri	2.60	7	0.65	6
Upper Subansiri	4.90	1	3.69	2
West Siang	2.73	6	1.17	3
East Siang	3.00	4	5.72	1
Upper Siang	2.85	5	0.94	5
Dibang Valley	2.59	8	-0.23	7
Lohit	2.49	9	-0.44	9
Changlang	1.42	11	-1.5	13
Tirap	1.11	12	-0.57	10
Arunachal Pradesh	**2.78**		**0.81**	

Note: - The first column refers to the average yearly exponential growth rate of the Net State Domestic Product of a district/Arunachal Pradesh and GP is the average yearly exponential growth rate of the per capita Net State Domestic Product of a district/Arunachal Pradesh.

Table A 4.5

Structure of District Domestic Product in Arunachal Pradesh: average for the period 1993-94 to 2000-2001

Districts	A	F	O_1	PS	M	C	O_2	SS	TS	Total
Tawang	32.48	6.09	0.97	39.54	0.99	6.23	0.50	7.72	52.74	100
West Kameng	14.16	26.91	0.51	41.58	2.32	20.24	0.53	23.11	35.31	100
East Kameng	36.69	7.39	2.28	46.36	1.09	22.78	1.27	24.73	28.97	100
Papum Pare	14.00	5.51	0.83	20.34	2.09	22.63	0.67	25.99	53.67	100
Lower Subansiri	34.56	7.22	1.69	43.47	1.19	22.09	0.67	23.95	32.58	100
Upper Subansiri	24.79	5.88	0.41	31.08	1.38	21.79	0.87	23.60	45.32	100
West Siang	34.87	5.07	1.42	41.36	1.73	18.38	0.63	20.98	38.41	100
East Siang	51.64	3.53	0.81	55.98	1.35	13.59	0.31	15.57	28.98	100
Upper Siang	35.53	12.07	1.66	49.26	1.17	25.69	0.30	27.51	23.23	100
Dibang Valley	46.36	4.23	1.29	51.88	3.57	13.77	0.59	17.64	30.48	100
Lohit	30.34	9.49	1.07	40.90	5.91	15.11	0.53	21.61	37.72	100
Changlang	32.13	13.56	8.95	54.64	5.76	13.08	0.69	19.37	25.99	100
Tirap	23.33	9.25	0.91	33.49	13.16	17.23	0.84	31.08	35.43	100
Arunachal Pradesh	**31.38**	**8.33**	**1.79**	**41.50**	**3.73**	**17.86**	**0.84**	**22.43**	**36.07**	**100**

*Note: i) Values against each sector are percentages of contribution by it to the Net Domestic Product. **PS** means primary sector, **SS** secondary, **TS** tertiary sector, **A** agriculture, **F** forestry, **M** manufacturing, **C** construction.*
*ii) O_1 means others in Primary Sector **(PS)**, and O_2 means others in Secondary Sector (SS).*

Table A 4.6

Inter-district variation in per capita income in Arunachal Pradesh

Year	N	Min	Max	Mean	Std. Deviation	CV
1993-94	13	6,006	13,335	8,844	2,140	24.20
1994-95	13	5,878	13,068	8,631	2,197	25.46
1995-96	13	6,899	14,740	9,726	2,337	24.03
1996-97	13	5,811	13,829	9,002	2,414	26.82
1997-98	13	5,970	13,551	9,001	2,315	25.72
1998-99	13	6,221	13,375	9,340	2,381	25.50
1999-00	13	5,948	13,230	9,070	2,351	25.92
2000-01	13	6,701	13,242	9,373	2,065	22.04

Note: N is the number of districts. Unit of Min (Minimum), Max (Maximum), Mean and Std. Deviation (Standard Deviation) is rupee. CV is, coefficient of variation (%).

Source: Calculated from Estimates of NDDP, Arunachal Pradesh, Directorate of Economics and Statistics, Itanagar, 2002.

Table A 4.7

Change in structure of District Domestic Product in Arunachal Pradesh: (1993-94 to 2000-2001)

Districts	A	F	PS	M	C	SS	PA	TS
Tawang	-1.31	-2.00	-3.26	0.00	-0.50	0.01	0.55	3.25
West Kameng	-0.75	-2.36	-3.20	0.03	-0.15	0.52	0.84	2.68
East Kameng	-0.80	-1.23	-2.00	0.02	-1.18	-0.30	1.41	2.30
Papum Pare	-0.21	-1.14	-1.31	0.01	-2.96	-1.32	1.64	2.64
Lower Subansiri	-0.26	-1.08	-1.34	0.02	-1.57	-0.71	1.05	2.05
Upper Subansiri	0.17	-0.78	-0.64	-0.03	-2.04	-1.49	0.53	2.13
West Siang	-0.93	-0.98	-1.88	-0.00	-1.16	-0.50	0.77	2.45
East Siang	-0.42	0.75	-1.19	-0.01	-0.91	-0.44	0.55	1.68
Upper Siang	2.18	-1.07	1.43	-0.06	-3.32	-2.86	0.60	1.43
Dibang Valley	-0.60	-0.89	-1.44	0.03	-0.99	-0.57	0.50	2.01
Lohit	-0.24	-1.99	-2.14	-0.01	-0.93	-0.47	0.04	1.21
Changlang	-0.08	-1.73	-1.70	0.10	-0.80	-0.15	0.82	1.85
Tirap	-0.43	-2.44	-2.86	0.26	-0.99	0.02	1.15	2.84
Arunachal Pradesh	**-0.25**	**-1.53**	**-1.78**	**0.16**	**-1.25**	**-0.43**	**0.85**	**2.21**

*Note: Changes are in percentage points per annum. **PS** means primary sector, **SS** secondary, **TS** tertiary sector, **A** agriculture, **F** forestry, **M** manufacturing, **C** construction, and **PA** means public administration.*

Source: Computed from Estimates of District Domestic Product, Directorate of Economics and Statistics, Govt. of Arunachal Pradesh, Itanagar.

Table A 4.8

Per capita Net State Domestic Product: (1993-94 to 2000-2001)

Districts	N	Minimum	Maximum	Mean	Rank	Std. Deviation
Tawang	8	9,287	12,082	10,541	4	973
West Kameng	8	10,698	14,740	12,391	2	1,308
East Kameng	8	6,703	8,030	7,237	11	429
Papum Pare	8	7,648	10,582	9,334	6	820
Lower Subansiri	8	5,811	6,899	6,179	13	378
Upper Subansiri	8	6,075	8,438	7,268	10	748
West Siang	8	7,842	9,465	8,595	7	559
East Siang	8	8,223	12,203	10,719	3	1,477
Upper Siang	7	9,337	10,374	9,878	5	346
Dibang Valley	8	12,652	13,890	13,328	1	372
Lohit	8	7,655	9,275	8,450	8	555
Changlang	8	6,364	7,846	7,167	12	517
Tirap	8	7,166	8,256	7,602	9	366

Note: N is the number of years. Unit of Minimum, Maximum, Mean, and Std. Deviation is rupee.

Source: Computed from Estimates of District Domestic Product, Directorate of Economics and Statistics, Govt. of Arunachal Pradesh, Itanagar, 2002.

Table A 4.9

Sectoral growth rate (%) in districts of Arunachal Pradesh (1993-94 to 2000-01)

Sector	A	FL	F	MQ	PS	M	C	SS
Tawang	-0.46	-26.25	10.58	-17.44	-4.30	3.04	-4.60	4.34
West Kameng	-3.00	-8.43	-22.9	6.81	6.39	3.09	1.55	4.82
East Kameng	-1.51	-71.82	1.74	-	-3.71	2.84	-4.50	-0.56
Papum Pare	2.88	-23.16	8.70	-	-2.33	3.27	-8.13	-0.60
Lower Subansiri	1.93	-15.47	5.07	-26.80	-0.48	4.64	-4.49	-0.37
Upper Subansiri	5.66	-11.62	6.34	-10.89	2.82	2.53	-4.50	-1.43
West Siang	0.12	-18.07	4.98	-	-1.73	2.35	-3.85	0.28
East Siang	2.26	-19.91	0.84	-	0.96	2.34	-3.84	0.27
Upper Siang	9.18	- 6.70	30.04	-	6.11	-1.96	-8.20	-5.95
Dibang Valley	1.33	-23.83	8.52	-11.93	-0.16	3.27	-4.49	-0.57
Lohit	1.84	-20.32	8.16	-3.88	-2.63	2.41	-3.86	0.34
Changlang	1.23	-17.32	4.13	3.86	-1.70	3.23	-4.56	0.70
Tirap	-0.75	-30.05	19.24	-47.01	-7.54	3.21	-4.54	1.25

Note: Dash means data not available.

Sector	T	TH	B	R	PA	RS	TS	NDDP
Tawang	13.09	0.53	12.52	6.42	9.99	11.53	10.09	3.46
West Kameng	12.86	0.46	12.74	6.27	9.73	11.51	9.14	1.69
East Kameng	12.84	0.32	12.71	6.19	9.86	11.40	8.79	0.61
Papum Pare	12.90	0.43	12.82	6.38	9.83	11.53	9.38	4.30
Lower Subansiri	13.05	0.48	12.96	6.41	9.84	11.55	9.02	2.60
Upper Subansiri	13.05	0.48	12.67	6.32	9.98	11.53	9.65	4.90
West Siang	13.60	0.47	12.88	6.40	9.66	11.74	9.29	2.73
East Siang	13.51	0.44	12.98	6.34	9.70	11.72	9.04	3.00
Upper Siang	16.25	-1.18	13.07	7.85	10.07	11.07	9.30	2.85
Dibang Valley	13.02	0.45	13.32	6.55	9.89	11.52	9.25	2.59
Lohit	13.61	0.43	12.73	5.88	9.69	11.75	9.64	2.49
Changlang	12.90	0.44	12.83	6.66	9.86	11.56	8.56	1.42
Tirap	12.97	0.50	12.82	6.45	9.84	25.21	9.14	1.11

*Note: **A** = agriculture; **F** = fishing; **FL** = forestry & logging; **MQ=** mining & quarrying; **PS** = primary sector; **M** = manufacturing; **C** = construction; **SS** = secondary sector; **T** = transport, storage & communication; **TH** = trade, hotel & restaurant; **B** = banking; **R** = real estate ownership of dwelling & business service; **PA** = public administration; **RS** = other services; **TS** = tertiary sector; **NDDP** = net district domestic product.*

Table A 4.10

Sectoral contribution (%) to NDDP growth in Arunachal Pradesh: 1994-2001

Sector	A	FL	F	MQ	PS	M	C	E	SS
Tawang	-3.76	-40.27	2.35	-0.35	-42.04	0.76	-7.21	14.88	8.44
West Kameng	-27.47	-147.06	-6.11	0.18	-180.48	4.63	20.30	47.11	72.04
East Kameng	-97.03	-230.74	6.66	0.00	-321.12	5.41	-179.53	149.87	-24.25
Papum Pare	9.206	-29.12	1.65	7.44	-10.83	1.56	-42.03	36.91	-3.56
Lower Subansiri	27.38	-45.88	3.24	-1.42	-16.68	2.27	-40.72	34.81	-3.64
Upper Subansiri	29.58	-14.41	0.21	-0.57	14.82	0.74	-20.67	12.82	-7.12
West Siang	1.43	-31.35	2.40	3.04	-24.47	1.39	-24.20	24.81	2.01
East Siang	36.43	-21.91	0.21	2.05	16.78	0.99	-16.29	16.61	1.31
Upper Siang	91.54	-22.69	13.92	1.70	84.47	-0.64	-59.12	13.83	-45.93
Dibang Valley	25.58	-41.80	4.38	-0.28	-12.12	4.84	-25.64	16.63	-4.17
Lohit	22.98	-79.38	3.24	-0.09	-53.24	5.87	-24.01	21.17	3.03
Changlang	52.69	-313.14	6.79	39.70	-213.96	24.81	-79.55	72.82	18.08
Tirap	-3.35	-53.15	2.95	-1.06	-54.61	8.08	-14.96	14.31	7.43

Sector	T	TH	B	R	PA	RS	TS
Tawang	6.96	0.67	4.18	4.04	22.88	94.86	133.60
West Kameng	25.98	1.65	12.66	7.99	66.11	94.03	208.44
East Kameng	28.35	2.13	50.76	29.61	273.52	60.99	445.37
Papum Pare	16.44	0.58	13.09	3.55	69.27	11.44	114.39
Lower Subansiri	12.93	0.83	11.56	8.91	60.45	25.62	120.32
Upper Subansiri	14.02	0.61	4.08	3.24	22.90	47.45	92.30
West Siang	26.15	1.02	7.36	4.27	37.45	46.13	122.46
East Siang	15.26	0.69	5.01	4.28	25.45	31.22	81.91
Upper Siang	15.73	-1.14	5.04	5.14	26.21	10.48	61.67
Dibang Valley	33.72	1.03	5.73	5.10	29.09	41.62	116.29
Lohit	42.56	1.08	6.22	3.19	32.11	65.06	150.21
Changlang	49.36	2.80	24.60	25.67	130.41	63.03	295.88
Tirap	8.30	0.47	4.64	3.81	25.22	104.7	147.18

