

# India's Undernourished Children: A Call for Reform and Action

Michele Gragnolati, Meera Shekar, Monica Das Gupta,  
Caryn Bredenkamp and Yi-Kyoung Lee

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## Health, Nutrition and Population (HNP) Discussion Paper

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## India's Undernourished Children: A Call for Reform and Action

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Funding from the Netherlands Ministry of Foreign Affairs, through the Bank-Netherlands Partnership Program, is gratefully acknowledged

**Abstract:** The prevalence of child undernutrition in India is among the highest in the world, nearly double that of Sub-Saharan Africa, with dire consequences for morbidity, mortality, productivity and economic growth.

Drawing on qualitative studies and quantitative evidence from large household surveys, this paper (i) explores the dimensions of child undernutrition in India, and (ii) examines the effectiveness of the Integrated Child Development Services (ICDS) program in addressing it.

We find that although levels of undernutrition in India declined modestly during the 1990s, the reductions lagged far behind that achieved by other countries with similar economic growth rates. Nutritional inequalities across different states, socioeconomic and demographic groups are large – and, in general, are increasing.

We also find that the ICDS program appears to be well-designed and well-placed to address the multidimensional causes of malnutrition in India. However, there are several mismatches between the program's design and its actual implementation that prevent it from reaching its potential. These include an increasing emphasis on the provision of supplementary feeding and preschool education to children aged four to six years, at the expense of other program components that are crucial for combating persistent undernutrition; a failure to effectively reach children under three — the age window during which nutrition interventions can have the most effect; and, ineffective targeting of vulnerable children such as poorer households and lower castes. Moreover, the poorest

states and those with the highest levels of undernutrition still have the lowest levels of program funding and coverage. In addition, ICDS faces substantial operational challenges and suffers from a lack of high-level commitment.

The paper concludes with a discussion of a number of concrete actions that can be taken to bridge the gap between the policy intentions of ICDS and its actual implementation.

**Keywords:** India, ICDS, nutrition, malnutrition, anganwadi

**Disclaimer:** The findings, interpretations and conclusions expressed in the paper are entirely those of the authors, and do not represent the views of the World Bank, its Executive Directors, or the countries they represent.

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## TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND ACRONYMS .....	XI
ACKNOWLEDGMENTS .....	XII
EXECUTIVE SUMMARY .....	XIV

### CHAPTER 1 WHAT ARE THE DIMENSIONS OF THE UNDERNUTRITION PROBLEM IN INDIA? ..... 1

1.1 WHY INVEST IN COMBATTING UNDERNUTRITION? .....	5
1.1.1 <i>The effect of undernutrition on morbidity, mortality, cognitive and motor development</i> .....	5
1.1.2 <i>The effect of undernutrition on schooling, adult productivity and economic growth</i> .....	7
1.2 UNDERWEIGHT .....	9
1.2.1 <i>An international perspective</i> .....	9
1.2.2 <i>National patterns and trends</i> .....	11
1.2.3 <i>Inter-state variation and within-state variation in the prevalence of underweight</i> .....	14
1.3 MICRONUTRIENT DEFICIENCIES .....	20
1.3.1 <i>Prevalence of iron deficiency anemia (IDA)</i> .....	20
1.3.2 <i>Prevalence of Vitamin A deficiency (VAD)</i> .....	22
1.3.3 <i>Prevalence of iodine deficiency disorders (IDD)</i> .....	24
1.4 WILL INDIA MEET THE NUTRITION MDG? .....	25
1.4.1 <i>MDG projections: the effect of economic growth alone</i> .....	26
1.4.2 <i>MDG projections: the effect of economic growth plus an expanded set of interventions</i> .....	27
1.5 CONCLUSIONS .....	28

### CHAPTER 2 THE INTEGRATED CHILD DEVELOPMENT SERVICES PROGRAM (ICDS) – ARE RESULTS MEETING EXPECTATIONS? ..... 30

2.1 HOW ICDS AIMS TO ADDRESS THE CAUSES OF PERSISTENT UNDERNUTRITION .....	31
2.1.1 <i>A conceptual framework of the causes of undernutrition</i> .....	31
2.1.2 <i>The design of the ICDS program and the underlying causes of child undernutrition</i> .....	35
2.1.3 <i>ICDS and the World Bank</i> .....	36
2.2 EMPIRICAL FINDINGS ON THE IMPACT OF ICDS .....	37
2.3 GEOGRAPHICAL TARGETING: THE PLACEMENT OF ICDS PROGRAMS ACROSS STATES AND VILLAGES .....	39

2.3.1	<i>The relationship between state income and ICDS coverage</i> .....	39
2.3.2	<i>The relationship between state malnutrition prevalence and ICDS coverage</i> .....	40
2.4	<b>INDIVIDUAL TARGETING: CHARACTERISTICS OF BENEFICIARIES</b> .....	43
2.4.1	<i>By age</i> .....	44
2.4.2	<i>By gender</i> .....	44
2.4.3	<i>By caste</i> .....	45
2.4.4	<i>By household wealth</i> .....	45
2.4.5	<i>By urban-rural location</i> .....	46
2.5	<b>CHARACTERISTICS AND QUALITY OF ICDS SERVICE DELIVERY</b> .....	47
2.5.1	<i>Growth promotion</i> .....	47
2.5.2	<i>Targeting and take-up of the supplementary nutrition component</i> .....	48
2.5.3	<i>Providing a safe and hygienic environment for ICDS service delivery</i> .....	50
2.5.4	<i>Anganwadi worker training, workload and status</i> .....	51
2.5.5	<i>Collaboration between ICDS and the Reproductive and Child Health Program</i> .....	52
2.6	<b>MONITORING AND EVALUATION</b> .....	55
2.6.1	<i>Low prioritization of monitoring and evaluation activities</i> .....	56
2.6.2	<i>Personnel capacity in monitoring and evaluation</i> .....	56
2.6.3	<i>Inadequate use of information systems and qualitative data</i> .....	57
2.7	<b>SUCCESSFUL INNOVATIONS IN ICDS</b> .....	57
2.7.1	<i>Gains from ICDS-RCH convergence and community change agents: lessons from INHP II</i> .....	58
2.7.2	<i>Gains from community-based interventions: the Dular strategy</i> .....	59
2.7.3	<i>Gains from community participation: Mothers' Committees in Andhra Pradesh</i> .....	60
2.7.4	<i>The Tamil Nadu Integrated Nutrition Program (TINP)</i> .....	61
 <b>CHAPTER 3 – HOW TO ENHANCE THE IMPACT OF ICDS?</b> .....		<b>63</b>
3.1	<b>STRENGTHS AND WEAKNESSES OF ICDS</b> .....	64
3.2	<b>ELEMENTS OF SUCCESS IN PUBLIC HEALTH: HOW CAN ICDS REACH ITS FULL POTENTIAL?</b> .....	66
3.2.1	<i>Predictable, adequate funding – further expansion or consolidation of impact?</i> .....	66
3.2.2	<i>Political leadership and commitment – do malnutrition in India and ICDS really matter to the key decision-makers?</i> .....	67
3.2.3	<i>Technical consensus about the right approach – can the mismatches in ICDS be fixed?</i> .....	67
3.2.4	<i>Good management on the ground – can service delivery be improved?</i> .....	70
3.2.5	<i>Effective use of information – can information be used for action?</i> .....	71
3.2.6	<i>Community participation and decentralization – can they introduce flexibility, attract more resources and create accountability?</i> .....	72
3.3	<b>NEXT STEPS: RATIONALIZE DESIGN AND IMPROVE IMPLEMENTATION</b> .....	74



<b>ENDNOTES.....</b>	<b>76</b>
<b>BIBLIOGRAPHY.....</b>	<b>79</b>
<b>APPENDIX: ADDITIONAL FIGURES AND TABLES .....</b>	<b>89</b>

## LIST OF FIGURES

Figure 1 Weight-for-age distribution: children under three in India compared to the global reference population .....	2
Figure 2 A modest reduction in the prevalence of undernutrition during the 1990s .....	3
Figure 3 Trends in the prevalence of underweight and stunting among children under five in rural India .....	4
Figure 4 Underweight: comparing India to other countries with similar levels of economic development .....	10
Figure 5 How the probability of underweight increases for girls in increasingly vulnerable positions .....	12
Figure 6 By the age of two, most of the damage has been done .....	13
Figure 7 Demographic and socioeconomic variation in the prevalence of underweight, among children under 3, 1992/93 – 1998/99 .....	14
Figure 8 Cumulative distribution of all underweight children under three across villages and districts in India, 1998/99 .....	15
Figure 9 Urban-rural disparities in underweight, by state, 1992/93-1998/99 .....	17
Figure 10 Change in the prevalence of underweight, by wealth tertile and state, 1992/93-1998/99 .....	19
Figure 11 Trends in prevalence of iron deficiency in preschool children, by region, 1990-2000 .....	21
Figure 12 Prevalence of anemia among children aged 6-35 months and women of reproductive age, by demographic and socioeconomic characteristics, 1998/99 .....	22
Figure 13 Trends in prevalence of subclinical vitamin A deficiency among children under 6, by region, 1990-2000 .....	23
Figure 14 Proportion of children (per 1000) experiencing day and night-time vision difficulties .....	24
Figure 15 Prevalence and number of IDD in the general population, by region and country .....	25
Figure 16 Predicted prevalence of underweight in 2015, under different economic growth scenarios .....	27
Figure 17 Projected percentage of children under three who are underweight in poor states, under different intervention scenarios, 1998 to 2015 .....	28
Figure 18 Conceptual framework: the causes of undernutrition .....	31
Figure 19 How infection compromises growth: the association between repeated episodes of infection and weight gain of a child during the first three years of life .....	33
Figure 20 Inter-state variation in the percentage of children enrolled in the SNP component, 2002 .....	39
Figure 21 Relationship between <i>per capita</i> net state domestic product (NSDP) and ICDS coverage .....	40
Figure 22 Relationship between the proportion of villages covered by ICDS and underweight prevalence, by state, 1998/99 .....	41
Figure 23 Inverse relationship between the percentage of underweight children and the percentage of children who are ICDS beneficiaries, by state .....	42

Figure 24 Relationship between state underweight prevalence and GOI and state public expenditure allocations, 1998/99 .....	43
Figure 25 Percentage of children (of those living in villages with AWCs) who attend the AWC at least once a month, by age.....	44
Figure 26 Percentage of children (of those living in villages with AWCs) who attend the AWC at least once a month, by caste .....	45
Figure 27 Percentage children (of those living in villages with AWCs) who attend the AWC at least once a month, by asset quintile .....	46
Figure 28 Percentage of children (of those living in villages with AWCs) who attend the AWC at least once a month, by location .....	47
Figure 29 Percentage of AWWs with growth-monitoring equipment in place .....	48

## LIST OF TABLES

Table 1 Prevalence of micronutrient deficiencies in South Asia.....	5
Table 2 Productivity losses due to malnutrition in India.....	9
Table 3 Underweight, stunting and wasting, by global region, 2000.....	9
Table 4 Disparities in underweight, by location, wealth quintile, gender and caste, 1992/93-1998/99.....	11
Table 5 Matrix classifying states according to prevalence and change in prevalence of underweight.....	16
Table 6 Classification of states by the change in gender differentials in the prevalence of underweight.....	18
Table 7 Wealth disparities in the trend of underweight prevalence, by state, 1992/93- 1998/99.....	19
Table 8 Under all likely economic growth scenarios, India will not reach the nutrition MDG without direct nutrition interventions.....	27
Table 9 Range of services that the ICDS seeks to provide to children and women.....	36
Table 10 Comparison of intermediate health outcomes and behaviors across children living in villages with and without an AWC.....	38
Table 11 Regularity of food supply to AWCs and the availability of the take-home food program.....	49
Table 12 <i>Anganwadi</i> center infrastructure, by location.....	51
Table 14 Summary of strengths and weaknesses of ICDS.....	64

## LIST OF ABBREVIATIONS AND ACRONYMS

ANC	Antenatal care
ANM	Auxiliary nurse-midwife
AWC	Anganwadi center
AWH	Anganwadi helper
AWW	Anganwadi worker
BMI	Body mass index
CDPO	Child Development Project Officer
DALY	Disability-adjusted life year
DHFW	Department of Health and Family Welfare
DHS	Demographic and Health Survey
DWCD	Department of Women and Child Development
GDP	Gross domestic product
HAZ	Height-for-age z-scores
ICDS	Integrated Child Development Services
ICN	International Conference on Nutrition
IDA	Iron deficiency anemia
IDD	Iodine deficiency disorder
IFA	Iron and folic acid
IMR	Infant mortality rate
LAC	Latin America and the Caribbean
LHW	Lady health-worker
M&E	Monitoring and evaluation
MDG	Millennium Development Goal
MoHFW	Ministry of Health and Family Welfare
MPR	Monthly Progress Report
NFHS	National Family Health Survey
NID	National Immunization Day
PEM	Protein energy malnutrition
PPP	Purchasing power parity
PRIs	Panchayat raj institutions
RCH	Reproductive and child health program
SAR	South Asia Region
SNP	Supplementary nutrition program
TB	Tuberculosis
VAD	Vitamin A deficiency
VPD	Vaccine preventable disease
WAZ	Weight-for-age z-scores
WCD	Women and Child Development
WHZ	Weight-for-height z-scores

## ACKNOWLEDGMENTS

This report is authored by Michele Gragnolati (task team leader), Meera Shekar, Monica Das Gupta, Caryn Bredenkamp and Yi-Kyoung Lee.

It was supported by generous funding from the Netherlands Ministry of Foreign Affairs, through the Bank-Netherlands Partnership Program.