*Note: **A** = agriculture; **F** = fishing; **FL** = forestry & logging; **MQ** = mining & quarrying; **PS** = primary sector; **M** = manufacturing; **M** = construction; **E** = electricity, gas & water supply; **SS** = secondary sector; **T** = transport, storage & communication; **TH** = trade, hotel & restaurant; **B** = banking; **R** = real estate, ownership of dwelling & business service; **PA** = public administration; **RS** = other services; **TS** = tertiary sector.*

Table A 5.1

Human Development Index (2001), Arunachal Pradesh

Districts/ State	Literacy Rates 2001 (%)	Gross Enrolment Ratios, 2000-2001, 6-22 yrs. (%)	Literacy Index	Enrolment Index	Education Index	Life Expectancy at Birth (years)	Health Index	Per Capita DDP at Current Prices in 2000-01 (Rs.)	Income Index	Human Development Index	HDI Rank
Tawang	47.32	46.87	0.473	0.469	0.472	49.79	0.413	21,706	0.780	0.555	6
West Kameng	60.76	48.22	0.608	0.482	0.566	53.35	0.473	19,645	0.680	0.573	3
East Kameng	40.64	65.45	0.406	0.655	0.489	43.36	0.306	13,349	0.291	0.362	13
Papum Pare	69.32	79.96	0.693	0.800	0.729	61.8	0.613	14,534	0.376	0.573	3
Lower Subansiri	44.79	98.27	0.448	0.983	0.626	52.41	0.457	12,091	0.191	0.425	11
Upper Subansiri	50.35	64.82	0.504	0.648	0.552	46.34	0.356	14,995	0.408	0.438	10
West Siang	59.47	91.45	0.595	0.915	0.701	55.37	0.506	15,907	0.467	0.558	5
East Siang	60.73	78.31	0.607	0.783	0.666	60.08	0.585	20,624	0.729	0.660	1
Upper Siang	49.78	59.94	0.498	0.599	0.532	54.02	0.484	17,394	0.557	0.524	7
Dibang Valley	58.89	53.73	0.589	0.537	0.572	52.9	0.465	25,482	0.942	0.659	2
Lohit	56.07	38.89	0.561	0.389	0.503	56.3	0.522	16,934	0.530	0.518	8
Changlang	51.32	39.3	0.513	0.393	0.473	55.7	0.512	14,462	0.371	0.452	9
Tirap	41.73	44.82	0.417	0.448	0.428	52.66	0.461	13,488	0.301	0.397	12
Arunachal Pradesh	**54.34**	**61.16**	**0.543**	**0.612**	**0.566**	**54.05**	**0.484**	**16,343**	**0.495**	**0.515**	

Goal Posts

Indicator	Maximum	Minimum
Literacy (%)	100	0
Enrolment (%)	100	0
LEB	85	25
Per Capita Income (Rs.)	27,000	10,000

Sources: SHDR Survey, Statistical Abstract of Arunachal Pradesh, Census of India (Arunachal Pradesh), and Estimates of District Domestic Product, Arunachal Pradesh, Directorate of Economics and Statistics, Government of Arunachal Pradesh, Itanagar.

Note: LEB means Life Expectancy at Birth.

Table A 5.2

Expenditure ratios of Arunachal Pradesh

	Public Expenditure	Social Allocation	Social Priority	Human Expenditure
1993-94	70.86	28.2	77.46	15.50
1994-95	72.27	70.9	79.07	17.27
1995-96	74.06	72.3	73.89	15.93
1996-97	81.34	74.1	74.83	19.89
1997-98	80.51	81.3	77.17	19.12
1998-99	66.30	80.5	77.75	17.50
1999-00	94.00	66.3	72.03	11.53
2000-01	65.87	94.0	75.98	16.04
2001-02	76.66	65.9	75.28	18.24

Definitions:

- *Public Expenditure Ratio = Budgetary expenditure as a percentage of the Net State Domestic Product (NSDP).*
- *Social Allocation Ratio = Social sector expenditure as a percentage of budgetary expenditure.*
- *Social Priority Ratio = Social priority sector expenditure as a percentage of social sector expenditure.*
- *Human Expenditure Ratio = (Public expenditure ratio)*(Social allocation ratio)*(Social priority ratio)*

Table A 5.3

As a percentage of social sector expenditure

	Education	Health	Water	Nutrition
1989-90	40.94	16.12	15.50	0.15
1990-91	46.30	15.69	14.99	0.71
1991-92	47.49	15.77	15.83	0.75
1992-93	44.05	15.61	17.28	0.79
1993-94	44.30	15.92	16.48	0.76
1994-95	42.99	16.16	19.20	0.72
1995-96	40.09	15.99	16.68	1.13
1996-97	39.60	14.49	19.92	0.82
1997-98	39.99	16.27	19.89	1.02
1998-99	39.65	17.03	21.04	0.03
1999-00	35.81	22.80	13.42	0.00
2000-01	41.44	16.72	17.79	0.03
2001-02	43.48	16.06	15.74	0.00

Sources: Computed from Annual Budgets of Arunachal Pradesh (various issues), and Estimates of Domestic Product, Arunachal Pradesh, Directorate of Economics and Statistics, Itanagar, 2002.

Table A 6.1

Gender-related Development Index: Arunachal Pradesh (2001)

Districts	Education					Health			Income			Gender-related Development Index	GDI Rank
	Literacy Rate (%)		Gross Enrolment 6-22 yrs (%)		Equally Distributed Education Index	Expectancy of Life (yrs)		Equally Distributed Health Index	Estimated Male Income (Rs.)	Estimated Female Income (Rs.)	Equally Distributed Income Index		
	Male	Female	Male	Female		Male	Female						
Tawang	60.32	30.04	51.47	42.43	0.442	49.750	50.0	0.416	12,768	8,938	0.757	0.538	6
West Kameng	70.29	47.46	48.41	48	0.553	53.040	53.5	0.474	11,556	8,089	0.698	0.424	12
East Kameng	52.36	28.59	75.9	54.57	0.461	43.860	42.5	0.294	7,852	5,497	0.445	0.400	13
Papum Pare	77.27	60.35	87.51	71.71	0.719	60.920	62.5	0.612	8,549	5,985	0.503	0.611	3
Lower Subansiri	53.37	36.01	108.02	88.41	0.613	52.190	52.7	0.455	7,112	4,979	0.382	0.483	9
Upper Subansiri	59.55	40.7	70.23	59.38	0.540	45.500	47.2	0.354	8,821	6,174	0.519	0.471	10
West Siang	66.63	51.56	93.32	89.2	0.696	56.300	54.4	0.502	9,357	6,550	0.558	0.585	4
East Siang	68.42	52.42	84.88	71.59	0.658	59.060	61.4	0.587	12,132	8,492	0.716	0.654	1
Upper Siang	58.71	38.79	61.62	58.15	0.521	55.590	52.5	0.480	10,232	7,162	0.617	0.539	5
Dibang Valley	67.21	48.66	59.47	49.08	0.563	52.490	53.6	0.468	14,990	10,492	0.851	0.627	2
Lohit	65.74	44.54	42.76	34.45	0.488	55.510	57.7	0.527	9,961	6,973	0.600	0.538	6
Changlang	62.13	39.23	46.04	35.67	0.460	54.720	56.6	0.511	8,507	5,955	0.499	0.490	8
Tirap	53.36	28.84	46.04	35.67	0.391	54.360	50.5	0.449	7,934	5,554	0.455	0.432	11
Arunachal Pradesh	**63.83**	**43.53**	**65.77**	**55.92**	**0.553**	**53.660**	**54.5**	**0.484**	**9,227**	**6,459**	**0.550**	**0.529**	

Table A 6.2

Sex ratio in Arunachal Pradesh (1961-2001)

Year	All Population			S.T. Population		
	Total	Rural	Urban	Total	Rural	Urban
1961	894	894	–	1,013	1,013	–
1971	861	881	457	1,007	1,009	765
1981	862	881	629	1,005	1,010	803
1991	859	880	728	998	1,004	921
2001	893	914	819	1,003	1,000	1,020

Note: Dash means there was no urban centre in the State.

Source: Census of India, various years.

Table A 6.3

Sex ratio in Arunachal Pradesh and its districts (1961-2001)

Districts/State	1961	1971	1981	1991	2001
Tawang	884	853	905	844	782
West Kameng	586	661	834	822	754
East Kameng	1,017	930	943	962	985
Papum Pare	832	909	754	831	901
Lower Subansiri	967	949	965	957	983
Upper Subansiri	982	953	972	867	960
West Siang	870	850	913	873	912
East Siang	963	863	833	877	931
Upper Siang	879	872	907	822	848
Dibang Valley	999	806	661	788	836
Lohit	854	762	781	797	856
Changlang	918	855	833	863	906
Tirap	961	903	899	862	910
Arunachal Pradesh	**894**	**861**	**862**	**859**	**893**

Source: Census of India, Arunachal Pradesh, different years.

Table A 6.4

Child Sex Ratio in Arunachal Pradesh and its districts (1991-2001)

Districts/State	1991			2001		
	Total	Rural	Urban	Total	Rural	Urban
Tawang	965	965	NA	948	948	948
West Kameng	970	973	932	955	956	952
East Kameng	1,036	1,036	NA	1,035	1,027	1,058
Papum Pare	934	942	924	978	967	990
Lower Subansiri	970	978	947	1,005	1,013	945
Upper Subansiri	1,005	1,005	NA	985	985	985
West Siang	997	1,008	921	950	949	953
East Siang	1,008	1,007	1,009	958	945	1,003
Upper Siang	967	967	NA	1,010	1,010	NA
Dibang Valley	994	1,008	906	946	947	939
Lohit	968	980	912	933	927	966
Changlang	987	987	NA	954	958	912
Tirap	946	940	1,054	941	933	1,000
Arunachal Pradesh	**982**	**986**	**946**	**964**	**960**	**980**

Note: NA implies not applicable, as there was no urban population in the district.

Source: (i) 1991- District Census Handbooks, Census of India, 1991, Series-3, Arunachal Pradesh, Part XII- A&B; 2001 — Provisional Population Totals, Paper-2 of 2001, Census of India 2001, Series-13, Arunachal Pradesh.
(ii) Census of India 2001, Arunachal Pradesh, Series 13, Primary Census Abstract.

Table A 6.5

Literacy rate (Female): Arunachal Pradesh (2001)

Districts	Literacy Rate (Female)			Urban-rural
	Total	Rural	Urban	Gap
Tawang	30.0	25	66.6	41.6
West Kameng	47.5	44.8	71.3	26.5
East Kameng	28.6	20.8	52.7	31.9
Papum Pare	60.4	49	71.3	22.3
Lower Subansiri	36.	31.3	69.8	38.5
Upper Subansiri	40.7	32.5	63.0	30.5
West Siang	51.6	46.7	73.0	26.3
East Siang	52.4	47.5	67.2	19.7
Upper Siang	38.8	38.8	NA	NA
Dibang Valley	48.7	42.5	78.1	35.6
Lohit	44.5	38.80	69.3	30.5
Changlang	39.2	35.0	75.4	40.5
Tirap	28.8	21.2	73.1	51.9
Arunachal Pradesh	**43.5**	**36.9**	**69.5**	**32.6**

Note: NA means not applicable because there was no urban centre in the district.

Source: Census of India 2001, Series-13, Arunachal Pradesh, Provisional Population Totals, Paper-2 of 2001.

Table A 6.6

Gender gap in literacy: Arunachal Pradesh and the States of North-East India (1981-2001)

States	1981			1991			2001		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Arunachal Pradesh	21.1	20.23	18.48	18.73	21.69	15.76	20.30	20.80	15.70
Assam	-	-	-	18.84	19.47	11.17	15.19	16.77	8.85
Manipur	29.48	29.33	29.07	24.03	24.38	23.44	18.17	18.62	17.31
Meghalaya	9.48	8.59	10.81	8.27	7.71	8.40	5.73	5.88	5.60
Mizoram	10.75	11.97	6.4	7.01	10.33	3.54	4.56	8.21	1.28
Nagaland	18.20	18.20	9.7	12.87	13.06	6.84	9.85	9.86	6.92
Sikkim	25.62	26.49	15.37	19.05	19.51	10.25	15.27	16.06	8.42
Tripura	23.48	24.74	14.32	20.93	22.74	12.07	16.06	17.84	8.15
All-India	26.62	27.89	-	24.84	27.25	-	21.50	24.60	13.43

Note: (i) Census was not held in Assam in 1981.
(ii) Literacy rate is defined as the proportion of literates to the population in the age group 7+.
(iii) Gender gap in literacy is defined as the literacy rate for men minus the literacy rate for women.
(iv) Dash means data not available.

Source: 1981- Census of India, Social and Cultural Tables; 1991- Paper 2 of 1991, Series1, Census of India, 1991; 2001 - Primary Census 2001 estimates. Calculations based on NHDR, 2001; Tables 4.1 - 3.

Table A 6.7

Gender gap in literacy: Arunachal Pradesh and its districts (1991-2001)

Districts/State	Gender Gap in Literacy Rate		Gender Gap in Adult Literacy Rate
	1991	2001	2001
Tawang	35. 82	30.28	23.15
West Kameng	19.81	22.83	23.71
East Kameng	23.67	23.77	19.05
Papum Pare	22.47	16.92	18.91
Lower Subansiri	17.55	17.36	19.12
Upper Subansiri	20.34	18.85	14.86
West Siang	18.01	15.07	15.37
East Siang	16.74	16.00	19.62
Upper Siang	21.97	19.92	23.02
Dibang Valley	22.64	18.55	20.65
Lohit	22.81	21.20	23.03
Changlang	24.80	22.90	27.02
Tirap	24.92	24.52	25.40
Arunachal Pradesh	**21.76**	**20.30**	**20.92**

Note: (i) Literacy rate is the percentage of literates to the total population aged 7 years and above.
(ii) Adult literacy rate has been estimated as percentage of literates among the 15+ population.

Source: Census of India, 2001, Final Population Totals, 2001.

Table A 6.8

Rural work participation rates in Arunachal Pradesh (1991-2001)

Districts	1991			2001		
	Total	Male	Female	Total	Male	Female
Tawang	55.61	61.71	48.38	58.63	65.74	49.37
West Kameng	44.78	56.06	31.21	47.29	59.35	31.01
East Kameng	50.77	53.98	47.43	49.54	50.14	48.94
Papum Pare	43.60	50.72	35.19	36.53	43.53	28.96
Lower Subansiri	51.88	53.35	50.38	47.94	48.07	47.81
Upper Subansiri	47.38	51.37	42.78	43.97	44.70	43.24
West Siang	44.19	49.59	38.30	42.46	45.55	39.19
East Siang	42.86	49.37	35.72	41.09	45.23	36.74
Upper Siang	52.41	58.64	48.83	51.30	57.34	44.17
Dibang Valley	47.86	57.22	36.31	46.68	53.37	38.87
Lohit	45.98	54.92	35.27	44.52	52.13	35.73
Changlang	45.53	53.15	36.70	49.15	52.77	45.23
Tirap	52.82	55.25	50.06	51.19	51.48	50.87
Arunachal Pradesh	**47.69**	**53.69**	**40.86**	**46.47**	**51.13**	**41.33**

Note: Work Participation Rates have been calculated for total workers, and include both main and marginal workers.

Source: Census of India, 2001, Series-13, Arunachal Pradesh, Provisional Population Totals, Paper-3, 2001.

Table A 6.9

Urban work participation rates in Arunachal Pradesh (1991-2001)

Districts	1991			2001		
	Total	Male	Female	Total	Male	Female
Tawang	-	-	-	38.26	54.86	18.59
West Kameng	37.77	54.36	15.64	33.96	48.15	17.26
East Kameng	-	-	-	33.83	44.60	21.82
Papum Pare	35.64	53.20	14.10	36.12	49.71	20.66
Lower Subansiri	35.36	52.15	13.02	33.14	44.68	20.65
Upper Subansiri	-	-	-	30.80	42.94	17.11
West Siang	37.06	53.27	12.25	36.63	52.64	15.98
East Siang	34.90	51.96	12.10	30.59	45.93	13.30
Upper Siang	-	-	-	-	-	-
Dibang Valley	34.95	50.76	11.74	33.18	48.80	12.68
Lohit	37.21	56.65	8.28	31.16	48.15	10.45
Changlang	-	-	-	36.17	53.20	14.13
Tirap	40.42	61.78	8.81	35.80	55.49	11.49
Arunachal Pradesh	**36.39**	**54.18**	**11.95**	**34.16**	**48.99**	**16.69**

Note: Work participation rates have been calculated for total workers, and include both main and marginal workers. Dash means there was no urban centre in the district.

Source: Census of India, 2001, Series-13, Arunachal Pradesh, Provisional Population Totals, Paper-3 of 2001.

Table A 6.10

Work participation rates in Arunachal Pradesh (rural + urban) (1991-2001)

Districts	1991			2001		
	Total	Male	Female	Total	Male	Female
Tawang	55.61	61.71	48.38	56.31	64.55	45.71
West Kameng	44.08	55.88	29.72	46.09	58.40	29.69
East Kameng	50.77	53.98	47.43	45.42	48.63	42.76
Papum Pare	40.22	51.78	26.31	36.32	46.71	24.79
Lower Subansiri	50.12	53.21	46.88	46.08	47.63	44.50
Upper Subansiri	47.38	51.37	42.78	40.22	44.17	36.12
West Siang	43.14	50.20	35.05	41.30	47.07	34.95
East Siang	41.24	49.94	31.31	38.45	45.41	31.01
Upper Siang	52.41	58.64	44.83	51.30	57.34	44.17
Dibang Valley	45.77	56.11	32.65	44.31	52.53	34.51
Lohit	44.12	55.31	30.09	42.04	51.38	31.16
Changlang	45.53	53.15	36.70	47.88	52.82	42.43
Tirap	51.79	55.85	47.08	48.84	52.13	45.23
Arunachal Pradesh	**46.24**	**53.76**	**37.49**	**43.97**	**50.69**	**36.45**
All-India	37.5	51.6	22.3	39.26	51.93	25.68

Note: Work Participation Rates have been calculated for total workers, and includes both main and marginal workers.

Source: Census of India, 2001, Series-13, Arunachal Pradesh, Provisional Population Totals, Paper-3 of 2001.

Table A 7.1 (a)

Number and types of operational land holdings (1995-96)

Districts	Marginal	Small	Semi-med	Med	Large	All Size
Tawang	4,499	1,685	171	-	-	6,355
	70.79	**26.51**	**2.69**	**-**	**-**	**100**
West Kameng	1,299	1,225	2,307	252	12	5,095
	25.5	**24.04**	**45.28**	**4.95**	**0.24**	**100**
East Kameng	516	1,492	2,632	2,156	20	6,816
	7.57	**21.89**	**38.62**	**31.63**	**0.29**	**100**
Papum Pare	841	837	1,598	1,374	262	4,912
	17.12	**17.04**	**32.53**	**27.97**	**5.33**	**100**
Lower Subansiri	2,323	2,678	3,718	2,299	592	11,610
	20.01	**23.07**	**32.02**	**19.8**	**5.1**	**100**
Upper Subansiri	84	332	1,976	2,356	568	5,316
	1.58	**6.25**	**37.17**	**44.32**	**10.68**	**100**
West Siang	500	580	2,320	5,048	2,060	10,508
	4.76	**5.52**	**22.08**	**48.04**	**19.6**	**100**
East Siang	476	1,069	2,089	3,522	691	7,847
	6.07	**13.62**	**26.62**	**44.88**	**8.81**	**100**
Upper Siang	1,520	884	976	1,304	508	5,192
	29.28	**17.03**	**18.8**	**25.12**	**9.78**	**100**
Dibang Valley	1,089	993	1,041	655	216	3,994
	27.27	**24.86**	**26.06**	**16.4**	**5.41**	**100**
Lohit	3,164	3,249	4,559	1,823	360	13,155
	24.00	**24.09**	**34.66**	**13.86**	**2.74**	**100**
Changlang	2,781	3,492	2,635	1,105	327	10,340
	26.9	**33.77**	**25.48**	**10.69**	**3.16**	**100**
Tirap	1,329	2,018	4,691	6,359	479	14,876
	8.93	**13.57**	**31.53**	**42.75**	**3.22**	**100**
Arunachal Pradesh	204	205	307	283	61	1,060
	19.24	**19.33**	**28.96**	**26.69**	**5.75**	**100**

Note: (i) Highlighted figures indicate percentages.
(ii) Dash means data not available.
(iii) Semi-med means semi-medium, and Med means medium.

Source: Agricultural Census, 1995-1996.

Table A 7.1 (b)

Area under different landholders (1995-96)

Districts	Marginal	Small	Semi-med	Med	Large	All Size
Tawang	2,391	1,980	375	-	-	4,746
	50.38	**41.72**	**7.9**	**-**	**-**	**100**
West Kameng	643	1,705	6,015	1,239	197	9,799
	6.56	**17.4**	**61.38**	**12.64**	**2.01**	**100**
East Kameng	345	2,107	7,043	10,614	938	21,047
	1.64	**10.01**	**33.46**	**50.43**	**4.46**	**100**
Papum Pare	503	1,153	4,390	8,640	5,688	20,374
	2.47	**5.66**	**21.55**	**42.41**	**27.92**	**100**
Lower Subansiri	1,293	3,598	9,733	13,108	9,202	36,934
	3.5	**9.74**	**26.35**	**35.49**	**24.91**	**100**
Upper Subansiri	56	596	6,932	16,648	8,488	32,720
	0.17	**1.82**	**21.19**	**50.88**	**25.94**	**100**
West Siang	240	888	6,172	30,788	27,624	65,712
	0.37	**1.35**	**9.39**	**46.85**	**42.04**	**100**
East Siang	254	1,555	5,810	20,585	9,897	38,101
	0.67	**4.08**	**15.25**	**54.03**	**25.98**	**100**
Upper Siang	759	1,199	2,375	8,340	6,423	19,096
	3.97	**6.28**	**12.44**	**43.67**	**33.64**	**100**
Dibang Valley	546	1,145	2,085	2,244	1,198	7,218
	7.56	**15.86**	**28.89**	**31.09**	**16.6**	**100**
Lohit	1,854	4,763	11,959	10,702	5,574	34,852
	5.32	**13.67**	**34.31**	**30.71**	**15.99**	**100**
Changlang	1,745	5,581	7,154	6,281	7,971	28,732
	6.07	**19.42**	**24.9**	**21.86**	**27.74**	**100**
Tirap	770	2,390	14,001	33,640	5,760	.
	1.36	**4.22**	**24.75**	**59.48**	**10.18**	**100**
Arunachal Pradesh	114	287	841	1628	889	3759
	3.03	**7.64**	**22.37**	**43.31**	**23.65**	**100**

Note: (i) Highlighted figures indicate percentages.
(ii) Dash means data not available.
(iii) Semi-med means semi-medium, and Med means medium.

Source: Agricultural Census, 1995-1996.

Table A 7.2

Per capita asset, income and consumption (in Rs. 1000)

Districts	Asset	Income	Consumption	Essential Consumption
Tawang	35.76	14.06	9.36	58.48
West Kameng	31.9	13.13	8.80	66.53
East Kameng	21.56	9.71	7.41	56.43
Papum Pare	35.91	13.48	8.78	64.43
Kurung Kumey	16.74	8.29	7.54	52.59
Lower Subansiri	23.04	12.43	7.95	60.00
Upper Subansiri	20.04	9.78	7.94	66.55
West Siang	30.8	12.76	8.76	60.82
East Siang	37.71	13.80	9.59	68.07
Upper Siang	32.81	13.23	8.05	58.12
Lower Dibang Valley	34.08	18.19	9.78	62.89
Dibang Valley (New)	21.53	13.05	8.69	54.28
Lohit	27.67	13.16	8.02	64.17
Changlang	17.02	9.28	7.48	57.49
Tirap	16.49	8.72	7.14	63.64
Arunachal Pradesh	**29.63**	**12.93**	**8.53**	**63.25**

Note: Consumption and income figures are annual.

Source: SHDR Survey.

Table A 7.3

Average per capita household asset (in Rs. 1000) and its share

Districts	Bottom		Top		Difference	
	10%	20%	20%	10%	D_1	D_2
Tawang	13.32	14.77	84.72	107.14	93.82	69.95
	3.10	**6.88**	**49.36**	**37.45**	**34.35**	**42.48**
West Kameng	1.89	2.92	105.92	162.10	160.21	103
	0.54	**1.77**	**67.75**	**51.84**	**51.3**	**65.98**
East Kameng	2.94	4.02	47.47	57.02	54.08	43.45
	1.08	**3.43**	**46.34**	**27.83**	**26.75**	**42.91**
Papum Pare	4.02	4.68	126.87	193.38	189.36	122.19
	1.11	**2.59**	**72.66**	**57.28**	**56.17**	**70.07**
Kurung Kumey	5.52	6.84	30.93	36.02	30.5	24.09
	3.09	**7.66**	**40.42**	**26.90**	**23.81**	**32.76**
Lower Subansiri	1.78	2.85	63.38	92.28	90.5	60.53
	0.67	**2.42**	**59.78**	**43.52**	**42.85**	**57.36**
Upper Subansiri	2.55	3.73	59.29	96.94	94.39	55.56
	1.01	**3.43**	**62.28**	**50.91**	**49.9**	**58.85**
West Siang	9.98	11.02	56.00	61.67	51.69	44.98
	2.95	**6.50**	**38.57**	**24.27**	**21.32**	**32.07**
East Siang	4.38	5.06	133.22	210.84	206.46	128.16
	1.07	**2.68**	**70.64**	**60.20**	**59.13**	**67.96**
Upper Siang	3.65	4.00	90.11	116.55	112.9	86.11
	0.59	**1.93**	**57.82**	**37.39**	**36.8**	**55.89**
Lower Dibang Valley	11.89	13.07	81.75	110.16	98.27	68.68
	3.42	**7.52**	**51.73**	**38.03**	**34.61**	**44.21**
Dibang Valley (New)	-	13.98	35.72	48.94	-	-
	-	**9.28**	**47.41**	**32.48**	**-**	**-**
Lohit	2.81	3.20	96.68	148.32	145.51	93.48
	0.92	**2.28**	**74.13**	**56.86**	**55.94**	**71.85**
Changlang	7.23	7.79	33.88	38.94	31.71	26.09
	3.86	**8.32**	**42.21**	**27.73**	**23.87**	**33.89**
Tirap	-	-	25.86	26.06	-	-
	-	**-**	**35.98**	**18.13**	**-**	**-**
Arunachal Pradesh	3.24	4.41	93.04	141.28	138.04	88.63
	1.08	**2.95**	**62.81**	**47.69**	**46.61**	**59.86**

Note: Highlighted figures indicate percentages. D_1 is the difference between top and bottom 10 per cent, and D_2 is the difference between top and bottom 20 per cent.
Dash means data not available.