A number of background papers were prepared in advance of this report. These include:

- “Who does India’s ICDS nutrition program reach, and what effect does it have?” by Monica Das Gupta, Michael Lokshin and Oleksiy Ivaschenko (DECRCG, World Bank)
- “Noon meal program” by P. Subramaniam
- “Analysis of public expenditures and impact of public distribution system (PDS) on food security” by S. Mahendra Dev
- “India’s ICDS program – meeting the health and nutritional needs of vulnerable children, adolescent girls and women?” by Caryn Bredenkamp and John S. Akin
- “Literature review of MDM, ICDS and PDS (1992-2003), including annotated bibliography” by New Concept Information Systems, India
- “Analysis of positive deviance in the ICDS program in Rajasthan and Uttar Pradesh” by Educational Resource Unit, India
- “Monitoring and Evaluation in India’s ICDS programme” by Saroj Kr. Adhikari, Department of Women and Child Development, Government of India
- “Reviewing the costs of malnutrition in India” by Laveesh Bhandari and Lehar Zaidi, Indicus Analytics, India
- “Will Asia meet the nutrition Millennium Development Goal? And even if it does, will it be enough?” by Meera Shekar (HDNHE, World Bank), Mercedes de Onis, Monika Blössner and Elaine Borghi (Department of Nutrition for Health and Development, World Health Organization).

Peer reviewers were Prof. Abhijit Sen of the Planning Commission, Government of India, Ruth Levine of the Center for Global Development and Harold Alderman of the Development Economics Research Group, World Bank.

The final report was strengthened by valuable comments from the Department of Women and Child Development (DWCD), Government of India.

A number of technical experts provided inputs at various stages of the report’s development:

Peer reviewers involved in the conceptualization of the project were Ruth Levine (Center for Global Development), John S. Akin (University of North Carolina – Chapel Hill), Harold Alderman, Meera Shekar and Jishnu Das (World Bank);

Additional analysis of the various data on which this report depends was performed by Peter Heywood, Himani Pruthi, Jayshree Balachander, Venkatachalam Selvaraju and Julie Babinard (World Bank and consultants to the World Bank);

Information on some of the case studies included in this report was generously shared by Deepika Chaudhery, T. Usha Kiran and others at CARE-India;

Overall project guidance and specific comments were provided by Anabela Abreu, Peter Berman, Charlie Griffin, Meera Priyadarshi and Julian Schweitzer.

Additional inputs and comments were received from Paoli Belli, Alan Berg, Barbara Kafka (World Bank), Werner Schultnik (UNICEF, India) and Arun Gupta.

The Government of India and respective State Governments provided data from a baseline survey of the ICDS III program and an endline survey of the ICDS II program. These data were collected by research teams at six research organizations, namely Agricultural Finance Corporation (AFCIndia), Indian Institute of Development Management (IIDM), Indian Institute of Health Management Research (IIHMR), ORG Centre for Social Research, Rajagiri College of Sciences (RCSS) and Xavier Institute of Social Sciences (XISS).

Program support and administrative assistance were provided by Nira Singh and Elfreda Vincent, and editorial and publishing assistance by Rama Lakshminarayanan, Miyuki Parris and Jennifer Vito.

## EXECUTIVE SUMMARY

The global community has designated halving the prevalence of underweight children by 2015 as a key indicator of progress towards the Millennium Development Goal (MDG) of eradicating extreme poverty and hunger. Economic growth alone, though impressive, will not reduce malnutrition sufficiently to meet the nutrition target. If this is to be achieved, difficult choices about how to scale up and reform existing nutrition programs or introduce new ones have to be made by the Government of India and other agencies involved in nutrition in India.

Several factors are converging to make a review of the Integrated Child Development Services (ICDS) program timely. These include the launch of the Government of India's National Health Mission and a National Nutrition Mission in fiscal year 2005-2006; the decision to target improving nutrition outcomes as part of the MDGs; the findings of the Copenhagen Consensus project which identified several nutrition interventions as some of the most high-yielding of all possible development investments; and the Government of India's pledge, in its February 2005 Budget speech, to expedite the expansion of the ICDS program.

The World Bank has supported efforts to improve nutrition in India since 1980 with mixed results. This report aims at helping those who have to make difficult policy decisions, by providing information on the characteristics of child malnutrition across regions and over time and on the effectiveness of the ICDS program in addressing the causes and symptoms of undernutrition. The most important mismatches between what an effective, efficient and equitable program should do to reduce child undernutrition and what is currently being done are identified and possible options to resolve them are presented.

Approximately 60 million children are underweight in India. Given its impact on health, education and productivity, persistent undernutrition is a major obstacle to human development and economic growth in the country, especially among the poor and the vulnerable, where the prevalence of malnutrition is highest. The progress in reducing the proportion of undernourished children in India over the past decade has been modest and slower than what has been achieved in other countries with comparable socioeconomic indicators. While aggregate levels of undernutrition are shockingly high, the picture is further exacerbated by the significant inequalities across states and socioeconomic groups – girls, rural areas, the poorest and scheduled tribes and castes are the worst affected – and these inequalities appear to be increasing.

In India, child malnutrition is mostly the result of high levels of exposure to infection and inappropriate infant and young child feeding and caring practices, and has its origins almost entirely during the first two to three years of life. However, the commonly-held assumption is that food insecurity is the primary or even sole cause of malnutrition. Consequently, the existing response to malnutrition in India has been skewed towards food-based interventions and has placed little emphasis on schemes addressing the other determinants of malnutrition.



India's main early child development intervention, the Integrated Child Development Services program, has been sustained for about 30 years and has been successful in many ways. However, it has not yet succeeded in making a significant dent in child malnutrition. This is mostly due to the priority that the program has placed on food supplementation rather than on nutrition and health education interventions, and because of the fact that the program targets children mostly after the age of three when malnutrition has already set in. Interventions to address good caring behaviors, which have been proven to be cost-effective in many places, including India, require substantial development of the skills of grass-roots workers and an efficient management system. Although there has been progress towards providing training and skill development, much of the emphasis has been on universalizing the program rather than on strengthening the quality of its implementation and monitoring in a way that increases its impact. Transforming ICDS into an intervention that effectively combats undernutrition will yield huge benefits for India, both in terms of human development and economic returns, but will require substantial changes in the program's design and implementation. In particular, public investments in ICDS should be redirected towards the younger children (0-3 years) and the most vulnerable population segments in those states and districts where the prevalence of undernutrition is higher. The focus should be on those ICDS components that directly address the most important causes of undernutrition in India, specifically improving mothers' feeding and caring behavior, improving household water and sanitation, strengthening the referral to the health system and providing micronutrients.

The report consists of three chapters. A short summary of each is presented below.

## **CHAPTER 1**

**The consequences of child undernutrition for morbidity and mortality are enormous – and there is, in addition, an appreciable impact of undernutrition on productivity so that a failure to invest in combating nutrition reduces potential economic growth. In India, with one of the highest percentages of undernourished children in the world, the situation is dire. Moreover, inequalities in undernutrition between demographic, socioeconomic and geographic groups increased during the 1990s. More, and better, investments are needed if India is to reach the nutrition MDGs. Economic growth will not be enough.**

Undernutrition, both protein-energy malnutrition and micronutrient deficiencies, directly affects many aspects of children's development. In particular, it retards their physical and cognitive growth and increases susceptibility to infection and disease, further increasing the probability of being malnourished. As a result, malnutrition has been estimated to be associated with about half of all child deaths and more than half of child deaths from major diseases, such as malaria (57 percent), diarrhea (61 percent) and pneumonia (52 percent), as well as 45 percent of deaths from measles (45 percent). In India, child malnutrition is responsible for 22 percent of the country's burden of disease. Undernutrition also affects cognitive and motor development and undermines educational attainment; and, ultimately impacts on productivity at work and at home, with adverse implications for income and economic growth. Micronutrient deficiencies alone may cost India US\$2.5 billion annually.

The prevalence of underweight among children in India is amongst the highest in the world, and nearly double that of Sub-Saharan Africa. Most growth retardation occurs by the age of two, in part because around 30 percent of Indian children are born with low birth weight, and is largely irreversible. In 1998/99, 47 percent of children under three were underweight or severely underweight, and a further 26 percent were mildly underweight such that, in total, underweight afflicted almost three-quarters of Indian children. Levels of malnutrition have declined modestly, with the prevalence of underweight among children under three falling by 11 percent between 1992/93 and 1998/99. However, this lags far behind that achieved by countries with similar economic growth rates.

Disaggregation of underweight statistics by socioeconomic and demographic characteristics reveals which groups are most at risk of malnutrition. Underweight prevalence is higher in rural areas (50 percent) than in urban areas (38 percent); higher among girls (48.9 percent) than among boys (45.5 percent); higher among scheduled castes (53.2 percent) and scheduled tribes (56.2 percent) than among other castes (44.1 percent); and, although underweight is pervasive throughout the wealth distribution, the prevalence of underweight reaches as high as 60 percent in the lowest wealth quintile. Moreover, during the 1990s, urban-rural, inter-caste, male-female and inter-quintile inequalities in nutritional status widened.

There is also large inter-state variation in the patterns and trends in underweight. In six states, at least one in two children are underweight, namely Maharashtra, Orissa, Bihar, Madhya Pradesh, Uttar Pradesh, and Rajasthan. The four latter states account for more than 43 percent of all underweight children in India. Moreover, the prevalence in underweight is falling more slowly in the high prevalence states. Finally, the demographic and socioeconomic patterns at the state level do not necessarily mirror those at the national level (e.g. in some states, inequalities in underweight are narrowing and not widening, and in some states boys are more likely to be underweight than girls) and nutrition policy should take cognizance of these variations.

Undernutrition is concentrated in a relatively small number of districts and villages with a mere 10 percent of villages and districts accounting for 27-28 percent of all

underweight children, and a quarter of districts and villages accounting for more than half of all underweight children, suggesting that future efforts to combat malnutrition could be targeted to a relatively small number of districts/villages.

Micronutrient deficiencies are also widespread in India. More than 75 percent of preschool children suffer from iron deficiency anemia (IDA) and 57 percent of preschool children have sub-clinical Vitamin A deficiency (VAD). Iodine deficiency is endemic in 85 percent of districts. Progress in reducing the prevalence of micronutrient deficiencies in India has been slow - IDA has not declined much, in part due to the high prevalence of hookworm, and reductions in subclinical VAD slowed in the second half of the 1990s, despite earlier gains. As with underweight, the prevalence of different micronutrient deficiencies varies widely across states.

Economic growth alone is unlikely to be sufficient to lower the prevalence of malnutrition substantially – certainly not sufficiently to meet the nutrition MDG of halving the prevalence of underweight children between 1990 and 2015. It is only with a rapid scaling-up of health, nutrition, education and infrastructure interventions that this MDG can be met. Additional and more effective investments are especially needed in the poorest states.

## CHAPTER 2

**India’s primary policy response to child malnutrition, the Integrated Child Development Services (ICDS) program, is well-conceived and well-placed to address the major causes of child undernutrition in India. However, more attention has been given to increasing coverage than to improving the quality of service delivery and to distributing food rather than changing family-based feeding and caring behavior. This has resulted in limited impact.**

The ICDS has expanded tremendously over its 30 years of operation to cover almost all development blocks in India and offers a wide range of health, nutrition and education services to children, women and adolescent girls. However, while the program is intended to target the needs of the poorest and the most undernourished, as well as the age groups that represent a significant “window of opportunity” for nutrition investments (i.e. children under three, pregnant and lactating women), there is a mismatch between the program’s intentions and its actual implementation.

Key mismatches are that:

- (i) The dominant focus on food supplementation is to the detriment of other tasks envisaged in the program which are crucial for improving child nutritional outcomes. For example, not enough attention is given to improving child-care behaviors, and on educating parents how to improve nutrition using the family food budget;

- (ii) Service delivery is not sufficiently focused on the youngest children (under three), who could potentially benefit most from ICDS interventions. In addition, children from wealthier households participate much more than poorer ones and ICDS is only partially succeeding in preferentially targeting girls and lower castes (who are at higher risk of undernutrition);
- (iii) Although program growth was greater in underserved than well-served areas during the 1990s, the poorest states and those with the highest levels of undernutrition still have the lowest levels of program funding and coverage by ICDS activities.

In addition to these mismatches, the program faces substantial operational challenges. Inadequate worker skills, shortage of equipment, poor supervision and weak M&E detract from the program's potential impact. Community workers are overburdened, because they are expected to provide pre-school education to four to six year olds as well as nutrition services to all children under six, with the consequence that most children under three—the group that suffers most from malnutrition—do not get micronutrient supplements, and most of their parents are not reached with counseling on better feeding and child care practices.

However, examples of successful interventions (Bellary district in Karnataka) and innovations/variations in ICDS from several states (the INHP II in nine states, the Dular scheme in Bihar and the TINP in Tamil Nadu) suggest that the potential for better implementation and for impact does exist.

### **CHAPTER 3**

**Urgent changes are needed to bridge the gap between the policy intentions of ICDS and its actual implementation. This is probably the single biggest challenge in international nutrition, with large fiscal and institutional implications and a huge potential long-term impact on human development and economic growth.**

ICDS was designed to address the multidimensional causes of malnutrition. As the program has expanded to reach more and more villages, it has tremendous potential to impact positively on the well-being of the millions of women and children who are eligible for participation. The key constraint on its effectiveness is that its actual implementation deviates from the original design. There has been an increasing emphasis on the provision of supplementary feeding and preschool education to children four to six years old, at the expense of other components that are crucial for combating persistent undernutrition. Because of this, most children under three—the group that suffers most from malnutrition—are not reached, and most of their parents do not receive counseling on better feeding and child care practices. Realizing ICDS' potential, however, will require substantial commitment and resources in order to realign its implementation with its original objectives and design:

- The first immediate step should be to resolve the current ambiguity about the priority of different program objectives and interventions;
- To reduce malnutrition, ICDS activities need to be refocused on the most important determinants of malnutrition. Programmatically, this means emphasizing disease control and prevention activities, education to improve domestic child-care and feeding practices, and micronutrient supplementation. Greater convergence with the health sector, and in particular the Reproductive and Child Health (RCH) program, would help tremendously in this regard;
- Activities need to be better targeted towards the most vulnerable age groups (children under three and pregnant women), while funds and new projects need to be redirected towards the states and districts with the highest prevalence of malnutrition;
- Supplementary feeding activities need to be better targeted towards those who need it most, and growth-monitoring activities need to be performed with greater regularity, with an emphasis on using this process to help parents understand how to improve their children's health and nutrition;
- Involving communities in the implementation and monitoring of ICDS can be used to bring in additional resources into the *anganwadi* centers, improve quality of service delivery and increase accountability in the system;
- Monitoring and evaluation activities need strengthening through the collection of timely, relevant, accessible, high-quality information — and this information needs to be used to improve program functioning by shifting the focus from inputs to results, informing decisions and creating accountability for performance.



## CHAPTER 1 WHAT ARE THE DIMENSIONS OF THE UNDERNUTRITION PROBLEM IN INDIA?

**The consequences of child undernutrition for morbidity and mortality are enormous – and there is, in addition, an appreciable impact of undernutrition on productivity so that a failure to invest in combating nutrition reduces potential economic growth. In India, with one of the highest percentages of undernourished children in the world, the situation is dire. Moreover, inequalities in undernutrition between demographic, socioeconomic and geographic groups increased during the 1990s. More, and better, investments are needed if India is to reach the nutrition MDGs. Economic growth will not be enough.**

The prevalence of underweight among children in India is amongst the highest in the world, and nearly double that of Sub-Saharan Africa. In 1998/99, 47 percent of children under three were underweight or severely underweight, and a further 26 percent were mildly underweight such that, in total, underweight afflicted almost three-quarters of Indian children. Levels of malnutrition have declined modestly, with the prevalence of underweight among children under three falling by 11 percent between 1992/93 and 1998/99. However, this lags far behind that achieved by countries with similar economic growth rates.

Undernutrition, both protein-energy malnutrition and micronutrient deficiencies, directly affects many aspects of children's development. In particular, it retards their physical and cognitive growth and increases susceptibility to infection, further increasing the probability of malnutrition. Child malnutrition is responsible for 22 percent of India's burden of disease. Undernutrition also undermines educational attainment, and productivity, with adverse implications for income and economic growth.

Disaggregation of underweight statistics by socioeconomic and demographic characteristics reveals which groups are most at risk of malnutrition. Most growth retardation occurs by the age of two, and is largely irreversible. Underweight prevalence is higher in rural areas (50 percent) than in urban areas (38 percent); higher among girls (48.9 percent) than among boys (45.5 percent); higher among scheduled castes (53.2 percent) and scheduled tribes (56.2 percent) than among other castes (44.1 percent); and, although underweight is pervasive throughout the wealth distribution, the prevalence of underweight reaches as high as 60 percent in the lowest wealth quintile. Moreover, during the 1990s, urban-rural, inter-caste, male-female and inter-quintile inequalities in nutritional status widened.

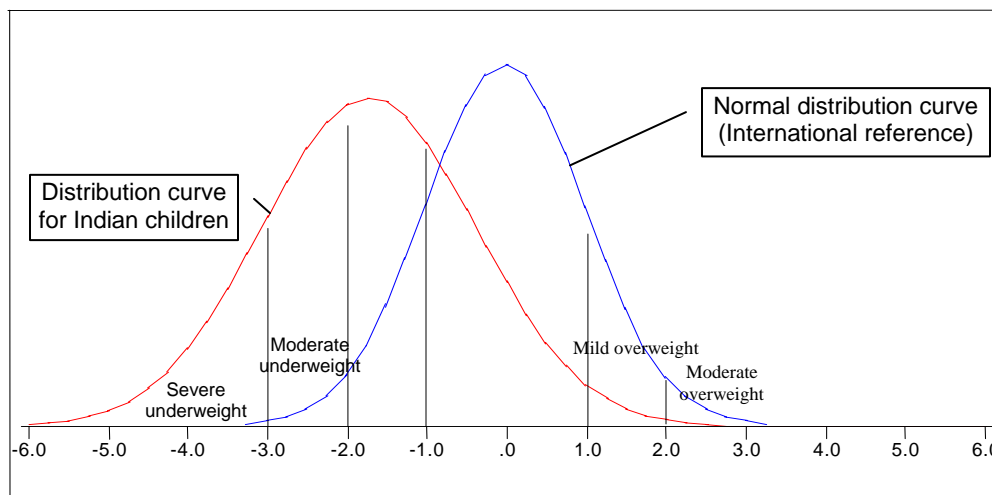
There is also large inter-state variation in the patterns and trends in underweight. In six states, at least one in two children are underweight, namely Maharashtra, Orissa, Bihar, Madhya Pradesh, Uttar Pradesh, and Rajasthan. The four latter states account for more than 43 percent of all underweight children in India. Moreover, the prevalence in underweight is falling more slowly in the high prevalence states. Finally, the demographic and socioeconomic patterns at the state level do not necessarily mirror those at the national level and nutrition policy should take cognizance of these variations.

Undernutrition is concentrated in a relatively small number of districts and villages with a mere 10 percent of villages and districts accounting for 27-28 percent of all underweight children, and a quarter of districts and villages accounting for more than half of all underweight children.

Micronutrient deficiencies are also widespread in India. More than 75 percent of preschool children suffer from iron deficiency anemia (IDA) and 57 percent of preschool children have sub-clinical Vitamin A deficiency (VAD). Iodine deficiency is endemic in 85 percent of districts. Progress in reducing the prevalence of micronutrient deficiencies in India has been slow. As with underweight, the prevalence of different micronutrient deficiencies varies widely across states.

The profile of malnutrition in India is one where the distribution of children’s age-standardized weight is dramatically to the left of the global reference standard (see Figure 1 below), suggesting a major undernutrition problem. Simultaneously, there is a small, but increasing percentage of overweight children who are at greater risk for non-communicable diseases such as diabetes and cardio-vascular heart disease later in life. Although the term “malnutrition” refers to both under- and overnutrition, in view of the size and urgency of the undernutrition problem in India, and its links to human development, this analysis deals only with the problem of undernutrition, i.e. macro- and micro-nutrient deficiencies<sup>a</sup>.

**Figure 1 Weight-for-age distribution: children under three in India compared to the global reference population**



Source: Calculated from NFHS data

Note: Prevalence of severe, moderate and mild underweight are given in parentheses.

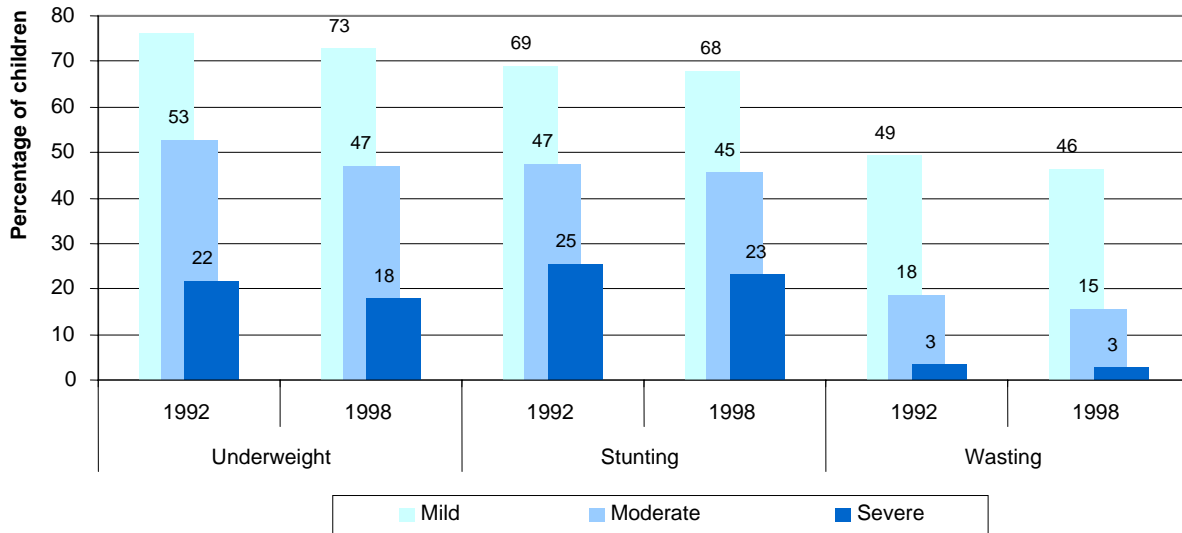
In 1998/99 (i.e. the latest date for which nationally representative data are available), 47% of children under three in India were underweight and 18% were severely underweight. A further 26% were mildly underweight so that, in total, underweight afflicted almost three-quarters of Indian children. 46% of children were stunted and 16% could be classified as wasted. Given that

<sup>a</sup> Nutritional status is typically described in terms of anthropometric indices, such as *underweight*, *stunting* and *wasting*. The terms underweight, stunting and wasting are measures of protein-energy undernutrition and are used to describe children who have a weight-for-age, height (or recumbent length)-for-age and weight-for-height measurement that is less than two standard deviations below the median value of the NCHS/WHO reference group. This is referred to as moderate malnutrition. The terms severe underweight, severe stunting and severe wasting are used when the measurements are less than three standard deviations below the reference median, and mild underweight, stunting and wasting refer to measurements less than one standard deviation below the reference population. Underweight is generally considered a composite measure of long and short-term nutritional status, while stunting reflects long-term nutritional status, and wasting is an indicator of acute short-term undernutrition. In addition, there are some indicators of micronutrient malnutrition. The most common forms of micronutrient malnutrition referred to in this document are Vitamin A deficiency, iodine deficiency disorders and iron-deficiency anemia.



even mild malnutrition is linked to a two-fold increase in mortality, and to much lower productivity levels, these levels of undernutrition significantly compromise health and productivity. There was, however, a modest improvement in the situation during the 1990s. Between 1992/93 and 1998/99, the prevalence of underweight fell by almost 11%, equivalent to a 1.5% annual reduction (see Figure 2).

**Figure 2 A modest reduction in the prevalence of undernutrition during the 1990s**

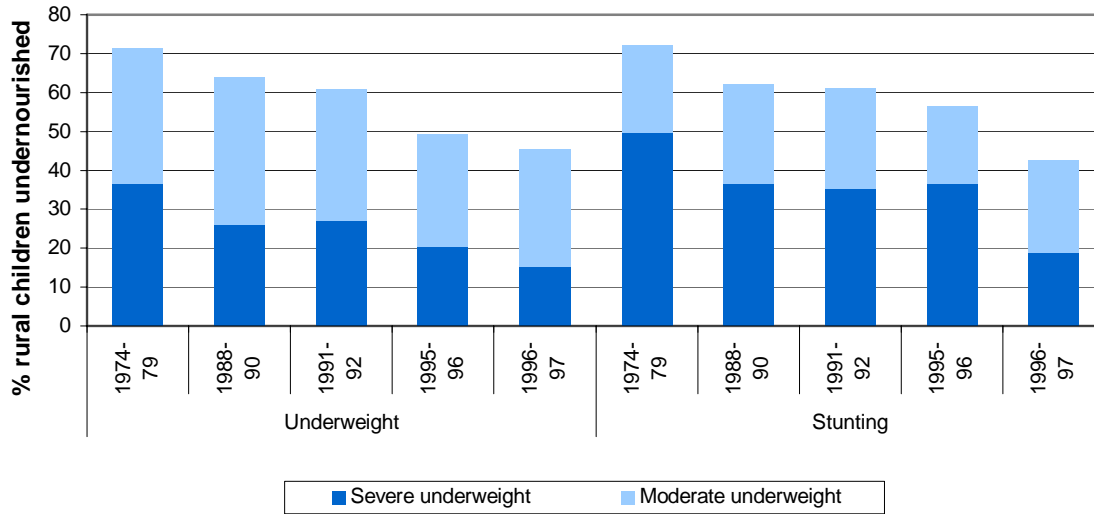


Source: Underweight figures calculated directly from NFHS I and NFHS II data; other figures obtained from StatCompiler DHS (ORC Macro 2004).

Note: Figures are for children under the age of three

The reduction in the prevalence of underweight in India in the 1990s is in line with gains made in earlier decades. According to the WHO Global Database on Child Growth and Nutrition, the prevalence of malnutrition among children *under five* in rural India fell from over 70% in the late 1970s to below 50% at the end of the 1990s for both underweight and stunting measures. The prevalence of severe stunting also declined over this period, from almost 50% to less than 25%, while that of severe underweight declined from 37% to less than 20%.

**Figure 3 Trends in the prevalence of underweight and stunting among children under five in rural India**



Source: WHO Global Database on Child Growth and Malnutrition (WHO 2004a); original data from NNMB (1974-79, 1988-90, 1991-92), DWCD (1995-96) and Vijayaraghavan and Rao (1996-97).

Note: Prevalence is not strictly comparable across time periods since each round of surveys used different sampling methodologies and calculated prevalence across different age groups<sup>b</sup>.

The prevalence of micronutrient deficiencies among children and women of reproductive age in India is also consistently among the highest in the world. For example, the prevalence of iron deficiency anemia (IDA) among preschool children is over 75%; although the nationwide prevalence of clinical Vitamin A deficiency (VAD) is less than 1-2%, up to 60% of preschool children have subclinical VAD<sup>c</sup>; and, about one in four school children have goiter, a sign of severe iodine deficiency<sup>1</sup>. 52% of all ever-married women aged 15 to 49 years have some degree of anemia, with the prevalence of anemia among pregnant women even higher (up to 87%); clinical and subclinical VAD is widespread, affecting about 5% and 12% of women, respectively; and, iodine deficiency in pregnant women in India is estimated to have so far caused the congenital mental impairment of about 6.6 million children<sup>2</sup>.

<sup>b</sup> The NNMB data include children aged 0-4 years in eight states, the DWCD data include children aged 1-4 years in 18 states and the Vijayaraghavan and Rao data are for children aged 0-4 years in 11 states.

<sup>c</sup> Clinical VAD is a severe form of Vitamin A deficiency, resulting in xerophthalmia, symptoms of which include night blindness, Bitot's spots, xerosis, and keratomalacia. If not treated early enough, it can eventually lead to blindness. Subclinical VAD, defined by a serum retinol concentration of less than 0.7 µmol/L, is associated with increased vulnerability to a variety of infectious diseases and, therefore, an increased risk of mortality and morbidity.