Source: SHDR Survey.

Table A 7.4

Annual average per capita household income (in Rs. 1000) and its share

Districts	Bottom		Top		Difference	
	10%	20%	20%	10%	D_1	D_2
Tawang	-	11.17	16.75	17.33	-	5.58
	-	**9.93**	**29.78**	**15.41**	**-**	**19.85**
West Kameng	3.33	4.84	24.78	28.59	25.26	19.94
	2.27	**7.09**	**38.71**	**22.33**	**20.06**	**31.62**
East Kameng	3.65	4.08	18.02	19.23	15.58	13.94
	3.76	**8.41**	**37.12**	**19.81**	**16.05**	**28.71**
Papum Pare	2.70	3.32	31.79	42.05	39.35	28.47
	1.89	**4.84**	**48.38**	**32.00**	**30.11**	**43.54**
Kurung Kumey	2.29	2.92	16.36	18.58	16.29	13.44
	2.44	**6.22**	**40.64**	**26.37**	**23.93**	**34.42**
Lower Subansiri	3.78	4.53	26.13	30.33	26.55	21.6
	2.94	**7.05**	**47.47**	**31.48**	**28.54**	**40.42**
Upper Subansiri	2.79	3.05	28.04	38.40	35.61	24.99
	2.44	**6.24**	**57.34**	**44.86**	**42.42**	**51.1**
West Siang	2.78	3.68	27.38	32.65	29.87	23.7
	1.98	**5.24**	**45.52**	**31.02**	**29.04**	**40.28**
East Siang	2.69	3.18	37.07	49.30	46.61	33.89
	1.89	**4.49**	**56.65**	**40.57**	**38.68**	**52.16**
Upper Siang	4.15	4.93	29.77	33.21	29.06	24.84
	2.09	**7.46**	**45.00**	**33.46**	**31.37**	**37.54**
Lower Dibang Valley	2.38	3.03	30.62	37.06	34.68	27.59
	1.81	**4.62**	**46.67**	**28.24**	**26.43**	**42.05**
Dibang Valley (New)	2.09	2.20	25.41	31.50	29.41	23.21
	1.46	**3.07**	**53.10**	**43.89**	**42.43**	**50.03**
Lohit	4.17	4.37	32.78	48.66	44.49	28.41
	2.58	**5.42**	**50.81**	**37.71**	**35.13**	**45.39**
Changlang	4.42	4.70	20.45	28.08	23.66	15.75
	4.05	**9.70**	**46.86**	**32.17**	**28.12**	**37.16**
Tirap	2.30	2.42	18.69	22.00	19.7	16.27
	1.88	**3.96**	**45.92**	**36.03**	**34.15**	**41.96**
Arunachal Pradesh	2.85	3.54	28.58	37.55	34.7	25.04
	2.32	**5.76**	**46.89**	**31.05**	**28.73**	**41.13**

Note: Highlighted figures indicate percentages. D_1 is the difference between top and bottom 10 per cent, and D_2 is the difference between top and bottom 20 per cent.
Dash means data not available.

Source: SHDR Survey.

Table A 7.5

Annual average per capita household consumption (in Rs.) and its share

Districts	Bottom		Top		Difference	
	10%	20%	20%	10%	D_1	D_2
Tawang	3,599	3,941	7,520	8,556	4,957	3,579
	6.07	**13.31**	**27**	**15.89**	**9.82**	**13.69**
West Kameng	3,412	3,767	11,282	13,236	9,824	7,515
	5.1	**11.26**	**34.18**	**20.31**	**15.21**	**22.92**
East Kameng	3,281	3,606	7,155	7,344	4,063	3,549
	5.41	**11.89**	**26.54**	**15.13**	**9.72**	**14.65**
Papum Pare	3,582	3,890	10,481	12,387	8,805	6,591
	5.48	**12.08**	**32.54**	**19.51**	**14.03**	**20.46**
Kurung Kumey	3,525	3,768	6,871	7,269	3,744	3,103
	5.29	**13.2**	**27.51**	**14.55**	**9.26**	**14.31**
Lower Subansiri	2,707	3,457	8,851	9,627	6,920	5,394
	4.37	**11.46**	**30.11**	**16.37**	**12**	**18.65**
Upper Subansiri	3,110	3,517	10,727	11,864	8,754	7,210
	4.63	**10.47**	**32.45**	**18.23**	**13.6**	**21.98**
West Siang	3,161	3,605	6,350	10,140	6,979	2,745
	5.07	**11.81**	**30.72**	**16.93**	**11.86**	**18.91**
East Siang	3,670	4,002	11,110	12,836	9,166	7,108
	5.35	**11.67**	**33.10**	**19.12**	**13.77**	**21.43**
Upper Siang	2,753	3,172	8,884	9,546	6,793	5,712
	4.7	**10.83**	**31.16**	**17.19**	**12.49**	**20.33**
Lower Dibang Valley	2,776	3,428	10,098	11,958	9,182	6,670
	4.19	**10.66**	**32.29**	**19.12**	**14.93**	**21.63**
Dibang Valley (New)	2,448	3,317	6,756	6,923	4,475	3,439
	3.76	**10.19**	**25.93**	**15.94**	**12.18**	**15.74**
Lohit	3,196	3,599	10,578	12,175	8,979	6,979
	4.9	**11.2**	**33.16**	**19.22**	**14.32**	**21.96**
Changlang	2,948	3,382	9,127	10,837	7,889	5,745
	5.13	**11.76**	**32.22**	**19.4**	**14.27**	**20.46**
Tirap	3,095	3,570	9,641	10,935	7,840	6,071
	4.86	**11.22**	**31.31**	**18.33**	**13.47**	**20.09**
Arunachal Pradesh	3,187	3,627	10,237	11,785	8,598	6,610
	5.04	**11.46**	**32.38**	**18.64**	**13.6**	**20.92**

Note: Highlighted figures indicate percentages. D_1 is the difference between top and bottom 10 per cent and, D_2 is the difference between top and bottom 20 per cent.
Dash means data not available.

Source: SHDR Survey.

Table A 7.6

Health deprivation measures (2000-2001)

Districts	Infant Mortality Rate			Under-Five Mortality Rate			Probability of not Surviving upto 40 years		
	M	F	T	M	F	T	M	F	T
Tawang	100	95	98	168	185	176	0.335	0.362	0.349
West Kameng	91	87	88	156	145	151	0.292	0.284	0.288
East Kameng	95	98	97	191	202	197	0.435	0.428	0.430
Papum Pare	71	64	67	120	109	115	0.249	0.205	0.226
Kurung Kumey	108	114	113	220	246	234	0.440	0.461	0.450
Lower Subansiri	58	60	59	109	127	118	0.283	0.257	0.268
Upper Subansiri	98	95	97	157	164	160	0.333	0.354	0.344
West Siang	85	87	85	154	165	159	0.297	0.243	0.271
East Siang	59	55	57	93	94	92	0.214	0.220	0.216
Upper Siang	96	80	87	141	152	143	0.283	0.385	0.332
Lower Dibang Valley	57	53	53	110	104	106	0.297	0.266	0.275
Dibang Valley (New)	100	95	98	173	159	166	0.441	0.449	0.445
Lohit	77	65	72	113	105	110	0.227	0.223	0.226
Changlang	61	63	62	96	136	116	0.246	0.238	0.241
Tirap	89	94	92	152	161	157	0.308	0.324	0.316
Arunachal Pradesh	78	76	77	131	137	134	0.281	0.280	0.281

Note: M= Male, F= Female, T= Total.

Source: SHDR Survey.

Table A 7.7

Adult illiteracy of different age groups

(Percentage)

Districts	1991					1981				
	15+	15-59	60+	15-35	35-59	15+	15-59	60+	15-35	35-59
Tawang	73.3	70.7	97.5	64.4	81.7	-	-	-	-	-
West Kameng	58.0	58.9	92.3	48.7	67.6	75.3	73.2	95.6	68.0	81.4
East Kameng	80.0	78.7	97.7	69.0	90.0	91.8	91.3	99.4	87.2	96.1
Lower Subansiri	61.9	60.2	93.3	51.2	75.0	77.3	76.0	96.9	68.7	87.0
Upper Subansiri	67.9	66.1	94.7	54.2	84.2	86.3	85.4	99.3	78.7	94.0
West Siang	59.1	56.2	96.0	42.8	76.1	74.1	71.8	97.8	60.7	86.5
East Siang	60.3	57.4	92.5	45.3	75.8	71.8	69.2	94.5	57.0	84.7
Dibang Valley	57.0	54.6	90.3	46.4	68.7	69.0	67.4	96.3	61.8	77.3
Lohit	54.8	53.0	81.3	47.4	63.0	66.7	65.2	89.6	59.8	74.4
Changlang	60.0	57.5	88.9	50.8	69.5	-	-	-	-	-
Tirap	71.4	68.4	97.5	60.2	80.2	78.1	76.1	96.8	69.6	85.6
Arunachal Pradesh	**62.7**	**60.3**	**92.6**	**51.2**	**74.9**	**76.3**	**74.5**	**93.3**	**67.0**	**85.4**

Note: Lower Subansiri includes Papum Pare, and East Siang includes Upper Siang. In 1981, district Tawang was in West Kameng, and Changlang in Tirap.
Dash means data not available.

Source: Census of India (Arunachal Pradesh) various years, Social and Cultural Tables.

Table A 7.8

Illiteracy rate in Arunachal Pradesh

(Percentage)

Districts	Year			
	1971	1981	1991	2001
Tawang	-	-	70.2	52.68
West Kameng	-	74.16	53.7	39.24
East Kameng	-	90.61	73.8	59.36
Papum Pare	-	76.12*	44.89	30.68
Lower Subansiri	-	76.12*	69.93	55.21
Upper Subansiri	-	84.25	61.7	49.65
West Siang	-	71.97	54.4	40.53
East Siang	-	68.19*	52.15	39.27
Upper Siang	-	68.19*	64.67	50.22
Dibang Valley	-	68.15	53.1	41.11
Lohit	-	65.06	50.8	43.93
Changlang	-	75.97*	56.8	48.68
Tirap	-	75.97*	67.9	58.27
Arunachal Pradesh	**88.70**	**74.45**	**58.41**	**45.66**

Note: Dash means data not available.
** Relates to undivided districts of East Siang, Lower Subansiri, and Tirap.*

Source: Census of India (Arunachal Pradesh), various years.

Table A 7.9

Dropout rates for different classes, in different years

(In percent)

States	Class I - V			Class I - VIII			Class I -X		
	1981-82	1992-93	1998-99	1981-82	1992-93	1998-99	1981-82	1992-93	1998-99
Arunachal Pradesh	73.9	60.54	46.89	84.2	71.93	66.78	90.7	78.83	77.2
Assam	62.5	55.37	41.56	82.5	69.22	70.08	65.09	75.95	76
Manipur	81.1	67.25	52.59	86.4	67.77	46.15	88.33	74.52	76.54
Meghalaya	76	13.39	62.44	88.5	50.29	77.91	91.22	68	62.89
Mizoram	67.3	58.24	51.82	79.3	64.37	67.2	88.97	55.72	72.56
Nagaland	71.3	35.59	35.94	87.8	37.45	42.98	90.66	76.53	62.59
Tripura	55.7	59.7	51.95	74.4	69.39	70.26	85.59	82.36	81.78
India	53.5	45.01	39.58	72.1	61.1	56.82	82.33	72.93	67.44

Source: National HDR, 2001.