**Table 1 Prevalence of micronutrient deficiencies in South Asia**

	Iron deficiency				Vitamin A deficiency			Iodine deficiency			Folate deficiency
	IDA in children <5y (%)	IDA in women 15-49y (%)	IDA in pregnant women (%)	Maternal death from severe anemia/yr (no.)	Child deaths precipitated (no.)	Children <6 w/ subclinical VAD (%)	Children <6 w/ clinical VAD (%)	Children born mentally impaired (no.)	Total Goiter Rate (TGR) (%)	Total Goiter Rate (TGR) in school children (%)	Neural tube defects (no.)
Afghanistan	65	61	-	-	50,000	53	-	535,000	48	-	2,250
Bangladesh	55	36	74	2,800	28,000	28	0.7	750,000	18	50	8,400
Bhutan	81	55	68	<100	600	32	0.7	-	-	14	150
<b>India</b>	<b>75</b>	<b>51</b>	<b>87</b>	<b>22,000</b>	<b>330,000</b>	<b>57</b>	<b>0.7</b>	<b>6,600,000</b>	<b>26</b>	<b>19</b>	<b>50,000</b>
Nepal	65	62	63	760	6,900	33	1.0	200,000	24	40	1,600
Pakistan	56	59	-	-	56,000	35	-	2,100,000	38	-	11,000
South Asia Region Total				25,560	471,500			10,185,000			73,400
World Total				50,000	1,150,000			19,000,000			204,000

Source: UNICEF 2003b; WHO 2000; UNICEF and MI 2004a

The fact that approximately 37 million children *under the age of three*<sup>3</sup> are underweight and many more suffer from various micronutrient deficiencies makes undernutrition an urgent policy priority.

## 1.1 WHY INVEST IN COMBATting UNDERNUTRITION?

Failing to deal effectively with the undernutrition problem in India has dire consequences for children's development. It retards their physical growth and increases their susceptibility to disease in childhood and adulthood. It also affects cognitive and motor development, limits educational attainment and productivity, and ultimately perpetuates poverty. Moreover, in a country where undernutrition is so widespread, the consequences of undernutrition go well beyond the individual, affecting total labor force productivity and economic growth.

### 1.1.1 The effect of undernutrition on morbidity, mortality, cognitive and motor development

Through precipitating disease and speeding its progression, malnutrition is a leading contributor to infant, child and maternal mortality and morbidity. It has been estimated to play a role in about half of all child deaths<sup>4</sup> and more than half of child deaths from major diseases, such as malaria (57%), diarrhea (61%) and pneumonia (52%), as well as 45% of deaths from measles (45%)<sup>5</sup>. Pediatric malnutrition is a risk factor for 16% of the global burden of disease and for 22.4% of India's burden of disease<sup>6</sup>. In turn, infections contribute to malnutrition through a variety of mechanisms, including loss of appetite and reduced capacity to absorb nutrients.<sup>7</sup>

In this section, the consequences of protein-energy malnutrition (PEM) and micronutrient deficiencies for morbidity, mortality, cognitive and motor development are reviewed.

#### 1.1.1.1 Protein-energy malnutrition<sup>d</sup> (PEM)

Isolating the effects of protein and energy deficiencies on health and development outcomes is confounded by the fact that when food intake is low, the intake of many other nutrients is usually also inadequate<sup>8</sup>. Nevertheless, it is generally accepted that children who are underweight or stunted are at greater risk for childhood morbidity and mortality, poor physical and mental development, inferior school performance and reduced adult size and capacity for work<sup>9</sup>.

Protein-energy malnutrition weakens immune response and aggravates the effects of infection<sup>10</sup> and, so, children who are malnourished tend to have more severe diarrheal episodes and are at a higher risk of pneumonia. Underweight and stunted women are also at more risk of obstetric complications (because of smaller pelvic size) and low birth weight deliveries<sup>11</sup>. The result is an intergenerational cycle of malnutrition since low birth weight infants tend to attain smaller stature as adults. In addition, malnutrition in early infancy is associated with increased susceptibility to chronic disease in adulthood, including coronary heart disease, diabetes and high blood pressure<sup>12</sup>.

Although the precise mechanisms are not clear<sup>13</sup>, protein-energy malnutrition in early childhood is also associated with poor cognitive and motor development. The magnitude of the effect is very much dependent on the severity and duration of malnutrition as well as its timing. There is evidence that moderate protein-energy malnutrition of long-term duration has worse consequences for cognitive development than transient severe undernutrition. With respect to timing, it is nutritional status in the period between the last trimester of pregnancy and two to three years of age that is most important for mental development.

#### 1.1.1.2 Micronutrient deficiencies

Iron and Vitamin A deficiencies are leading risk factors for disease in developing countries, especially those with high mortality rates<sup>14</sup>. Iodine deficiency, too, is a mortality risk.

**Vitamin A:** Sub-clinical Vitamin A deficiency (VAD) is a well-known cause of morbidity and mortality, especially among young children and pregnant women. In young children, it can cause xerophthalmia and keratomalacia and lead to blindness<sup>15</sup>; limit growth; weaken the immune system, exacerbate infection and increase the risk of death<sup>16</sup>. VAD has been shown to increase the mortality of children, mainly from respiratory and gastrointestinal infections, and often occurring concurrently among children with PEM, is estimated to be responsible for about 1 million child deaths annually<sup>17</sup>. Pregnant women, especially in the third trimester when micronutrient demands are at their highest, often exhibit a high prevalence of night blindness. Recent studies have shown that VAD may also be associated with an increased risk of mother-to-child transmission of HIV, even though Vitamin A supplementation does not lower the risk of

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<sup>d</sup> Protein-energy malnutrition develops in children and adults whose consumption of protein and energy is insufficient. In most cases, both protein and energy deficiencies occur simultaneously. If protein deficiencies predominate, PEM may manifest as kwashiorkor (which usually appears around the age of 12 months when breastfeeding ceases, but can also occur later in childhood) and is characterized by edema, hair discoloration and peeling skin. If energy deficiencies predominate, PEM may manifest as marasmus (which usually develops in children aged 6 to 12 months who have been weaned from breastmilk or suffer from weakening infections, such as diarrhea) and is characterized by stunted growth and wasting.

transmission<sup>18</sup>. Vitamin A supplementation has proven successful in reducing the incidence and severity of illness, and has been associated with an overall reduction in child mortality by 25-35%<sup>19</sup>, especially from diarrhea, measles and malaria<sup>20</sup>.

**Iron:** Iron deficiency anemia (IDA) is common across all age groups, but highest among children and pregnant and lactating women, and affects about 2 billion people in developing countries. The consequences of IDA in pregnant women include increased risk of low birth weight or premature delivery, peri-natal and neonatal mortality, inadequate iron stores for the newborn, lowered physical activity, fatigue and increased risk of maternal morbidity<sup>21</sup>. It is also responsible for almost a quarter of maternal deaths<sup>22</sup>. Inadequate iron stores as a newborn child, coupled with insufficient iron intake during the weaning period, have been shown to impair intellectual development by adversely affecting language, cognitive, and motor development. Iron deficiency among adults contributes to low labor productivity<sup>23</sup>.

**Iodine:** Iodine deficiency during pregnancy is associated with low birth weight, increased likelihood of stillbirth, spontaneous abortion and congenital abnormalities such as cretinism and irreversible forms of mental impairment. During the childhood period, it impairs physical growth, causes goiter and decreases the probability of child survival. It is also the most common cause of preventable mental retardation and brain damage in the world<sup>24</sup>. Globally, 2.2 billion people (38% of the world's population) live in regions where iodine deficiency is endemic.

Iodine and iron deficiencies have also been linked to the retardation of cognitive processes in infants and young children. Maternal iodine deficiency has negative and irreversible effects on the cognitive functioning of the developing fetus, while postnatal iodine deficiency may also be associated with cognitive deficits<sup>25</sup>: iodine-deficient children have been shown to have IQs that are, on average, 13.5 points lower than iodine-sufficient children<sup>26</sup>; iron deficiency anemia has been associated with half a standard deviation reduction in IQ<sup>27</sup>.

### **1.1.2 The effect of undernutrition on schooling, adult productivity and economic growth**

The cognitive and physical consequences of undernutrition – both underweight and micronutrient deficiencies – undermine educational attainment and labor productivity, with adverse implications for income and economic growth.

#### *1.1.2.1 Schooling*

Malnutrition at any stage of childhood affects schooling and, thus, the lifetime-earnings potential of the child<sup>28</sup>. Some of the pathways through which malnutrition affects educational outcomes include a reduced capacity to learn (as a result of early cognitive deficits or lowered current attention spans) and fewer total years of schooling (since caregivers may invest less in malnourished children or schools may use child size as an indicator of school readiness)<sup>29</sup>. For example, in rural Pakistan, malnutrition has been found to decrease the probability of ever attending school, particularly for girls<sup>30</sup>. In the Philippines, children with higher nutritional status during the preschool years start primary school earlier, repeat fewer grades<sup>31</sup> and have higher high school completion rates<sup>32</sup> than other children. In Zimbabwe, stunting, via its association

with a 7 month delay in school completion and 0.7 loss in grade attainment, has been shown to reduce lifetime income by 7-12%<sup>33</sup>.

#### *1.1.2.2 Adult productivity and economic growth*

Measuring the productivity losses associated with undernutrition is complex and since different studies incorporate different types of productivity gains, estimates can vary widely<sup>e</sup>. Moreover, since a large share of productivity losses are measured in terms of foregone wages, when productivity losses are expressed in dollar terms rather than as % GDP, the productivity losses in India may appear lower relative to other countries with higher average wages. In general, in low-income agricultural Asian countries, the physical impairment associated with malnutrition is estimated to cost more than 2-3% of GDP per annum - even without considering the long-term productivity losses associated with developmental and cognitive impairment<sup>34</sup>. Iron deficiency in adults has been estimated to decrease productivity by 5-17%, depending on the nature of the work performed<sup>35</sup>. Other data from ten developing countries have shown that the median loss in reduced work capacity associated with anemia during adulthood is equivalent to 0.6% of GDP, while an additional 3.4% of GDP is lost due to the effects on cognitive development attributable to anemia during childhood<sup>36</sup>. The impact of iodine deficiency disorders (IDD) on cognitive development alone has been associated with productivity losses totaling approximately 10% of GDP<sup>37</sup>.

A few attempts have been made to estimate the productivity losses associated with malnutrition in India. As with the global estimates above, these are intrinsically imprecise, requiring many assumptions and approximations. One study estimates that the productivity losses due to PEM, IDD, and IDA, in the absence of appropriate interventions, amounts to around US\$114 billion between 2003 and 2012<sup>38</sup>. A more recent study, examining only the productivity losses associated with foregone wage-employment resulting from child malnutrition, estimates the loss to be US\$2.3 billion (or Rs.103 billion)<sup>39</sup>. Other studies suggest that micronutrient deficiencies alone may cost India US\$2.5 billion annually<sup>40</sup> and that the productivity losses (manual work only) from stunting, iodine deficiency and iron deficiency together are responsible for a total productivity loss of almost 3% of GDP<sup>41</sup> (see Table 2).

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<sup>e</sup> Estimating the economic costs of malnutrition typically involves taking into account the prevalence of a particular macro- or micro-nutrient deficiency among men and women and their average levels of participation in market economic activity and heavy labor. Economic calculations are based only on market activities and exclude non-market losses even though these may be socially valuable. The calculations also require estimating the degree to which different nutritional conditions may coexist.

**Table 2 Productivity losses due to malnutrition in India**

	(i) DALYs lost due to malnutrition in India	(ii) Estimated total annual losses due to malnutrition <sup>42</sup> (\$ billions)	(iii) Estimated loss of adult productivity, as % GDP <sup>43</sup>
<b>Protein-energy malnutrition (stunting)</b>	<b>2,939,000</b>	<b>8.1</b>	<b>1.4</b>
Vitamin A deficiency	404,000	0.4	
Iodine deficiency disorder	214,000	1.5	0.3
Iron deficiency	3,672,000	6.3	1.25

Source: (i) World Bank 2004c; (ii) and (iii) Horton 1999

Note: Productivity losses include only market activities

## 1.2 UNDERWEIGHT

### 1.2.1 An international perspective

Whether undernutrition is measured as the prevalence of underweight, stunting or wasting, it is clear that the nutritional situation in India is amongst the worst in the world (see Table 3). India's prevalence of underweight (47%) compares to Bangladesh (48%) and Nepal (48%), but is much higher than all other countries within South Asia and far higher than the averages for other regions of the world. High prevalence combined with India's large population means that of the 150 million malnourished children *aged under five* in the world, more than a third live in India<sup>44</sup>.