Table A 7.10

Households without toilet, drinking water and electricity (1991)

Districts/State	Toilet (%)			Drinking Water (%)		
	Total	Rural	Urban	Total	Rural	Urban
Tawang	18.18	18.18	-	34.23	34.23	-
West Kameng	68.61	75.56	18.50	24.09	26.27	8.33
East Kameng	76.98	76.98	-	17	17	-
Lower Subansiri	59.41	72.59	28.72	30.29	37.63	13.19
Upper Subansiri	8.78	8.78	-	28.41	28.41	-
West Siang	13.81	14.31	11.34	17.58	18.06	15.17
East Siang	69.81	78.87	23.59	22.03	23.38	15.13
Dibang Valley	61.86	68.53	27.91	24.38	28.52	3.29
Lohit	58.26	66.60	28.26	36.20	43.46	10.07
Changlang	62.22	62.22	-	48.94	48.94	-
Tirap	43.22	45.98	18.72	38.42	42.00	6.7
Arunachal Pradesh	**52.58**	**57.37**	**24.95**	**29.98**	**33.13**	**11.8**
All-India	76.3	91.52	36.15	37.3	44.5	18.6

Districts/State	Electricity (%)		Toilet and Electricity (%)			
	Total	Rural	Total	Rural	Total	Rural
Tawang	39.66	39.66	39.66	39.66	39.66	39.66
West Kameng	49.68	55.22	49.68	55.22	49.68	55.22
East Kameng	85.46	85.46	85.46	85.46	85.46	85.46
Lower Subansiri	47.78	63.17	47.78	63.17	47.78	63.17
Upper Subansiri	75.48	75.48	75.48	75.48	75.48	75.48
West Siang	56.03	64.87	56.03	64.87	56.03	64.87
East Siang	62.64	69.80	62.64	69.80	62.64	69.80
Dibang Valley	64.26	71.47	64.26	71.47	64.26	71.47
Lohit	73.04	82.80	73.04	82.80	73.04	82.80
Changlang	64.26	64.26	64.26	64.26	64.26	64.26
Tirap	42.30	45.98	42.30	45.98	42.30	45.98
Arunachal Pradesh	**59.15**	**66.11**	**59.15**	**66.11**	**59.15**	**66.11**
All-India	58.00	70.00	58.00	70.00	58.00	70.00

Note: Lower Subansiri includes Papum Pare, and East Siang includes Upper Siang.
Dash means there was no urban centre in the district.

Source: Census of India (Arunachal Pradesh), 1991, Tables on Housing and Household Amenities, 1991.

Table A 8.1

Sectoral plan outlays in Arunachal Pradesh since the Fifth Five Year Plan

(Percentage)

Plan Period	Agriculture & Allied	Industry & Mining	Power & Irrigation	Transport & Communication	Social & Community Services	Economic Services	General Services
V Plan	26.77	2.05	6.87	33.03	30.84	0.44	-
VI Plan	24.22	4.84	12.82	26.46	30.95	0.35	0.36
VII Plan	21.66	2.41	15.92	32.19	26.62	0.66	0.54
VIII Plan	11.26	2.82	20.59	32.13	28.77	1.28	3.15
IX Plan	13.16	1.29	20.93	26.04	33.03	3.26	2.29
X Plan (Draft)	18.11	1.78	18.55	25.1	29.83	4.64	1.99

Note: Although the plan process in Arunachal began with the First Five Year Plan, the process intensified after the Fifth Five Year Plan.
Dash means data not available.

Sources: Basic Statistics of the north-eastern region, 2000.
Ninth Five Year Plan, Planning and Development Department, Government of Arunachal Pradesh, Itanagar.
Draft Tenth Five-Year Plan, and Annual Plan, 2002-2003, Department of Planning, Government of Arunachal Pradesh, Itanagar.

Table A 8.2

Percentage share of the infrastructural sector in the Net State Domestic Product of Arunachal Pradesh (1970-71 to 2001-2002)

Sector	1970-71	1980-81	1990-91	1995-96	2001-2002
1. Electricity, Gas, Water Supply	-0.10	-2.99	-2.47	-0.39	2.29
2. Transport and Communication	1.55	0.39	0.64	3.37	6.03
a. Railways	NA	NA	NA	NA	NA
b. Transport by Other Means	0.99	0.11	0.48	2.98	5.36
c. Storage	-	-	-	-	-
d. Communication	0.56	0.28	0.16	0.39	0.67
3. Banking and Insurance	0.10	0.60	1.49	1.34	2.06
4. Other Services	6.09	6.98	11.72	8.36	12.02
Total Infrastructure	7.64	4.98	11.38	12.68	22.40

Note: Dash means data not available, and NA means not applicable.

Sources: State Domestic Product of Arunachal Pradesh, 1970-71 to 1999-2000(Q), Directorate of Economics and Statistics, Government of Arunachal Pradesh, Itanagar.
State Domestic Product of Arunachal Pradesh, 1993-94 to 2001-2002, Directorate of Economics and Statistics, Government of Arunachal Pradesh, Itanagar, 2002.

Table A 8.3

Percentage of surfaced roads and road density (2001)

Districts/State	Percentage of Surfaced Road	Road Density (km per 100 sq km)
Tawang	30.56	48.75
West Kameng	44.05	23.23
East Kameng	52.69	19.83
Papum Pare	58.70	35.48
Lower Subansiri	38.25	12.82
Upper Subansiri	41.43	14.32
West Siang	46.06	17.51
Upper Siang*	22.18*	10.07
East Siang*	67.04*	30.15
Dibang Valley (Old)	62.83	6.32
Lohit	65.50	9.63
Changlang	59.59	21.99
Tirap	51.14	54.83
Arunachal Pradesh	**49.63**	**17.36**

*Note: *Indicates figures are provisional for surfaced road data.*
Data for surfaced road refer to the year 1995-96.

Source: Statistical Abstract of Arunachal Pradesh, 2000-2001.
A Resource Atlas of Arunachal Pradesh, Government of Arunachal Pradesh, 1999.

Table A 8.4

Distance from bus stop (Percentage of villages) (1991)

Districts	< 0 Km	0-5 Km	5-10 Km	> 10 Km
Tawang	6.75	25.15	22.09	46.01
West Kameng	17.65	11.76	8.09	62.50
East Kameng	9.46	10.18	8.36	72.00
Papum Pare	6.08	16.35	17.49	60.08
Lower Subansiri	44.03	2.69	1.18	52.10
Upper Subansiri	6.17	4.69	8.64	80.50
West Siang	9.56	12.99	7.35	70.10
East Siang	22.55	12.75	11.76	52.94
Dibang Valley	16.39	10.50	7.98	65.13
Lohit	9.65	15.81	6.78	67.76
Changlang	11.58	20.35	13.33	54.74
Tirap	28.21	7.69	8.97	55.13
Arunachal Pradesh	**16.96**	**11.46**	**8.72**	**62.86**

Source: Census of India, 1991, District Census Handbooks of different districts of Arunachal Pradesh.

Table A 8.5

Road connectivity status of villages (1997)

Districts	% of Villages Connected	% of Villages not Connected
Tawang	25.66	74.34
West Kameng	46.97	52.03
East Kameng	26.52	73.48
Papum Pare	43.02	56.98
Lower Subansiri	33.17	66.83
Upper Subansiri	28.18	71.82
Kurung Kumey	7.47	92.53
Upper Siang	56.00	44.00
East Siang	73.68	26.32
West Siang	45.72	54.28
Lower Dibang Valley	66.96	33.04
Dibang Valley (New)	23.58	76.42
Lohit	40.70	59.30
Changlang	59.57	40.43
Tirap	57.23	42.77
Arunachal Pradesh	**38.53**	**61.47**

Note: Connectivity status for all 15 districts has been calculated on the basis of data available in the circles.

Source: Connectivity of villages, Public Works Department, Government of Arunachal Pradesh, Itanagar, 1997.

Table A 8.6

Road connectivity status of villages on the basis of population (1997)

Districts	% of Total Rural Population of Districts Connected by *Pucca* Road	% of Total Rural Population of Districts Connected by *Kutcha* Road	% of Total Rural Population of Districts not Connected by any Road
Tawang	20.10	27.78	52.12
West Kameng	49.13	29.89	20.98
East Kameng	27.19	20.28	52.53
Papum Pare	64.90	16.59	18.51
Lower Subansiri	78.37	2.68	18.95
Upper Subansiri	38.19	19.57	42.24
Kurung Kumey	1.35	21.89	76.76
Upper Siang	4.66	81.51	13.83
East Siang	47.22	44.24	8.54
West Siang	45.77	30.33	23.90
Lower Dibang Valley	66.21	27.11	6.68
Dibang Valley (New)	0.16	62.26	37.58
Lohit	60.24	23.92	15.84
Changlang	34.26	32.79	32.95
Tirap	46.67	27.79	25.54
Arunachal Pradesh	**46.51**	**26.93**	**26.56**

Note: Connectivity status for all 15 districts has been calculated on the basis of data available in the circle level.

Source: Connectivity of Villages, Public Works Department, Government of Arunachal Pradesh, Itanagar, 1997.

Table A 8.7

Road connectivity at village level (1997)
(Percentage of villages connected by road)

Districts	Village with Population Less than 500	Village with Population Between 500 to 1000	Village with Population Above 1000
Tawang	23.85	66.67	100.00
West Kameng	87.24	98.80	100.00
East Kameng	25.19	83.33	100.00
Papum Pare	41.01	100.00	100.00
Lower Subansiri	27.29	100.00	100.00
Upper Subansiri	27.11	100.00	100.00
Kurung Kumey	6.10	100.00	100.00
Upper Siang	41.67	90.00	100.00
East. Siang	83.52	96.29	100.00
West Siang	42.67	86.96	100.00
Lower Dibang Valley	16.61	100.00	100.00
Dibang Valley (New)	22.95	0.00	100.00
Lohit	36.10	83.21	92.86
Changlang	57.33	80.77	58.83
Tirap	52.38	66.66	68.18
Arunachal Pradesh	**34.98**	**87.64**	**93.96**

Note: Connectivity status for all 15 districts has been calculated on the basis of data available at the circle level.

Source: Connectivity of villages, Public Works Department, Government of Arunachal Pradesh, 1997.

Table A 8.8

Road connectivity status of different circles (1997)

Very High (80-100%)	1. Balukpong (West Kameng). 2. Seijosa (East Kameng). 3. Itanagar (Papum Pare). 4. Naharlagun (Papum Pare). 5. Geku (Upper Siang). 6. Jengging (Upper Siang). 7. Mariyang (Upper Siang). 8. Bilat (East Siang). 9. Mebo (East Siang). 10. Nari (East Siang). 11. Pasighat (East Siang). 12. Ruksin (East Siang). 13. Basar (West Siang). 14. Tirbin (West Siang). 15. Dambuk (Dibang Valley). 16. Roing (Dibang Valley). 17. Tezu (Lohit) 18. Namsai (Lohit). 19. Sunpura (Lohit). 20. Bordumsa (Changlang). 21. Changlang (Changlang). 22. Longding (Tirap).
High (50-80%)	1. Mukto (Tawang). 2. Kalaktang (West Kameng). 3. Trizino (West Kameng). 4. Doimukh (Papum Pare). 5. Sagalee (Papum Pare). 6. Baririjo (Upper Subansiri). 7. Daporijo (Upper Subansiri). 8. Along (West Siang). 9. Gensi (West Siang).10. Tato (West Siang). 11. Yomcha (West Siang). 12. Wakro (Lohit). 13. Mahadevpur (Lohit). 14. Kibithoo (Lohit). 15. Diyun (Changlang). 16. Miao (Changlang). 17. Kanubari (Tirap). 18. Khonsa (Tirap). 19. Namsang (Tirap).
Medium (30-50%)	1. Tawang (Tawang). 2. Dirang (West Kameng). 3. Seppa (East Kameng). 4. Balijan (Papum Pare). 5. Raga (Lower Subansiri). 6. Zero (Lower Subansiri). 7. Dumporijo (Upper Subansiri). 8. Taliha (Upper Subansiri). 9. Boleng (East Siang).10. Pangin (East Siang). 11. Darak (West Siang). 12. Kaying (West Siang). 13. Likabali (West Siang). 14. Payum (West Siang). 15. Rumgong (West Siang). 16. Hunli (Dibang Valley). 17. Anini (Dibang Valley). 18. Chowkham (Lohit). 19. Walong (Lohit). 20. Khimiyong (Changlang). 21. Manmao (Changlang). 22. Nampong (Changlang). 23. Lazu (Tirap). 24. Pongchau (Tirap).
Low (10-30%)	1. Lumla (Tawang). 2. Nafra (West Kameng). 3. Bameng (East Kameng). 4. Chayangtajo (East Kameng). 5. Khenowa (East Kameng). 6. Pake-Kesang (East Kameng). 7. Pipudipu (East Kameng). 8. Kimin (Papum Pare). 9. Giba (Upper Subansiri). 10. Nacho (Upper Subansiri). 11. Palin (Lower Subansiri). 12. Sangram (Lower Subansiri). 13. Palling (Upper Siang). 14. Koyu (East Siang). 15. Mechuka (West Siang). 16. Desali (Dibang Valley). 17. Etalin (Dibang Valley). 18. Koronu (Dibang Valley). 19. Hayuliang (Lohit). 20. Pumao (Tirap). 21. Wakka (Tirap).
Very Low (Below -10%)	1. Thingbu (Tawang). 2. Lada (East Kameng). 3. Mengio (Papum Pare). 4. Limeking (Upper Subansiri). 5. Siyum (Upper Subansiri). 6. Taksing (Upper Subansiri). 7. Chambang (Lower Subansiri). 8. Damin (Lower Subansiri) 9. Koloriang (Lower Subansiri). 10. Nyapin (Lower Subansiri) 11. Sarli (Lower Subansiri). 12. Tali (Lower Subansiri). 13. Gelling (Upper Siang). 14. Singa (Upper Siang). 15. Liromoba (West Siang). 16. Monigong (West Siang). 17. Anelih (Dibang Valley). 18. Mipi (Dibang Valley). 19. Changlagam (Lohit). 20. Goiliang (Lohit).

Note: The data refers to the circles in 1996-97.

Source: Connectivity of Villages, Public Works Department, Government of Arunachal Pradesh, 1997.

Table A 8.9

Road density of different blocks (1999)

Very High (More than 100 km)	1. Tawang (Tawang)
High (50-100 km)	1. Niausa (Tirap)
Medium (30-50 km)	1. Lumla (Tawang) 2. Along (West Siang). 3. Kaying-Payum (West Siang). 4. Dirang (West Kameng). 5. Kalaktang (West Kameng). 6. Daporijo (Upper Subansiri). 7. Taliha (Upper Subansiri). 8. Liromoba (West Siang). 9. Mebo (East Siang). 10. Ramle-Banggo (East Siang). 11. Namsang (Tirap).
Low (10-30 km)	1. Mukto (Tawang). 2. Nafra-Buragaon (West Kameng). 3. Seppa (East Kameng). 4. Pake-Kesang (East Kameng). 5. Doimukh-Kimin (Papum Pare). 6. Sagalee (Papum Pare). 7. Ziro (Lower Subansiri). 8. Yachuli (Lower Subansiri). 9. Palin (Lower Subansiri).10. Nyapin (Lower Subansiri). 11. Rumgong (West Siang). 12. Basar (West Siang). 13. Gensi (West Siang). 14. Pasighat (East Kameng). 15. Pangin-Boleng (East Siang). 16. Mariyang (Upper Siang). 17. Yingkiong (Upper Siang). 18. Hunli-Kronli (Dibang Valley). 19. Roing-Dambuk (Dibang Valley). 20. Tezu (Lohit). 21. Namsai (Lohit). 22. Changlang (Changlang). 23. Nampong-Manmao (Changlang). 24. Khagam-Miao (Changlang). 25. Bordumsa-Diyun (Changlang).
Very Low (Below 10 km)	1. Bameng (E/Kameng). 2. Chayangtajo (East Kameng). 3. Chambang (Lower Subansiri). 4. Koloriang (Lower Subansiri). 5. Damin (Lower Subansiri). 6. Tali (Lower Subansiri). 7. Raga (Lower Subansiri). 8. Giba (Upper Subansiri). 9. Dumporijo (Upper Subansiri). 10. Nacho-Siyum (Upper Subansiri). 11. Mechuka (West Siang). 12. Jengging (Upper Siang). 13. Tuting (Upper Siang). 14. Anini-Etalin (Dibang Valley). 15. Hayuliang (Lohit). 16. Hawai (Lohit). 17. Wakro (Lohit). 18. Pongchau-Wakka (Tirap).

Source: A Resource Atlas of Arunachal Pradesh, Government of Arunachal Pradesh, 1999.

Table A 8.10

State Transport balance sheet
(Profit and loss — financial performance)

Revenue Receipts (Rs. in thousand)				Expenditure (Rs. in thousand)			
Items	1998-99 Actuals	1999-2000 Revised	2000-2001 Budget Estimate	Items	1998-99 Actuals	1999-2000 Revised	2000-2001 Budget Estimate
Road Transport	54,534	72,800	63,300	1. Salary and Wages	52,416	57,280	61,408
				2. Purchase of Goods and Services	85,598	85,272	97,852
				3. Acquisition of Fleet	7,679	12,200	12,200
				4. Building	4,041	8,500	8,500
				5. Machinery & Equipment	1,668	2,000	2,000
					1,51,402	1,65,252	1,81,960

Source: Department of Finance, Government of Arunachal Pradesh, Itanagar.

Table A 8.11

Growth of the installed capacity of electricity developed by the Government of Arunachal Pradesh

Year	Installed Capacity (MW)		
	Hydel	Diesel	Total
1994-95	23.65 (59.83)	15.88 (40.17)	39.53
1995-96	23.83 (48.75)	25.05 (51.25)	48.88
1996-97	23.83 (48.75)	25.05 (51.25)	48.8
1997-98	23.83 (44.23)	30.05 (55.77)	53.88
1998-99	30.735 (55.37)	24.770 (44.63)	55.505
1999-2000	30.57 (46.62)	35.00 (53.38)	65.57
2000-2001	31.83 (53.99)	27.12 (46.01)	58.95

Note: Figures in brackets indicate the percentage of the total.

Source: Statistical Abstract of Arunachal Pradesh, 2001.

Table A 8.12

Power projects under implementation in Arunachal Pradesh

Name of Projects	Prime Mover	Capacity (MW)	Implementing Agency	Status
Ranganadi	Hydro	405	NEEPCO	Commissioned in March 2002
Subansiri Lower	Hydro	2,000	NHPC	Under Construction
Kameng	Hydro	600	NEEPCO	To be taken up
Ranganadi Stage-II	Hydro	130	NEEPCO	Investigation
Papum Pam	Hydro	100	NEEPCO	-do-
Pakke	Hydro	105	NEEPCO	-do-
Dikrong	Hydro	10	NEEPCO	Under Survey & Investigation
Siang Upper	Hydro	11,000	NHPC	-do-
Siang Middle	Hydro	700	NHPC	-do-
Siang Lower	Hydro	1,700	NHPC	-do-
Subansiri Upper	Hydro	2,500	NHPC	-do-
Subansiri Middle	Hydro	2,000	NHPC	-do-

Source: NEDFi Data Bank Quarterly, October, 2002.

Table A 8.13

Postal facilities in Arunachal Pradesh (1961-2001)

Year	Number of Post Offices	Population per Post Office	Area Served by a Post Office (sq km)
1960-61	23	14,632	3,641
1970-71	70	6,678	1,196.33
1980-81	200	3,159	418.72
1990-91	249	3,447	363.32
2000-2001	303	3,388	276.38

Source: Statistical Abstracts of Arunachal Pradesh.

Table A 8.14

Percentage of villages with postal and telegraph facilities, on the basis of distance covered (1991)

Districts	0 Km	0 - 5 Km	5 - 10 Km	Above 10 Km
Tawang	5.52	33.13	28.83	32.52
West Kameng	4.78	8.82	11.77	74.63
East Kameng	4.36	11.27	8.00	76.37
Papum Pare	2.66	14.45	13.31	69.58
Lower Subansiri	2.19	11.76	12.77	73.28
Upper Subansiri	2.50	8.15	9.60	79.75
West Siang	4.90	25.49	16.18	53.43
East Siang	13.24	22.55	12.25	51.96
Dibang Valley	10.08	14.29	10.50	65.13
Lohit	6.78	21.97	15.81	55.44
Changlang	8.42	28.42	15.09	48.07
Tirap	15.38	10.90	17.31	56.41
Arunachal Pradesh	**5.76**	**17.04**	**13.70**	**63.50**

Note: Postal facilities are calculated on the basis that there is at least one extra-departmental branch post office in the villages, i.e., at least, basic facilities are available where postcards, stamps, etc., are sold, and a letter box is maintained.

Source: Census of India, 1991, District Census Handbook of different districts of Arunachal Pradesh.

Table A 8.15

Percentage of rural population with access to post and telegraph facilities, on the basis of distance covered (1991)

Districts	0 Km	0 - 5 Km	5 - 10 Km	Above 10 Km
Tawang	23.56	36.59	18.69	21.16
West Kameng	35.88	10.49	10.31	43.32
East Kameng	26.22	9.59	10.64	53.55
Papum Pare	22.97	13.30	17.44	46.29
Lower Subansiri	18.10	13.95	11.82	56.13
Upper Subansiri	32.94	7.72	7.43	51.91
West Siang	23.20	18.82	15.32	42.66
East Siang	30.58	23.94	8.84	36.64
Dibang Valley	51.38	20.92	4.34	23.36
Lohit	29.10	30.79	13.15	26.96
Changlang	27.08	33.13	9.05	30.74
Tirap	25.26	15.83	8.27	50.64
Arunachal Pradesh	**27.94**	**20.29**	**10.99**	**40.78**

Note: Postal facilities are calculated on the basis that there is at least one extra-departmental branch post office in the villages, i.e., at least, basic facilities are available where postcards, stamps, etc., are sold and a letter box is maintained.

Source: Census of India, 1991, District Census Handbook of different districts of Arunachal Pradesh.

Table A 8.16

Number of postal institutions and telegraph facilities in Arunachal Pradesh, as on 31-3-2001

Districts	No. of Post Offices	No. of Telegraph Facilities
Tawang	13	1
West Kameng	22	3
East Kameng	14	1
Papum Pare	25	3
Lower Subansiri	23	1
Upper Subansiri	13	1
West Siang	28	2
East Siang	30	2
Upper Siang	10	3
Dibang Valley	22	2
Lohit	45	5
Changlang	28	5
Tirap	30	2
Arunachal Pradesh	**303**	**31**

Source: Statistical Abstract of Arunachal Pradesh, 2001.

Table A 8.17

Development of banking facilities in Arunachal Pradesh (1971-2001)

Year	No. of Banks	Population Served by a Bank	No. of Banks per 100 sq km
1971-72	1	4,67,511	0.001
1981-82	17	37,167	0.02
1991-92	42	20,437	0.05
2000-2001	99	11,021	0.12

Source: Statistical Abstracts of Arunachal Pradesh of different years.

Table A 8.18

Development of educational institutions in Arunachal Pradesh (1961-2001)

Years	No. of Pre-Primary & Primary Schools	No. of Middle Schools	No. of Secondary Schools	No. of Higher Secondary Schools	No. of Colleges
1960-61	169	22	05	-	NA
1970-71	503	47	09	07	01
1980-81	944	119	25	13	02
1990-91	1,371	254	68	46	04
2000-2001	1,360	333	116	68	07

Note: Dash means data not available, and NA means there were no colleges in Arunachal Pradesh.

Source: Statistical Abstracts of Arunachal Pradesh.

Table A 8.19

Strength of students by type of educational institutions, Arunachal Pradesh (2001)

Type of Institutions	No. of Institutions	No. of Students			Sex Ratio	Students	
		Boys	Girls	Total		Per Institution	Per Teacher
Pre-Primary School	57	20,772	16,339	37,111	787	651	229
Primary School	1,303	88,840	73,701	1,62,541	830	125	51
Middle School	333	26,912	24,308	51,220	903	154	19
Secondary School	116	13,181	8,972	22,153	681	191	12
Higher Secondary School	68	6,220	3,629	9,849	583	145	5
College	7	2,803	1,492	4,295	532	614	24
University	1	419	93	512	222	512	8

Source: Calculated from Statistical Abstract of Arunachal Pradesh, 2001.

Table A 8.20

Percentage of villages with educational facilities on the basis of distance covered (1991)

Districts	0 Km	0 - 5 Km	5 - 10 Km	Above 10 Km
Tawang	33.74	60.12	3.68	2.46
West Kameng	32.72	23.53	24.26	19.49
East Kameng	40.73	23.27	13.82	22.18
Papum Pare	22.81	40.69	20.53	15.97
Lower Subansiri	34.12	25.38	18.32	22.18
Upper Subansiri	24.94	26.91	26.91	21.24
West Siang	47.79	39.46	6.38	6.37
East Siang	80.39	11.28	4.90	3.43
Dibang Valley	26.89	25.21	15.97	31.93
Lohit	30.80	22.59	21.77	24.84
Changlang	69.82	15.44	6.32	8.42
Tirap	80.77	7.69	3.85	7.69
Arunachal Pradesh	**40.47**	**26.74**	**15.62**	**17.17**

Note: Educational infrastructure is calculated on the basis that there is at least Pre-Primary/Primary school in the village.

Source: Census of India, 1991, District Census Handbook of different districts of Arunachal Pradesh.

Table A 8.21

Percentage of rural population with access to educational facilities, on the basis of distance covered (1991)

Districts	0 Km	0 - 5 Km	5 - 10 Km	Above 10 Km
Tawang	57.55	34.17	7.45	0.83
West Kameng	59.98	21.37	12.29	6.36
East Kameng	51.87	14.81	10.61	22.71
Papum Pare	47.46	29.74	14.09	8.71
Lower Subansiri	52.18	17.27	15.58	14.97
Upper Subansiri	59.00	16.76	15.16	9.08
West Siang	75.54	21.26	1.34	1.86
East Siang	92.33	4.98	1.38	1.31
Dibang Valley	66.07	14.48	7.00	12.45
Lohit	71.42	11.73	8.00	8.85
Changlang	84.63	11.27	1.29	2.81
Tirap	91.34	5.11	0.64	2.91
Arunachal Pradesh	**71.23**	**14.81**	**6.86**	**7.10**

Note: Educational infrastructure is calculated on the basis that there is at least Pre-Primary/Primary school in the village.

Source: Census of India, 1991, District Census Handbook of districts of Arunachal Pradesh.

Table A 8.22

Development of health facilities of Arunachal Pradesh (1961-2001)

Year	Number of Hospitals/ Dispensaries/ Medical Units/ PHCs, etc.	No. of Doctors	No. of Hospital Beds	Population Served per Doctor	No. of Hospitals/ PHCs, etc., per 10,000 Population	No. of Hospital Beds per 10,000 Population
1960-61	77	73	-	4,610	2.287	-
1970-71	122	152	1,190	3,075	2.609	25.45
1980-81	171	256	1,475	2,468	2.706	23.34
1990-91	278	272	2,260	3,155	3.238	26.33
2000-2001	567	464	2,218	2,351	5.196	20.33

Note: Dash means data not available.