**Table 3 Underweight, stunting and wasting, by global region, 2000**

Region	% of under-fives (2000) suffering from		
	Underweight	Stunting	Wasting
Latin America and Caribbean	6	14	2
Africa	24	35	8
Asia	28	30	9
<b>India</b>	<b>47</b>	<b>45</b>	<b>16</b>
Bangladesh	48	45	10
Bhutan	19	40	3
Maldives	45	36	20
Nepal	48	51	10
Pakistan	40	36	14
Sri Lanka	33	20	13
All developing countries	22-27	28-32	7-9

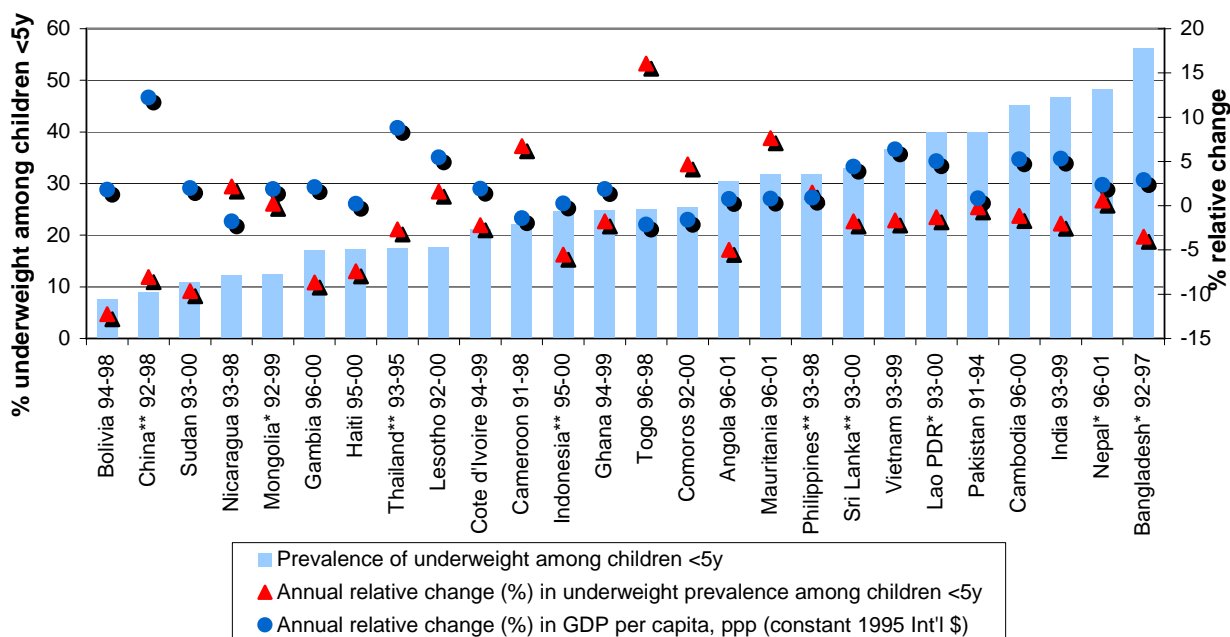
Source: ACC/SCN 2004

The decline of the prevalence of underweight during the 1990s has also been less rapid than in most other countries with similar socioeconomic or geographical characteristics. Figure 4 plots the prevalence of underweight among children *under five* and its annual relative change against *per capita* economic growth<sup>f</sup>. It shows that despite an average annual increase in *per capita* GDP of 5.3%, the average annual prevalence of underweight in India fell at a rate of only 1.5%. In some other countries, underweight prevalence fell by more than 5%, even though annual growth

<sup>f</sup> GDP per capita is adjusted for purchasing power parity (PPP) and in constant 1995 international dollars.

in *per capita* GDP was around 2% or less. In China, the prevalence of child underweight fell at an annual rate of more than 8%, backed by a 12% annual growth rate. In Bangladesh, despite economic growth that lagged behind that of India, the prevalence of underweight declined at a higher rate (3.5%).

**Figure 4 Underweight: comparing India to other countries with similar levels of economic development**



Source: GDF and WDI Central Database 2004

Note: Countries chosen<sup>§</sup> for this table are either in Asia or comparable to India in terms of *per capita* GDP at PPP (1995 constant international dollars), i.e. in the range \$1,333-\$2,333 where India's *per capita* GDP was \$1,833 in 1995. Countries in Asia with somewhat lower *per capita* GDP (<\$1333) are denoted by \* and with higher *per capita* GDP (>\$2333) by \*\*.

**The South Asian Enigma: Why is undernutrition in South Asia so much higher than in Sub-Saharan Africa?**

In 1997, Ramalingaswami *et al.* wrote, "In the public imagination, the home of the malnourished child is Sub-Saharan Africa...but ... the worst affected region is not Africa but South Asia". These statements were met with incredulity. However, undernutrition rates in South Asia, including and especially in India, are nearly double those in Sub-Saharan Africa today. This is not an artifact of different measurement standards or differing growth potential among ethnic groups: several studies have repeatedly shown that given similar opportunities, children across most ethnic groups, including Indian children, can grow to the same levels, and that the same internationally recognized growth references can be used across countries to assess the prevalence of malnutrition<sup>45</sup>. This phenomenon, referred to as the "South Asian Enigma", is real.

The "South Asian Enigma" can be explained by three key differences between South Asia and Sub-Saharan Africa:

- Low birth weight is the single largest predictor of undernutrition; and over 30% Indian babies are born with low birth weights, compared to approximately 16% in Sub-Saharan Africa.
- Women in South Asia tend to have lower status and less decision-making power than women in Sub-Saharan Africa. This limits women's ability to access the resources needed for their own and their children's health and nutrition, and has been shown to be strongly associated with low birth weight, as well as poor child feeding behaviors in the first twelve months of life
- Hygiene and sanitation standards in South Asia are well below those in Africa, and have a major role to play in causing the infections that lead to undernutrition in the first two years of life.

<sup>§</sup>All countries included in the table had at least two household h surveys between 1990 and 2002. When more than two surveys were available, information collected around 1992/93 and 1998/99 was used, to enhance comparability with India NFHS data. Countries with a prevalence of underweight of less than 10% among children under 5 in the first survey were dropped.



## 1.2.2 National patterns and trends

The prevalence of underweight among children *under three* and recent trends in underweight vary substantially across different subgroups of the Indian population. Table 4 summarizes these patterns, which are discussed in more detail in the paragraphs that follow.

**Table 4 Disparities in underweight, by location, wealth quintile, gender and caste, 1992/93-1998/99**

	Underweight			Severe underweight		
	Prevalence 1992/93	Prevalence 1998/99	Percentage change	Prevalence 1992/93	Prevalence 1998/99	Percentage change
<b>Total</b>	53	47	-11	22	18	-18
<b>Urban</b>	44	38	-13	16	12	-27
<b>Rural</b>	55	50	-10	24	20	-16
<b>Quintile 1 (Poorest)</b>	61	59	-4	30	27	-8
<b>Quintile 2</b>	60	56	-6	26	23	-12
<b>Quintile 3</b>	56	52	-6	23	21	-7
<b>Quintile 4</b>	49	44	-11	18	15	-12
<b>Quintile 5 (Wealthiest)</b>	36	33	-9	11	8	-26
<b>Female</b>	52	49	-6	21	19	-11
<b>Male</b>	53	45	-15	22	17	-24
<b>Scheduled Castes</b>	57	53	-7	25	21	-15
<b>Scheduled Tribes</b>	57	56	-2	29	26	-9
<b>Other Castes</b>	51	44	-14	20	16	-23

Source: Calculated from NFHS I and NFHS II data

### 1.2.2.1 Patterns

Disaggregation of the 1998/99 national averages for children *under three* shows that there are certain groups that are more likely to be underweight than others.

**Location:** The rural underweight prevalence of 50% exceeds that of urban areas. Rural areas bear a particularly large share of the total *severe* underweight prevalence.

**Wealth:** As expected, both underweight and severe underweight prevalence increases as household wealth falls, although at a decreasing rate. Underweight prevalence is as high as 60% in the lowest quintile, but is so pervasive throughout the wealth distribution that even in the wealthiest fifth of the population 33% of children are underweight and 8.5% are severely underweight.

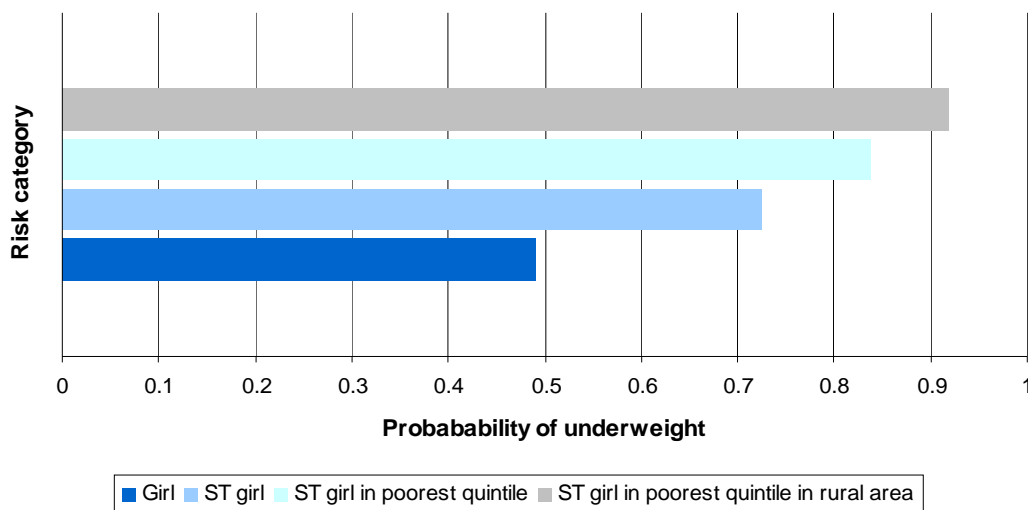
**Gender:** Underweight (and severe underweight) prevalence is slightly higher among girls, 48.9% (18.9%), than among boys, 45.5% (16.9%).

**Caste:** Both underweight (and severe underweight) prevalence is much higher among scheduled castes 53.2% (21.3%), and scheduled tribes 56.2% (26.3%) than among other castes, 44.1% (15.7%).

Thus, most at risk for underweight are girls whose families are poor, belong to scheduled tribes or castes, and live in rural areas. Assuming independence of conditional probabilities, the chance that a girl with all these characteristics is underweight is as high as 0.92<sup>h</sup> (Figure 5).

<sup>h</sup> The estimate here is an upper-bound since economic status of the child, for example, is unlikely to be completely independent of urban-rural location or caste.

**Figure 5 How the probability of underweight increases for girls in increasingly vulnerable positions**

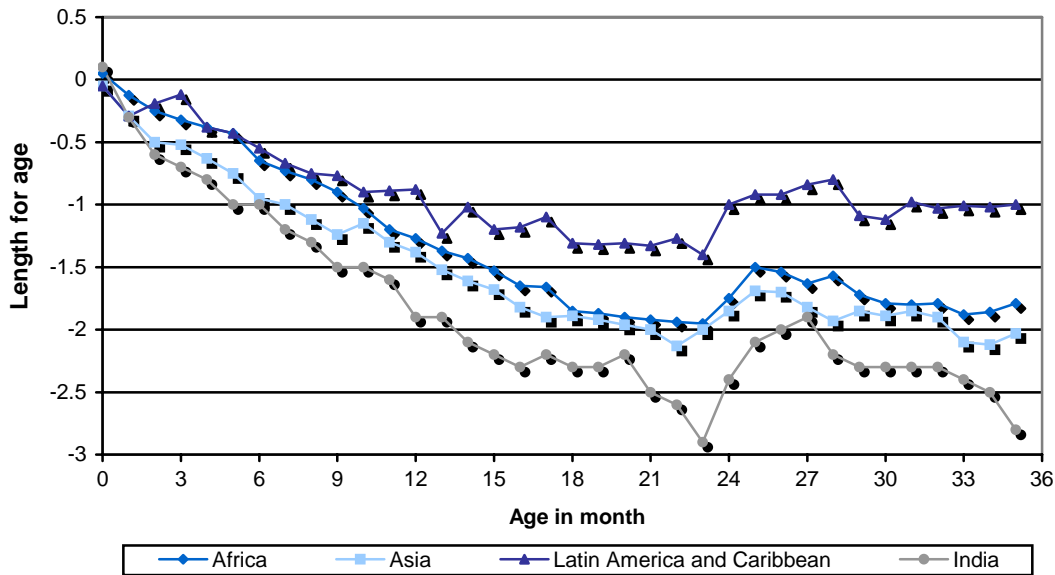


*Source: Calculated from NFHS II data*

The age-wise pattern of undernutrition is an important dimension of the problem in India, and indeed all over the world: growth retardation originates early in life, and most of this early damage is irreversible<sup>46</sup>. Most growth-faltering occurs either during pregnancy, such that approximately 30%<sup>i</sup> of children in India are born with low birth weight, and the rest of the damage happens during the first two years of life. Indeed, by the age of two years most growth retardation has already taken place (Figure 6). Consequently, the period between pregnancy and the first two years of life is the major “window of opportunity” in which to address undernutrition, and efforts to fight undernutrition need to focus on this age group, if they are to be successful.

<sup>i</sup> Measuring the incidence of low birth weight in developing countries is challenging because of measurement error, as observed by the heaping of data at the low birth weight cut-off of 2,500g, and because relatively few babies are weighed at birth.

**Figure 6 By the age of two, most of the damage has been done**



Source: Regional estimates from Shrimpton et al. 2001; India data from IIPS and ORC Macro 2000;

Note: A graph (Figure A) with the pattern of age-specific weight-for-age estimates can be found in the Appendix

### 1.2.2.2 Recent trends

Both underweight and severe underweight prevalence fell during the 1990s, but it has fallen more slowly among those segments of the population that were already more likely to be underweight in 1992/93. Consequently, over time, urban-rural, inter-caste, male-female and economic inequalities in nutritional status have widened. According to Figure 7 below:

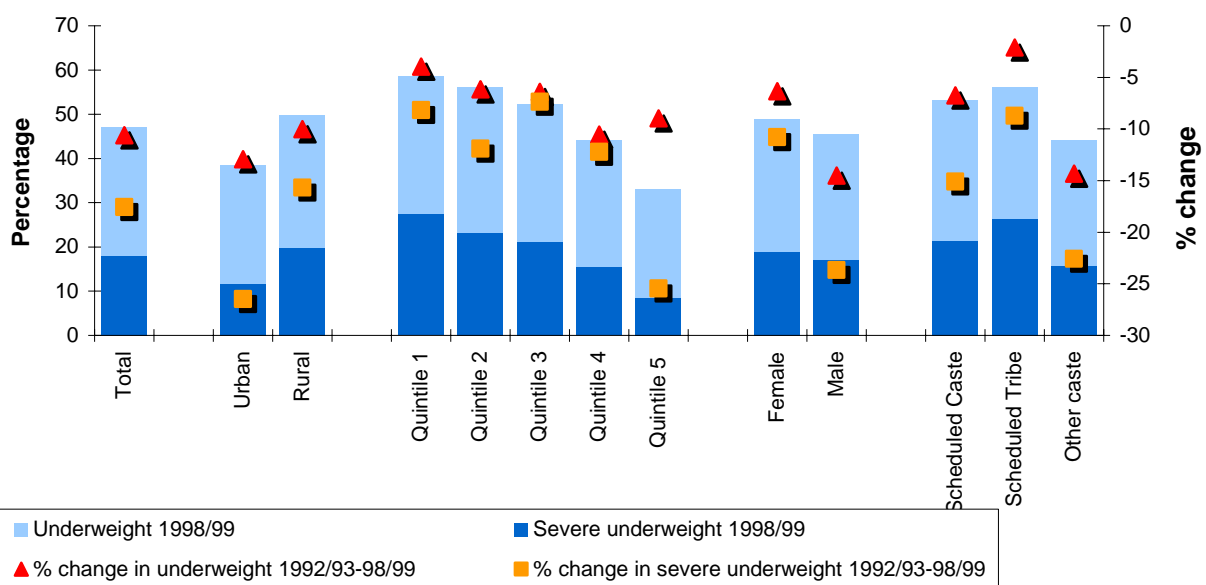
**Location:** The percentage reduction in severe underweight prevalence from 1992/93 to 1998/99 was dramatically higher in urban areas (26%) than in rural areas (16%), and somewhat higher for underweight prevalence.