Source: Statistical Abstracts of Arunachal Pradesh of different years.

Table A 8.23

Rural-urban distribution of allopathic medical institutions in Arunachal Pradesh (2001)

No. of Medical Institutions	Rural	Urban	Total
General Hospital	NA	3 (100)	3
District Hospital	2 (15.38)	11 (84.62)	13
Dispensaries	-	18 (100)	18
Community Health Centres (CHCs)	8 (29.63)	19 (70.37)	27
Primary Health Centres (PHCs)	25 (37.31)	42 (62.69)	67
Health Sub-centres	350 (100.00)	-	350
Others	48 (85.71)	8 (14.29)	56

Note: Figures in the parentheses indicate percentage to total.
Dash means data not available, and NA means not applicable, as there are no general hospitals in the rural areas.

Source: Statistical Abstract of Arunachal Pradesh, 2001.

Table A 8.24

Percentage of rural population with access to medical facilities, on the basis of distance covered (1991)

Districts	0 Km	0 - 5 Km	5 - 10 Km	Above 10 Km
Tawang	37.98	15.39	8.88	37.75
West Kameng	53.62	12.77	8.60	25.01
East Kameng	26.85	10.05	12.07	51.03
Papum Pare	28.14	17.37	14.22	40.27
Lower Subansiri	24.81	12.69	16.59	45.91
Upper Subansiri	34.61	9.03	9.04	47.32
West Siang	47.01	18.75	10.80	23.44
East Siang	23.75	22.54	18.10	35.61
Dibang Valley	37.34	22.29	2.92	37.45
Lohit	29.58	18.18	16.55	35.69
Changlang	42.20	21.42	19.16	17.22
Tirap	48.18	8.16	10.68	32.98
Arunachal Pradesh	36.25	16.01	13.44	34.30

Note: Medical facilities indicate that the village has at least a primary health centre.

Source: Census of India, 1991, District Census Handbook of different districts of Arunachal Pradesh.

Table A 8.25

Percentage of villages with medical facilities, on the basis of distance covered (1991)

Districts	0 Km	0 - 5 Km	5 - 10 Km	Above 10 Km
Tawang	12.27	23.31	9.82	54.60
West Kameng	22.43	14.71	18.01	44.85
East Kameng	4.00	8.36	13.09	74.55
Papum Pare	4.94	21.29	12.55	61.22
Lower Subansiri	49.92	5.88	9.24	34.96
Upper Subansiri	3.46	9.38	15.06	72.10
West Siang	21.32	30.39	17.65	30.64
East Siang	10.78	23.04	20.10	46.08
Dibang Valley	6.30	15.97	10.92	66.81
Lohit	7.19	14.58	21.56	56.67
Changlang	22.81	22.81	20.35	34.03
Tirap	28.21	9.61	17.31	44.87
Arunachal Pradesh	18.24	15.73	15.44	50.59

Note: Medical facilities indicate that the village has at least a primary health centre.

Source: Census of India, 1991, District Census Handbooks of different districts of Arunachal Pradesh.

Table A 8.26

Percentage of gross irrigated area to total cropped area (1991)

Districts	Gross Irrigated Area (in hectares)	Total Cropped Area (in hectares)	Percentage
Tawang	457	4,552	10.04
West Kameng	116	5,914	1.96
East Kameng	2,393	10,012	23.90
Papum Pare	1,176	10,904	10.79
Lower Subansiri	3,730	17,048	21.88
Upper Subansiri	345	5,000	6.90
West Siang	6,664	25,379	26.26
East Siang	10,298	26,421	38.98
Dibang Valley	2,820	15,144	18.62
Lohit	3,379	20,639	16.37
Changlang	3,788	13,613	27.83
Tirap	616	11,769	5.23
Arunachal Pradesh	**35,782**	**166,395**	**21.50**

Source: Arunachal Pradesh Agricultural Census (1990-91).

Table A 8.27

Descriptive statistics of variables of infrastructural facilities of villages surveyed (2001-02)

Distance From	Maximum (in Km)	Minimum (in Km)	Mean (in Km)	Standard Deviation (in Km)	Coefficient of Variation
Pucca Road	100	0	7.09	13.3	187.58
Jeepable Road	126	0	3.54	13.2	373.88
Bus Stand	230	0	12.06	22.75	188.62
Post Office	126	0	10.17	15.04	147.86
Telegraph	190	0	22.00	28.01	127.35
Banks	126	0	22.66	28.54	125.93
Daily Market	60	0	11.04	11.73	106.28
Weekly Market	126	0	14.30	17.98	125.7
Primary School	22	0	1.61	3.94	244.78
Middle School	57	0	6.69	10.06	150.44
Secondary School	107	0	15.87	21.77	137.17
Higher Secondary School	126	0	27.05	32.88	121.54
Primary Health Centres	84	0	11.98	13.38	111.67
Sub-centres	47	0	7.52	9.47	125.88

Source: SHDR Survey.

Table A 8.28

Percentage of surveyed households with different types of houses (2001-02)

Districts	*Kutcha*	Semi-*pucca*	*Pucca*
Tawang	8.20	88.60	3.20
West Kameng	9.20	40.80	50.00
East Kameng	81.10	3.70	15.20
Papum Pare	70.30	16.20	13.40
Kurung Kumey	98.20	1.53	0.27
Lower Subansiri	81.70	9.60	8.70
Upper Subansiri	94.60	5.20	0.30
West Siang	62.60	35.70	1.70
East Siang	77.60	9.90	12.50
Upper Siang	79.80	18.90	1.30
Lower Dibang Valley	69.70	16.90	13.50
Dibang Valley (New)	82.80	15.10	2.20
Lohit	80.50	13.70	5.80
Changlang	95.70	3.12	1.18
Tirap	81.70	8.90	9.50
Arunachal Pradesh	**74.29**	**17.59**	**8.12**

Source: SHDR Survey.

Table A 8.29

Indicators of infrastructure development index for districts of Arunachal Pradesh (2001)

Districts	Length of Road per 100 sq km	Surface Roads as % of Total Road Length	% of Villages having Road Connectivity	% of Gross Irrigated Area to Total Cropped Area	Electrified Villages as % of Total Villages	No. of Banks per 10,000 Population
	X1	X2	X3	X4	X5	X6
Tawang	48.25	30.56	25.66	10.04	100.00	1.44
West Kameng	23.23	44.05	46.97	1.96	93.00	1.07
East Kameng	19.83	52.69	26.52	23.90	34.19	0.54
Papum Pare	35.45	58.90	43.02	10.79	77.19	1.40
Lower Subansiri	12.82	38.25	18.30	21.88	94.29	0.82
Upper Subansiri	14.32	41.43	28.18	6.90	32.00	0.73
West Siang	17.51	46.06	45.72	26.26	46.00	1.06
East Siang	30.51	67.04	73.68	38.98	86.36	1.26
Upper Siang	10.07	22.18	56.00	12.09	55.56	1.51
Dibang Valley	6.32	62.83	44.73	18.62	51.00	0.87
Lohit	9.63	65.90	40.70	16.37	45.00	0.63
Changlang	21.99	59.59	59.57	27.83	82.00	0.56
Tirap	54.83	37.23	57.23	5.23	100.00	0.60

Contd. on 300

Contd. from 299

No. of Banks per 100 sq km	Credit Deposit Ratio (%)	No. of Schools per 10,000 Population	No. of Schools per 100 sq km	No. of Health Centres etc., per 10,000 Population	No. of Health Centres etc., per 100 sq km	No. of Medical Technical Personnel per 10,000 Population	No. of Hospital Beds per 10,000 Population
X7	X8	X9	X10	X11	X12	X13	X14
0.23	8.56	26.51	4.23	6.62	1.06	4.60	15.56
0.11	3.47	19.43	1.94	4.83	0.49	4.96	19.17
0.07	11.81	24.88	3.43	5.23	0.73	3.97	24.53
0.59	19.76	10.75	4.56	2.38	1.01	6.59	29.73
0.08	9.45	17.31	1.67	7.99	0.77	3.12	16.6
0.07	31.04	25.09	1.96	7.27	0.57	3.79	20.73
0.14	12.00	24.91	3.38	5.31	0.72	5.89	22.88
0.23	42.25	17.16	3.20	4.69	0.87	10.44	25.28
0.08	16.10	19.30	1.03	6.03	0.32	9.72	23.53
0.04	14.81	6.71	0.51	6.43	0.28	9.28	22.59
0.08	13.81	12.48	1.57	4.11	0.52	3.10	17.77
0.15	19.43	14.24	3.82	3.20	0.86	2.51	10.80
0.25	15.95	16.46	6.99	4.59	1.94	5.15	12.66

Contd. on 301

Contd. from 300

No. of Post & Telegraph Offices per 10,000 Population	No. of Post & Telegraph Offices per 100 sq km	No. of Fair Price Shops & Co-operative Societies per 10,000 Population	No. of Fair Price Shops and Co-operative Societies per 100 sq km	% of Villages to Total Villages Fully Covered by Drinking Water Supply
X15	**X16**	**X17**	**X18**	**X19**
4.32	0.69	2.30	0.36	50.84
5.08	0.39	4.28	0.43	71.34
2.80	0.39	1.05	0.14	87.94
2.79	1.18	4.51	1.91	73.43
2.46	0.24	3.48	0.34	76.57
2.54	0.20	2.00	0.16	90.55
3.11	0.41	3.47	0.47	84.19
3.77	0.70	3.66	0.68	61.96
3.92	0.21	3.02	0.16	82.67
4.17	0.18	2.43	0.11	44.94
3.48	0.44	2.16	0.27	39.35
2.80	0.75	1.04	0.66	45.39
3.19	1.35	1.99	0.84	58.08

Note: *(i) The data for X2 refers to the year 1995-96.*
(ii) The data for X3 refers to the year 1996-97.
(iii) The data for X4 refers to the year 1990-91.

Source: *1. Statistical Abstract of Arunachal Pradesh, 2001.*
2. Arunachal Pradesh Agricultural Census, 1990-91.
3. Unpublished Data, Directorate of Economics and Statistics, Government of Arunachal Pradesh, Itanagar.
4. Unpublished Data, Office of Rural Works Department, Government of Arunachal Pradesh, Itanagar.
5. Resource Atlas of Arunachal Pradesh, Government of Arunachal Pradesh, Itanagar.

References

Bardhan, P.K. 1973. "On the Incidence of Poverty in Rural India", *Economic and Political Weekly.* Annual Number

Baster, N. [ed). 1972. *Measuring Development, the Role and Adequacy of Indicators*. London: Frank Class & Co. Ltd.

Becker, G.S. 1993. *Human Capital.* Chicago: The University of Chicago Press

Biswas, N.B. 1996. "Development of Education in Arunachal Pradesh: A critical study", *Arunachal University Research Journal*, Vol. I

Boserup, E. 1970. *Women's Role in Economic Development.* New York: St Martin Press.

Chattopadhyay, B and Moonis Raza. 1975. '*Regional Development, Analytical Framework and Indicators*', *Indian Journal of Regional Scienc*e, VII (1)

Chowdhury, JN, 1966, *Arunachal Panaroma*, Directorate of Research, Itanagar

Dandekar, V. M. and N. Rath. 1971. "Poverty in India", *Economic and Political Weekly*, VI (1 & 2)

Das Gurudas. 1994. "The Strategy of Development Planning in Arunachal Pradesh since independence", *Resarun*, XX (1 & 2)

Das Gurudas. 1995. Tribes *of Arunachal Pradesh in Transition,* New Delhi: Vikas Publishing House

Dasgupta, B. 1971. "Socio-economic Classification of Districts - A Statistical Approach" *Economic and Political Weekly,* August 14

Directorate of School Education. (Undated). *Sixth All India Educational Survey*, *State Report, Arunachal Pradesh*

Dreze Jean and Amartya Sen. 1995. *India: Economic Development and Social Opportunity.* New Delhi: Oxford University Press

Durand, A. 1975. *The Labour Force in Economic Development: A Comparison of International Census Data, 1946-1966.* Princeton: Princeton University Press

Elwin, V. 1957. *A Philosophy for NEFA*. Directorate of Research, Government of Arunachal Pradesh, Itanagar, (1999 Reprint)

Elwin,V. 1988. (First published in 1957) *The Art of North East Frontier of India,* Directorate of Research, Government of Arunachal Pradesh, Itanagar

Foster, A. D. and M. R. Rosenweig. 1995. "Learning by doing and hearing from others: Human Capital and technology in agriculture". *Journal of Political Economy*, Vol.103, No.6

Fleming, Robert L, Jr. 1995. "Great River ecosystems of Asia Trust: A summary of biodiversity," Unpublished Report for Future Generations, Franklin, WV

Furer-Haimendorf, Christoph von. 1962. The Apatani and their neighbours

Furer-Haimendorf, Christoph von. 1982. *Highlanders of Arunachal Pradesh:* Anthropological Research in North-east India, London, Garlandfold, Ltd