**Wealth:** It is encouraging to see that, by 1998, the percentage of children in the poorest quintile and second poorest quintile who are underweight had fallen below the 60% mark. However, the reductions in the percentage of malnourished children in the lower quintiles is smaller than the reductions in the upper quintiles, indicative of a growing health disparity between children of relatively low and relatively high economic status. In fact, the greatest percentage reduction in the prevalence of underweight, and especially severe underweight, accrued to children in the wealthiest quintiles.

**Gender:** What is especially remarkable is the decline in male underweight prevalence, which fell by 14.3% (from 53.2% to 45.5% between 1992/93 and 1998/99) compared to the 6% decline in female underweight prevalence (from 52.2% to 48.9%). The effect of this is a reversal of the underweight gender gap so that, on aggregate in India, girls now lag far behind boys. The same reversal is observed for severe underweight prevalence, and is actually even more pronounced. Severe underweight prevalence fell by 23.7% (from 22% to 17%) for boys and by 10.8% (from 21% to 19%) for girls.

**Caste:** Despite the ostensible targeting of nutrition and health interventions to vulnerable castes, the percentage decline in underweight prevalence during the 1990s was smaller for scheduled castes and tribes than for others. Scheduled tribes, in particular, lagged far behind. Compared to other castes where underweight (and severe underweight) prevalence was reduced by 14.3% (22.6%) in the 1990s, the reduction for scheduled caste groups was only 6.7% (15.1%) and for scheduled tribe groups only 2.1% (8.7%). The effect of these differential gains was a marked widening of the gap in nutritional status between scheduled and non-scheduled castes, and particularly between scheduled caste and scheduled tribe groups. Divergence is more acute for severe underweight than for underweight.

**Figure 7 Demographic and socioeconomic variation in the prevalence of underweight, among children under 3, 1992/93 – 1998/99**

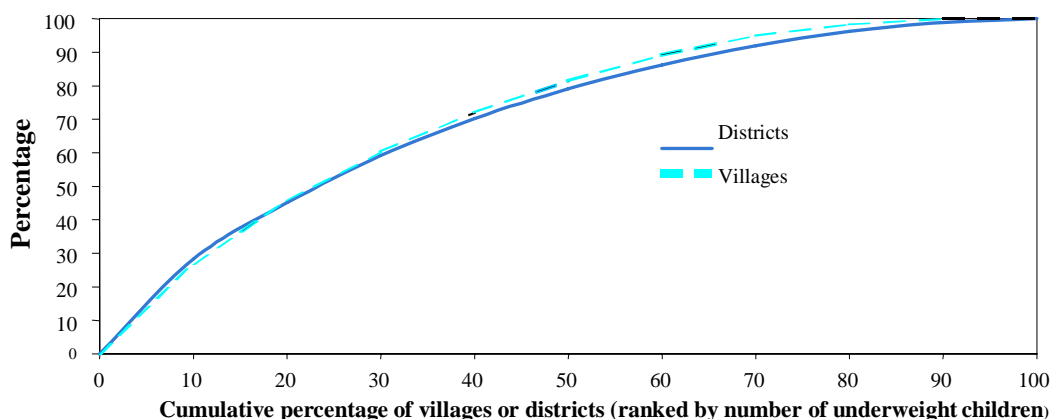


Source: Calculated from NFHS I and NFHS II data

### 1.2.3 Inter-state variation and within-state variation in the prevalence of underweight

Although underweight prevalence is widespread across the states of India, much of the total underweight prevalence is concentrated in a relatively small number of districts and villages (Figure 8). A mere 10% of villages and districts account for 27-28% of all underweight children in the country, and a quarter of districts and villages account for more than half of all underweight children<sup>47</sup>.

**Figure 8 Cumulative distribution of all underweight children under three across villages and districts in India, 1998/99**



Source: World Bank 2004a

The geographic concentration of the prevalence of underweight in India means that tailoring an appropriate response to malnutrition in a country as large and diverse as India requires a more richly-textured picture of malnutrition patterns and trends than the national picture presented above. It also suggests that actions to combat undernutrition could be targeted to a relatively small number of districts/villages. The remainder of this section examines how the prevalence in underweight and its trends varied across states between 1992/93 and 1998/99, and across the different socio-economic groups within states. Since data from only two points in time are used, however, it cannot be assumed that these trends are representative of longer-term changes in undernutrition.

### 1.2.3.1 By state

There is large inter-state variation in both the prevalence of underweight and the extent to which it fell (or occasionally rose) during the 1990s (see Table 5). Underweight prevalence in Bihar and Madhya Pradesh fell from 60% to around 55% during the 1990s so that by 1998/99 there was no longer any state in India that had a malnutrition prevalence exceeding 60%. Yet, there remain six states where at least one in two children are underweight, namely Maharashtra, Bihar, Madhya Pradesh, Uttar Pradesh, Orissa and Rajasthan. A combination of large populations and high underweight prevalence means that four of these states account for 43% of all underweight children in India – Uttar Pradesh (11%), Madhya Pradesh (11%), Bihar (11%) and Rajasthan (10%)<sup>48</sup>. Moreover, most of these high prevalence states are also experiencing the smallest reductions in the prevalence of underweight in India. Rajasthan and Orissa even registered a sharp increase in total underweight prevalence.

**Table 5 Matrix classifying states according to prevalence and change in prevalence of underweight**

	<b>Below average prevalence (&lt;47%)</b>	<b>Above average prevalence (≥47)</b>
<b>Increase in malnutrition (&gt;0%)</b>	Manipur (28; 4)	Rajasthan (51; 14) Orissa (55; 4)
<b>Below average reductions in malnutrition (0-11.6%)</b>	Kerala (27; -0.5) Gujarat (46; -6) Himachal Pradesh (45; -2) Haryana (35; -2) Mizoram (28; -1)	Madhya Pradesh (55; -8) Maharashtra (50; -3) Tripura (50; -6) Uttar Pradesh (52; -10)
<b>Above average reduction in malnutrition (&gt;11.6%)</b>	Arunachal Pradesh (25; -35) Nagaland (24 -14) Andhra Pradesh (38; -20) Assam (37 -27 ) Delhi (35; -16) Goa (29; -16) Jammu & Kashmir (35; -19) Karnataka (44; -13) Meghalaya (38; -15) Punjab (29 -37) Tamil Nadu (37; -22)	Bihar (55; -12) West Bengal (49; -14)

Source: Calculated from NFHS I and NFHS II data

Note: The first figure in parentheses refers to prevalence (1998/99) and the second figure to the change in prevalence between 1992/93 and 1998/99. Since the latter is based on only two time points, trends cannot be extrapolated beyond this time period.

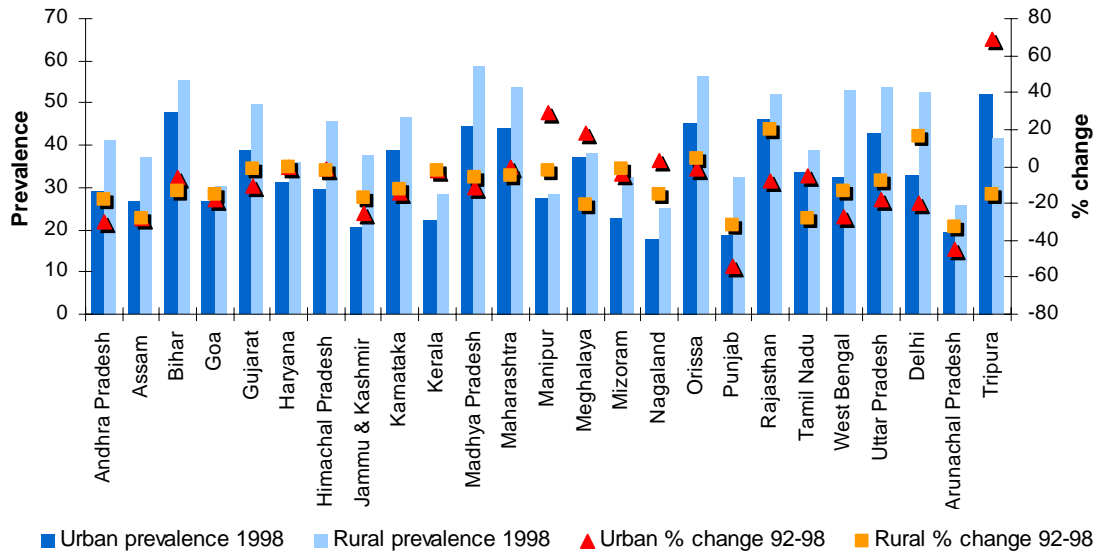
### 1.2.3.2 By location

In addition to the seven states identified (in Table 5) as having above-average total underweight prevalence, there are some states that have very high urban- or rural-specific underweight prevalence. Gujarat (50%) has a rural underweight prevalence that is higher than the 49% rural average, and Tripura's urban underweight prevalence of 52% is not only higher than the national urban average of 38%, but also exceeds the rural underweight prevalence in all other states.

There are clear and consistent urban-rural disparities in underweight prevalence and in all states, except Tripura, the percentage of underweight children is higher in rural areas than in urban areas (see Figure 9). The magnitude of these differentials varies by state, though. The largest differences are observed in Delhi, West Bengal, Punjab and Jammu and Kashmir where the percentage of underweight children in rural areas is, respectively, 61%, 64%, 78% and 81% greater than the percentage in urban areas. It is also noteworthy that although Rajasthan, Orissa and Manipur are the only states identified as experiencing increases in total underweight prevalence from 1992-1998, Delhi also registered significant increases in *rural*<sup>j</sup> malnutrition prevalence and the north-eastern states of Meghalaya, Manipur, Nagaland and Tripura experienced increases in *urban* malnutrition.

<sup>j</sup> The rural population of Delhi is not strictly comparable to the rural populations of the states, however; most of the "rural" population in Delhi consists of poor urban populations on the periphery of the city.

**Figure 9 Urban-rural disparities in underweight, by state, 1992/93-1998/99**



Source: Calculated from NFHS I and NFHS II data

### 1.2.3.3 By gender

Although at the national level the prevalence of underweight among female children exceeds the prevalence of underweight among male children by more than 3 percentage points and the rate of decline in the prevalence of male underweight is about 2.3 times that of female underweight (Figure 7), it would be incorrect to assume that this pattern of gender disparities characterizes every state. Indeed, while the national trend of a decline in the prevalence of male underweight that far outstrips the decline amongst females is observed in the states of Assam, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Meghalaya, West Bengal and Uttar Pradesh, in other states such as Goa, Jammu and Kashmir, Nagaland, Tripura and Mizoram, the female prevalence of underweight fell faster than the male prevalence. Moreover, in the three states where total underweight prevalence increased, namely Manipur, Orissa and Rajasthan, this increase was observed for both males and females.

This heterogeneity in the gender differentials in the prevalence of underweight is most apparent in Table 6, which classifies states into one of four categories. In states such as Delhi and Orissa, the percentage of underweight boys is higher than the percentage of underweight girls in both 1992 and 1998, while the pattern is reversed in Punjab, Tamil Nadu and West Bengal. In other states, such as Jammu and Kashmir, girls were in a relatively worse position than boys in 1992, but not in 1998. In the last group of states, girls fared better than boys in 1992, but by 1998 appeared to have lower nutritional status. This last group of states includes the BIMARU (Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh) states with high prevalence of underweight, as well as Kerala, Karnataka and Assam.

**Table 6 Classification of states by the change in gender differentials in the prevalence of underweight**

<b>% underweight girls exceeds % underweight boys in both 1998 and 1992:</b> Andhra Pradesh, Gujarat, Haryana, Manipur, Punjab, Tamil Nadu, West Bengal
<b>% underweight boys exceeds % underweight girls in both 1998 and 1992:</b> Goa, Nagaland, Delhi, Arunachal Pradesh, Tripura, Orissa
<b>% underweight girls exceeds % underweight boys in 1998, but not 1992:</b> Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Uttar Pradesh and Rajasthan
<b>% underweight boys exceeds % underweight girls in 1998, but not 1992:</b> Himachal Pradesh, Jammu and Kashmir, Mizoram

*Source: Calculated from NFHS I and NFHS II data*

#### 1.2.3.4 By caste

The national pattern whereby the prevalence of underweight is highest among scheduled tribes, followed by scheduled castes and then other castes, obscures variations at the state level. For example, in Himachal Pradesh, Jammu and Kashmir, Nagaland, Arunachal Pradesh and Tripura, underweight prevalence in 1998/99 was higher among scheduled castes than other castes. In Assam, Goa and Manipur, the underweight prevalence was, in fact, higher among other castes than among scheduled groups.

Within each state, the trend in underweight prevalence (from 1992/93 to 1998/99) can vary dramatically across the castes within that state. In Maharashtra, Uttar Pradesh, Tripura and Gujarat, for example, the underweight prevalence of scheduled tribes increased while the underweight prevalence of other scheduled and non-scheduled castes declined. A similar sort of pattern is observed for scheduled castes in Kerala and Himachal Pradesh and, surprisingly, for non-backward castes in Meghalaya and Haryana.