Government of Arunachal Pradesh, Annual Reports on the Activities of Family Welfare and Reproductive and Child Health Programme (1997-98-2001), Directorate of Health Services (Family Welfare), Naharlagun, Itanagar

__ *(Undated) "Arunachal Pradesh: The Changing Scenario"* Information and Public Relation Department, Govt. of Arunachal Pradesh

__ 1997. *Arunachal State Plan of Action for Children,* Department of Social Welfare, Government of Arunachal Pradesh, Itanagar

__ 1981, 1994, and 1999. *Economic Review of Arunachal Pradesh*, Directorate of Economics and Statistics, Itanagar

__ *2000-2001*. *Economic Scenario of Arunachal Pradesh,* Directorate of Economics and Statistics, Itanagar

__ *Statistical Abstract of Arunachal Pradesh,* Directorate of Economics and Statistics, Itanagar, Different Issues

__ 2004-05. *Sarva Shiksha Abhiyan: Annual work plan*, Arunachal Pradesh, Directorate of School Education, Itanagar

Government of Karnataka. 1999. *Human Development in Karnataka*, Bangalore

Government of Madhya Pradesh. 1998. *Madhya Pradesh Human Development Report*, Bhopal

Government of Maharashtra. 2002. *Human Development Report, Maharashtra,* Mumbai

Government of Rajasthan. 2002. *Rajasthan Human Development Report*, Jaipur

Government of Sikkim. *2001. Sikkim Human Development Report.* Social Science Press, New Delhi

Govinda R. 2002. *India Education Report: A Profile of Basic Education*, National Institute of Educational Planning and Administration, New Delhi: Oxford University Press

Griffiths, P., Z. Matthews and A. Hinde, 2002. "Gender, Family, and the nutritional status of children in three culturally contrasting states of India," *Social Science & Medicine* 55

Haddad, L., H. Alderman, S. Appleton, L. Song, Y. Yohannes, 2003: "Reducing Child Undernutrition: How far does Income Growth Take Us?," *World Bank Economic Review*, 17 (1)

Haq, Mahbub ul and Khadija Haq. 1985. *Human Development in South Asia*, Karachi: Oxford University Press

Hirway, I. and D. Mahadevia. 1996. 'Critique of Gender Development Index: Towards an Alternative,' *Economic and Political Weekly,* 31 (43)

IIM Ahmedabad, IIT Kanpur, and IDFC. *2003. India Infrastructure Report,* New Delhi: Oxford University Press

International Institute for Population Sciences. 2002. *National Family Health Survey (NFHS-2), India: 1998-99, North Eastern States*, IIPS, Mumbai

Iyengar, N.S. and P. Sudershan. 1982. 'A. Method of Classifying Regions from Multi-variate Data,' *Economic and Political Weekly*, December, 18

Joshi, B.M. 1990. *Infrastructure and Economic Development in India*, New Delhi: Ashish Publishing House

Kirit S. Parrikh, et al. 1997. *India Development Report*, New Delhi: Oxford University Press

King, E.M. and M.A. Hill (ed). 1999. *Women's Education in Developing Countries: Barriers, Benefits and Policies*, Baltimore: The Johns Hopkins University Press for the World Bank

Ramakrishna, P.S.1992. S*hifting Agriculture and Sustainable Development: An inter-disciplinary study from North Eastern India*, Wiley Eastern

Ramakrishna, P.S. 2002. *Land Use Dynamics and Sustainable Development in Arunachal Pradesh: Environmental Planning and Sustainable Development,* Himvikas, Occasional Publication

Rechlin.A and Varuni Ritu, *A Passion for pine - Forest Conservation practices of the Apatani people of Arunachal Pradesh*, Unpublished

Singh, KS edited, *People of India, Arunachal Pradesh*, Vol XIV

Sumi Krishna.1997. *Gender Dimensions in biodiversity management: India*; Case Study submitted to FAO, Regional Office for Asia and Pacific, Bangkok

Kundu, A. 1980. *Measurement of Urban Process: A Study in Regionalisation.* Bombay: Popular Prakashan

Kuznets, S. 1955. "Economic Growth and Income Inequality" *American Economic Review.* Vol.45

__ 1996. *Modern Economic Growth: Rate, Structure and Spread*. New Haven: Yale University Press

Kynch, J. and A.K. Sen. 1983. 'Indian Women: Well-being and Survival', *Cambridge Journal of Economics,* 83 (7)

Lucas, R.E. 1990. "Why doesn't Capital flow from rich to poor countries" *American Economic Review*, Vol.80, No.2

Luthra, P.N. 1993. *Constitutional and Administrative Growth of the Arunachal Pradesh*. Itanagar: Directorate of Research, Government of Arunachal Pradesh

Maine, Henry Summer, 1906. *Ancient Law, Its Connection with Early History of Society and its Relation of Modern Ideas*. London: John Murray (with an introduction and notes by Frederick Pollock), First published 1861

Mason, John, Joseph Hunt, David Parker, and Urban Jonsson. 2001. *Improving Child Nutrition in Asia:* ADB Nutrition and Development Series No.3, ADB Manila, and UNICEF, New York (Copenhagen Consensus 2004)

McDougall, Lori. 2000. 'Gender Gap in Literacy in Uttar Pradesh: Questions for Decentralised Educational Planning', *Economic and Political Weekly*, 35 (19)

Ministry of Food and Civil Supplies, Government of India. 1992. *Important Information on Food*, New Delhi: Department of Nutrition, Ministry of Food & Civil Supplies

Ministry of Human Resource Development, Government of India. 1998. *India Nutrition Profile*, Department of Women and Child Development, Government of India, New Delhi

Ministry of Rural Development, Government of India. 1993. *Report of the Expert Group on Estimation of Proportion and Number of Poor*

Mitra, A. 1997. *Internal Migration and Economic Development (NCAER) in the Hills*. New Delhi: Omsons Publications

__ 1999. "Regional Disparities in Arunachal Pradesh – An Inter-district Empirical Study of Arunachal Pradesh", *NEICSSR Journal,* Vol-24, No.1, April *1999*

Morris, Morris D. 1974. *Measuring the Conditions of the World's Poor: The Physical Quality of Life Index*. New York: Pergamon

National Council of Applied Economic Research (NCAER), 1967 *Techno-Economic Survey of NEFA,* New Delhi

__ *2001. South India Human Development Report,* New Delhi: Oxford University Press

2002. *West and Central India Human Development Report*, Oxford University Press

National Sample Survey Organization, 1997. 50th Round: Differences in Level of Consumption among Socio-Economic Groups

__ 2001. 55th Round Consumption of some important Commodities in India

__ 2001. 55th Round, Differences in Level of Consumption among Socio-Economic Groups

North Eastern Development Finance Corporation. 2002. *Data Bank Quarterly,* October 2002

Nussbaum, Martha. 2000. *Women and Human Development: The Capabilities Approach*, New Delhi: Kali for Women

Omran, A. R. 1971. "The Epidemiologic Transition; A theory of epidemiology of population change". *Milbank Memorial Fund Quarterly*

Osmani, S.R. (ed). 2000. *Nutrition and Poverty*, New Delhi: Oxford University Press

Pal, M.N. 1975. 'Regional Disparities in the Levels of Development of India' *Indian Journal of Regional Science*, Vol-II No.1

Pathak, C. R., and A. Kundu. 1973. *'Critique of the Techniques for Measuring the Levels of Development'* An abstract presented to the Symposium in the Regional Disparities in India. New Delhi, 1973

Pathak, K. B. and F. Ram. 1992. *Techniques of Demographic Analysis*, Delhi: Himalaya Publishing House

Patkar, A. 1995. 'Socio-Economic Status and Female Literacy in India', *Educational Development*

Planning Commission, Government of India. 2002. *National Human Development Report, 2001*, New Delhi

Prabhu, Seeta K., P.C. Sarker and A. Radha. 1996. 'Gender-related Development Index for Indian States: Methodological Issues', *Economic and Economic Weekly*

Radhakrishana, R., K. Hanumantha Rao, C. Ravi and B. Sambi Reddi. 2004. 'Chronic Poverty and Malnutrition in 1990s', *Economic and Political Weekly*: Volume XXXIX No 28

Rajan, S. Irudaya and P. Mohanachandran. 1998. 'Infant and Child Mortality Estimates, Part-I'. *Economic and Political Weekly,* 33 (19)

Raju, Saraswati and D. Bagchi (eds). 1993. *Women and Work in South Asia: Regional Patterns and Perspectives*. London and New York: Routledge

Ramachandran, V.K., Vikas Rawal and Madhura Swaminathan. 1997. "Investment Gaps in Primary education: A State-wise study" *Economic and Political Weekly,* 32 (1 & 2)

Registrar General, India. 1998. Vital Statistics of India 1991, Based on the Civil Registration System

. 2002. Sample Registration System Bulletin. 36(2)

Robinson, W.C. 1986. High Fertility as Risk-Insurance. *Population Studies*

Romer, P. 1986. "Increasing Returns and Long Run growth" *Journal of Political Economy*, 1994

Romer, P. 1990. "Endogenous Technological Change," *Journal of Political Economy*, 1994

Roy, N. C. and P. K. Kuri. 2002. *Land Reform in Arunachal Pradesh*. New Delhi: Classical Publishing House

Rustagi, Preet. 2000. 'Identifying Gender Backward Districts Using Selected Indicators,' *Economic and Political Weekly,* 35 (48)

Salomon, J. A. and C.J.L. Murray. 2002. "The Epidemiologic Transition Revisited: Compositional Models of Death by Age and Sex". *Population and Development Review*

Schultz, T. P. 1988. "Education, Investment and Returns" in H. B. Chenery and T. N. Srinivasan (eds.), *Handbook of Development Economics*, Vol.1 and 2, Amsterdam: North Holland

Schultz, T.W. 1961. Investment in Human Capital, *American Economic Review*

Singh, Surendra. 1997. *A Resource Atlas of Arunachal Pradesh,* Government of Arunachal Pradesh, Itanagar

Svedberg, Peter. 2002. *Poverty and Undernutrition; Theory, Measurement and Policy*, New Delhi: Oxford University Press

Swaminathan, Madhura and Vikas Rawal. 1990. "Primary Education for All" in K.S. Parikh (eds.), *India Development Report.* New Delhi: Oxford University Press

Solow, Robert M. 1957. *Technical Change and the Aggregate Production Function The Review of Economics and Statistics, Vol. 39*

Talukdar, A. C. 1997. "Land Tenures and Land Use Pattern in Arunachal Pradesh: A Review," in M. C. Behera and N. C. Roy, (edited), *Trends in Agrarian Structure in the Hills of North-East India*, New Delhi: Commonwealth Publishers

Tilak, J.B.G. 1995. "Cost and Financing of Education in India," *Studies in Human Development in India*, Discussion paper, No.5

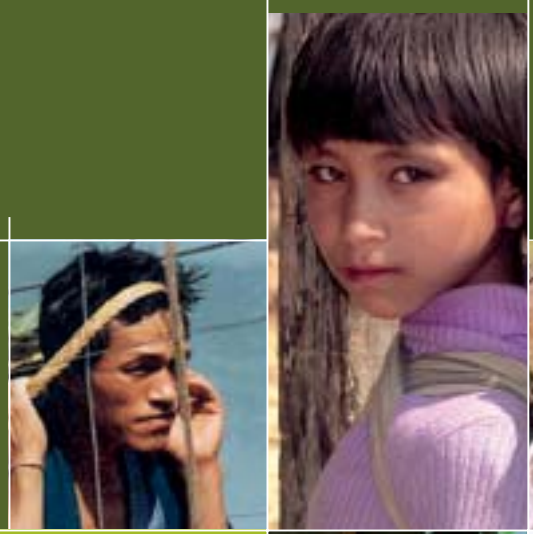
Taylor Elizabeth M. 2002. A Review of the Sustainable Basis of Development in Arunachal Pradesh, Future Generations

United Nations Development Programme. 1990-2003. *Human Development Reports,* Oxford University Press

— *2000. Poverty Report, Overcoming Human Poverty,* New York

Upadhyay, Vandana and Deepak. K Mishra. 2004. 'Micro enterprises in Hill Economies: The Case of Arunachal Pradesh,' *The Indian Journal of Labour Economics*, *Vol* 47, No 4

World Bank. 2000. *India*: *Reducing Poverty, Accelerating Development*, New Delhi: Oxford University Press



Arunachal Pradesh (Land of Dawn) is the largest State in North-East India. Home to 26 major tribes and 110 sub-tribes and minor tribes, Arunachal harbours a rich diversity of cultures. It is also one of the last reserves of exceptional biodiversity, which has been preserved for centuries by its indigenous communities, aided by its remoteness and relative isolation.

With its abundant forests and rivers, the State has considerable potential for hydroelectricity, horticulture and floriculture, plantation agriculture, organic farming and food processing, medicinal plants and ecotourism. The challenge is to use appropriate technologies and processes that are environmentally sound and in keeping with the aspirations of the people; to create a truly sustainable development model.

The Arunachal Pradesh Human Development Report 2005 evaluates the progress made by the State in recent years and helps to recognise its unique characteristics and special requirements.