#### 1.2.3.5 By wealth

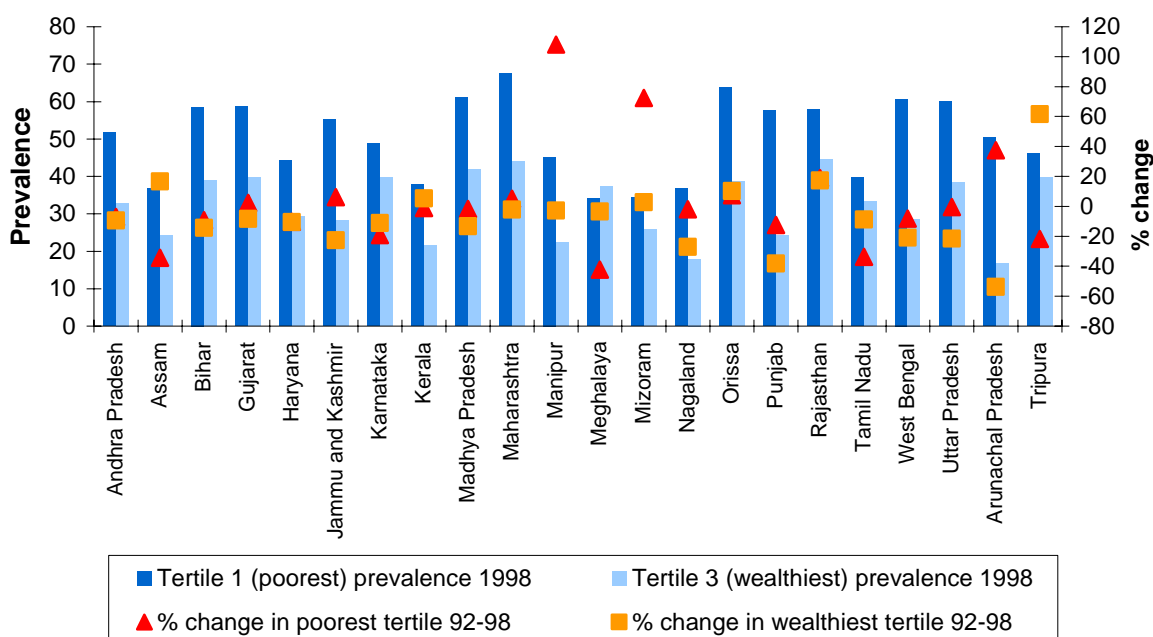
The expected correlation between wealth and nutritional status is evident in the graph below: with almost no exceptions, the prevalence of underweight, both in 1992 and 1998, is much higher among households that lie within the lower tertile (relatively poor) of the all-India wealth distribution than among those in the upper tertile (relatively well-off)<sup>k</sup>.

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<sup>k</sup> Principal components analysis, conducted on a set of variables including household assets and housing characteristics, was used to generate the cut-points for the wealth tertiles, which divide the population of each state into three categories based on the individual's position in the *all India* wealth distribution. Tertiles are used rather than quintiles since, in some states, the latter results in too few observations in particular quintiles.



**Figure 10 Change in the prevalence of underweight, by wealth tertile and state, 1992/93-1998/99**



Source: Calculated from NFHS I and NFHS II data

Note: Manipur data has very few observations in tertile 1 in 1992

More troubling is that the aggregate reduction in the prevalence of underweight between 1992/93 and 1998/99 was smaller for the lowest tertile (poorest third) than for the upper tertile (richest third). Not only is this true in aggregate, but it applies to most states in India, indicating that in most states there are growing disparities in the prevalence of underweight among the well-off and the not-so-well-off. There are, however, some notable exceptions where the percentage reduction in underweight prevalence among the lower tertile was much greater than the upper tertile, indicating some catch-up effect in nutritional status among the relatively poor. Table 7 below summarizes the situation in different states.

**Table 7 Wealth disparities in the trend of underweight prevalence, by state, 1992/93-1998/99**

**Growing inter-tertile nutritional inequalities as a result of:**

*Malnutrition declining less among tertile 1 than tertile 3:* Andhra Pradesh, Bihar, Madhya Pradesh, Nagaland, Punjab, West Bengal, Uttar Pradesh

*Malnutrition increasing in tertile 1 while declining in tertile 3:* Gujarat, Jammu and Kashmir, Maharashtra, Manipur, Arunachal Pradesh

*Malnutrition increasing more in tertile 1 than tertile 3:* Mizoram, Rajasthan

**Narrowing inter-tertile nutritional inequalities as a result of:**

*Malnutrition declining less among tertile 3 than tertile 1:* Karnataka, Meghalaya, Tamil Nadu

*Malnutrition increasing in tertile 3 while declining in tertile 1:* Assam, Kerala, Tripura

*Malnutrition increasing more in tertile 3 than in tertile 1:* Orissa

Source: Calculated from NFHS I and NFHS II data

## 1.3 MICRONUTRIENT DEFICIENCIES

### 1.3.1 Prevalence of iron deficiency anemia (IDA)

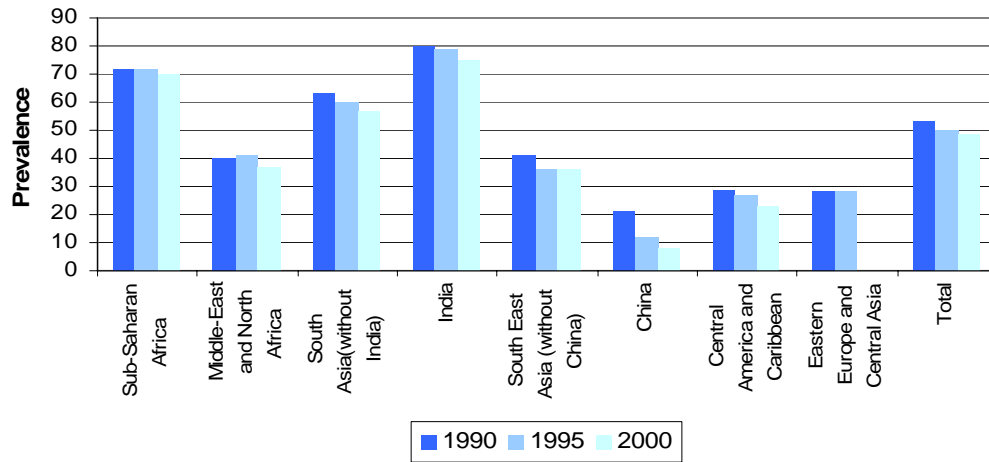
Although the exact prevalence figures vary from study to study, there is no doubt that iron deficiency anemia (IDA) is an extremely serious public health problem in India, especially among pregnant women and children. At least half of all ever-married women aged 15-49 years and adolescent girls are believed to have some degree of IDA<sup>49</sup>. One recent study showed that the prevalence of iron deficiency anemia among both pregnant and lactating women is over 75% and that more than half of pregnant women and a third of lactating women are moderately or severely anemic<sup>50</sup>. In some states, an anemia prevalence as high as 87% has been found among pregnant women from disadvantaged groups<sup>51</sup>. Severe anemia from iron deficiency is believed to claim the lives of 22,000 women during pregnancy and childbirth each year.

The prevalence of IDA among children is much higher than among adult women, and may be partly attributable to the high prevalence of hookworm among children. The overall prevalence of anemia among children aged 6 to 35 months is 74% and most suffer from mild (23%) or moderate (46%) anemia<sup>52</sup>. A recent study found that anemia prevalence among children aged 1 to 5 years is a little lower than the above estimate, but two-thirds of these children can still be classified as anemic, with the majority suffering from moderate anemia<sup>53</sup>.

#### 1.3.1.1 Trends

Progress in reducing the prevalence of IDA has been very slow in India. A recent estimate of IDA prevalence among both non-pregnant and pregnant women aged 15 to 49 years shows that there was very little progress in reducing prevalence between 1990 and 2000. Moreover, population growth added 34.1 million non-pregnant and 2.3 million pregnant anemic women during this time period<sup>54</sup>. Although it has fallen somewhat from almost 80% in 1990, the prevalence of IDA among preschool children was still around 75% in 2000<sup>55</sup>. By contrast, the prevalence of IDA in neighboring countries such as Bangladesh and Pakistan has fallen to 55%. The reduction of IDA prevalence in China is especially remarkable: the prevalence of IDA was halved from over 20% to the current level of 8% within a decade.

**Figure 11 Trends in prevalence of iron deficiency in preschool children, by region, 1990-2000**



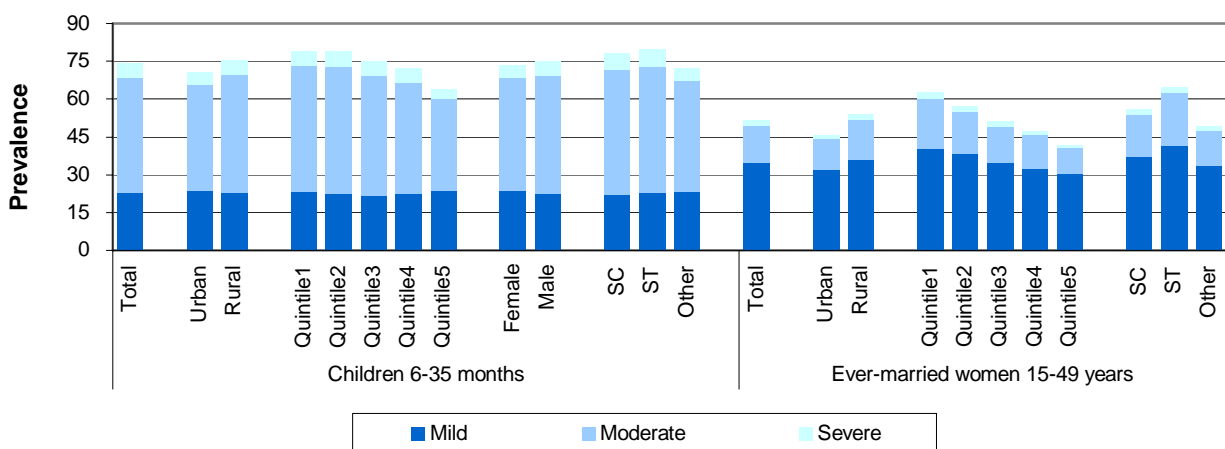
Source: UNICEF and MI 2004b

*1.3.1.3 Variation by demographic and socioeconomic characteristics*

Among children aged 6 to 35 months, there is a noticeable variation in the prevalence of moderate IDA (1998/99) by demographic and socioeconomic characteristics. It tends to be higher among children from disadvantaged groups, namely those living in rural areas, poor households, and from scheduled castes/tribes. The prevalence of mild and severe anemia is less variable, however, hovering around 23% and 5%, respectively. There is almost no difference in the prevalence of IDA by children’s gender.

The pattern of IDA prevalence among ever-married women aged 15-49 years is somewhat similar to that among children, but the variation is larger. The total prevalence among women from scheduled tribes and the poorest 20% of population, for example, is at least 10% higher than the national average (52%), so that the total prevalence among these two groups is above 63%. Figure 12 also reveals that IDA is a condition that afflicts not only the poor: more than 40% of women in the richest two quintiles are also anemic.

**Figure 12 Prevalence of anemia among children aged 6-35 months and women of reproductive age, by demographic and socioeconomic characteristics, 1998/99**



Source: IIPS and ORC Macro 2000

#### 1.3.1.4 Inter-state variation

The prevalence of IDA varies widely across states, among both children and ever-married women. While less than half of children are anemic in Nagaland, Kerala and Manipur, more than 80% of children suffer from IDA in Punjab, Bihar, Rajasthan and Haryana. The prevalence of child anemia is generally higher in the states with a high prevalence of underweight, yet some states with a relatively low underweight prevalence (like Sikkim and Punjab where less than a third of children are underweight) have a surprisingly high IDA prevalence (77% and 80%, respectively).

The variation in IDA prevalence among ever-married women is even higher, ranging from 23% in Kerala to 70% in Assam. Manipur (29%), Goa (36%), and Nagaland (38%) also have a relatively low prevalence. By contrast, in seven states, namely Sikkim, Arunachal Pradesh, West Bengal, Orissa, Meghalaya, Bihar and Assam, more than 60% of ever-married women are anemic. In some states, such as Assam and Arunachal Pradesh, the prevalence of IDA among women is even higher than that among children under three. Figures for the prevalence of IDA among women and children, disaggregated by state and severity of IDA, can be found in Table B in the Appendix.

### 1.3.2 Prevalence of Vitamin A deficiency (VAD)

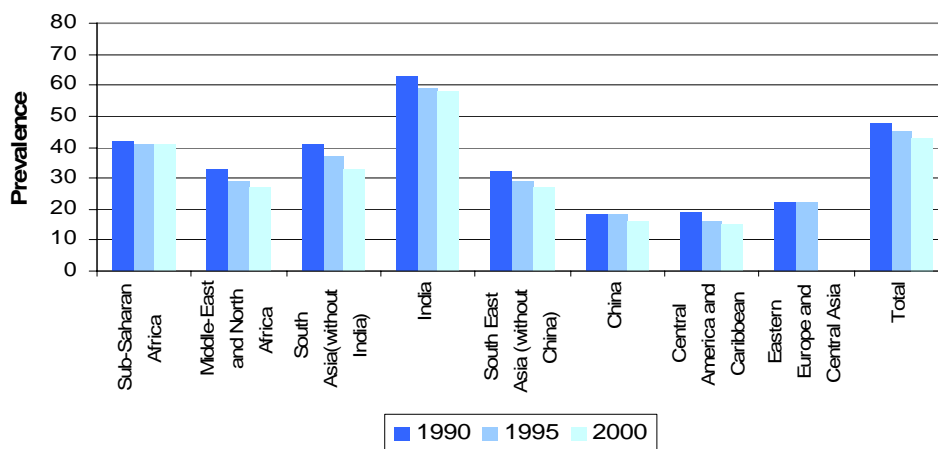
The prevalence of Vitamin A deficiency (VAD) in India is one of the highest in the world, especially among preschool children. The prevalence of subclinical VAD ranges from 31% to 57% among preschool children and a further 1% to 2% of children suffer from clinical VAD<sup>56</sup>. With its large population, India is home to more than a quarter of the world's population of preschool children suffering from subclinical VAD (35.4 out of 127.3 million) and a third of the preschool population with xerophthalmia (1.8 million out of 4.4 million)<sup>57</sup>. As a result of this high prevalence, VAD is estimated to precipitate the deaths of more than 0.3 million children annually in India<sup>58</sup>.

VAD is also prevalent among women of reproductive age and clinical symptoms of night blindness are extremely widespread. About one in every twenty pregnant women has subclinical VAD and almost 12% of them suffered from night blindness during their most recent pregnancy<sup>59</sup>. An extremely high prevalence of maternal night blindness, coupled with a large number of pregnancies, means that approximately every second pregnant woman with night blindness lives in India (3.0 million out of 6.2 million). As might be expected, the prevalence of night blindness is much higher, in fact twice as high, in rural (13.7%) than in urban (6.4%) areas<sup>60</sup>.

### 1.3.2.2 Trends

A trend analysis of the progress in reducing VAD in India shows that there has been some improvement, yet the prevalence of subclinical VAD remains one of the highest in the world. The prevalence of subclinical VAD fell relatively fast in the early 1990s, down to less than 60% among preschool children. However, progress slowed in the second half of 1990s, and recent sources estimate a current prevalence of around 57%<sup>61</sup>.

**Figure 13 Trends in prevalence of subclinical vitamin A deficiency among children under 6, by region, 1990-2000**

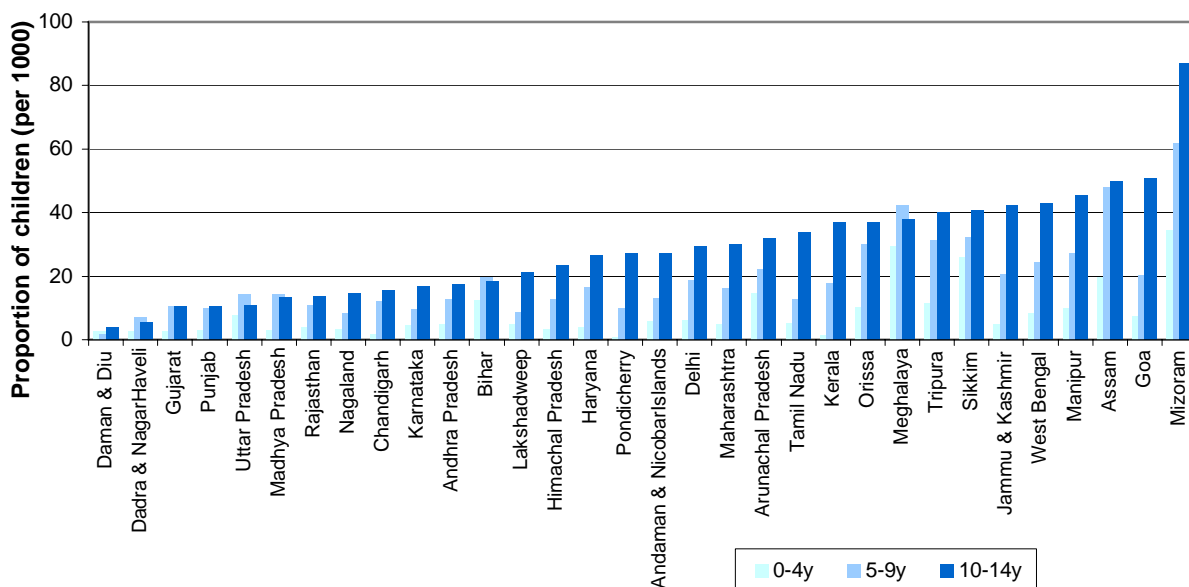


Source: UNICEF and MI 2004b

### 1.3.2.3 Inter-state variation

There is huge variation in the prevalence of VAD among children by state. The incidence of vision problems can, with some measurement error, be used as an indicator of Vitamin A deficiency<sup>1</sup>. The number of children with vision problems has fallen below 10 per 1,000 children in several states and union territories, such as Gujarat and Punjab, but many states in the North-East, such as Tripura, Sikkim, Manipur, Assam, and Mizoram, as well as Jammu and Kashmir, West Bengal, and Goa have more than 30 per 1,000 children with vision problems<sup>62</sup>.

**Figure 14 Proportion of children (per 1000) experiencing day and night-time vision difficulties**



Source: DWCD and UNICEF 2001

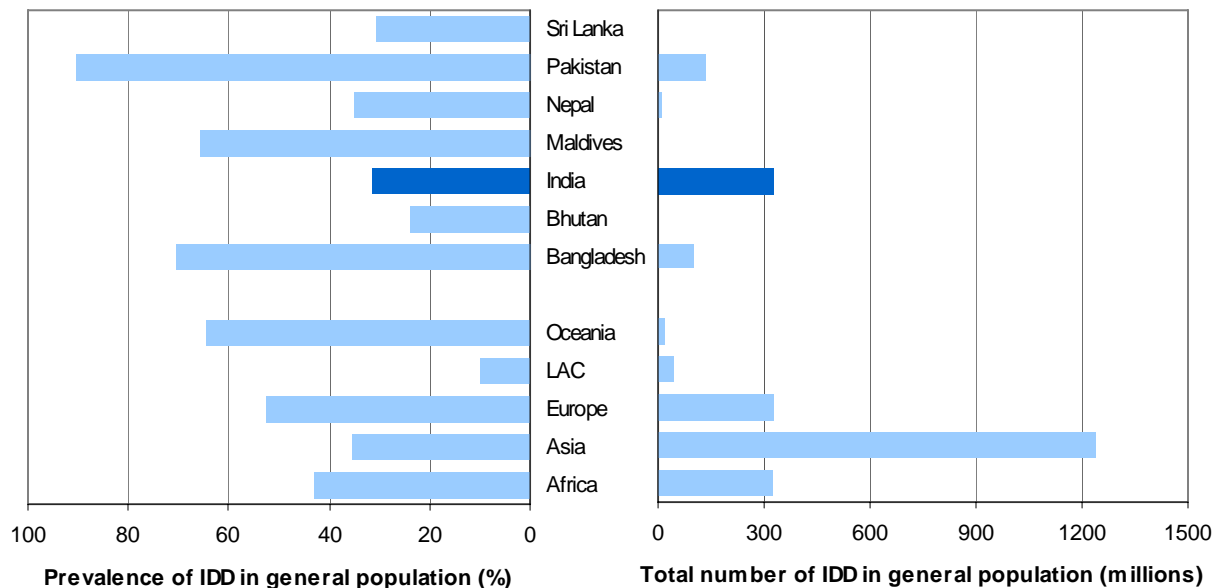
Note: The variation in day and night-time vision difficulties across states is used as an indicator of the variation in Vitamin A deficiency across states

### 1.3.3 Prevalence of iodine deficiency disorders (IDD)

Although the prevalence of iodine deficiency disorders (IDD) in India is lower than in most South Asian countries, the problem is ubiquitous and affects millions of people. One survey showed that more than 85% of districts (241 out of 282) are IDD endemic<sup>63</sup>. This places about 329 million people at risk, equivalent to a third of India's population or a sixth of the total global population that is at risk of IDD (see Figure 15). Of those who suffer from IDD in India, 51 million are school-aged children (aged 6 to 12 years). A third of all children in the world that are born with IDD-related mental damage live in India<sup>64</sup>.

<sup>1</sup> In the source data (DWCD and UNICEF 2001), reports of day and night-time vision problems were used as indicators of Vitamin A deficiency. However, it is probable that not all vision problems are Vitamin A-related and that there may be some under-reporting in disadvantaged areas due to poorer diagnostic capabilities.

**Figure 15 Prevalence and number of IDD in the general population, by region and country**



Source: ACC/SCN 2004

### 1.3.3.1 Inter-state variation

Like other vitamin and mineral deficiencies, the prevalence of IDD varies widely across and within states. 17 states have been identified as goiter-endemic,<sup>65</sup> as have most hilly regions. More recently, there appears to have been an emergence of new endemic areas in the plains<sup>66</sup>. According to a 2001 five state study, the prevalence of IDD varies from 15% in Tamil Nadu to 46% in Karnataka. At the district level, the variation is even greater: for example, the East Godavari and Nellore districts in Andhra Pradesh and Kannur district in Kerala are effectively free of iodine deficiencies, while the prevalence is as high as 90% in Shimoga district in Karnataka<sup>67</sup>.

## 1.4 WILL INDIA MEET THE NUTRITION MDG?

The Millennium Development Goals (MDGs) are a set of internationally agreed goals that countries and institutions have committed to reach by 2015. The second MDG target, which we refer to as the nutrition MDG, is to halve between 1990 and 2015:

- (i) the prevalence of underweight children (under five years of age)
- (ii) the proportion of population below a minimum level of dietary energy consumption.

A few studies, using different assumptions<sup>m</sup>, have considered the likelihood that India will attain the second nutrition MDG. Although their projections differ, in sum it seems unlikely that the prevalence of malnutrition in India will fall from its level of 54% in 1990 to 27%<sup>n</sup> by 2015<sup>68</sup>. NFHS data shows that, in 1998/99, even the wealthiest quintile had a prevalence of malnutrition (33%) that far exceeded the MDG goal. Our projections indicate that economic growth alone is unlikely to be sufficient to lower the prevalence of malnutrition. When combined with policy interventions, the projections are rosier, but a rapid scaling-up of health, nutrition, education and infrastructure interventions is needed if the MDG is to be met<sup>69</sup>.

#### 1.4.1 MDG projections: the effect of economic growth alone

The effect that India's economic growth in the coming decade will have on the prevalence of malnutrition in 2015 can be projected using estimates of the elasticity (i.e. responsiveness) of malnutrition to annual economic or income growth. The magnitude of these elasticities should ideally be calculated from household surveys<sup>70</sup>, provided that surveys have appropriate income or expenditure data. In the absence of appropriate data, an alternative it to assume a rule-of-thumb elasticity and test its sensitivity.

In order to estimate that effect that economic growth will have on the prevalence of underweight, the following assumptions are made:

- a 3% average annual *per capita* growth rate, which was the actual average in India between 1990 and 2002<sup>71</sup>.
- an income elasticity of underweight of 0.51<sup>72</sup>.

Under these assumptions, the prevalence of underweight among children *under three* will fall to only 39% by the year 2015 (see Table 8). Under a more generous average annual *per capita* growth rate of 5%, the prevalence falls to 36.3% - still short of the MDG. Even under an unrealistically generous income elasticity assumption of 0.7, prevalence falls to only 35%. Under the assumption that the prevalence of underweight in 2002 has fallen somewhat since 1999, for example by 1% *per annum* to 43%, the change in the predicted prevalence is greater, but still remains far in excess of the targeted 27.4% mark. Only when an exceptional average annual *per capita* economic growth rate of 8% is assumed does underweight fall low enough to reach the MDG. This sensitivity analysis shows that this conclusion is robust to a wide range of assumptions: economic growth by itself cannot be expected to reduce the prevalence of underweight to MDG levels.

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<sup>m</sup> Wagstaff and Claeson (2004) use 1990-92 data from rural areas, as well as the later NFHS I (1992/93) and NFHS II (1998/99) data, and obtain an average annual reduction of 3.9%; Chhabra and Rokx (2004) and World Bank (2004a) obtain similar estimates (1.7% and 1.9% respectively) when using a constant rate of change and data from NFHS I and NFHS II with the differences in the estimates only attributable to rounding.

<sup>n</sup> The rate shown for 1990 is projected from the change observed between the two NFHS surveys in 1992/93 and 1998/99. This MDG target is calculated for children under three and, therefore, differs from the WHO target which focuses on children under five.

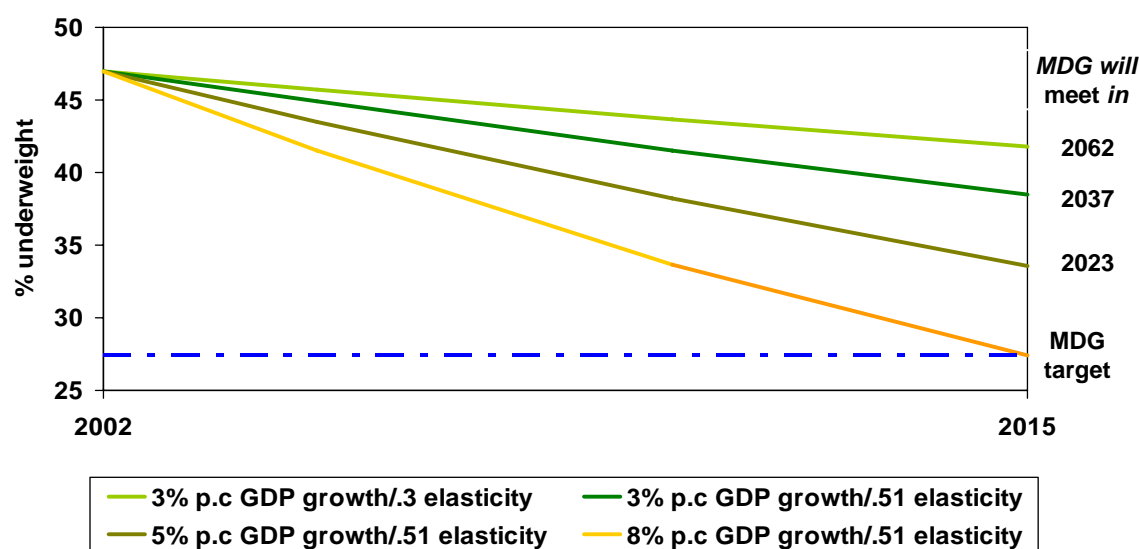


**Table 8 Under all likely economic growth scenarios, India will not reach the nutrition MDG without direct nutrition interventions**

Estimated prevalence of underweight 2002	Income elasticity of malnutrition	Average annual <i>per capita</i> GDP growth		
		3%	5%	8%
43%	0.51	35%	31%	
47%	0.51	39%	36%	27.3%
47%	0.3	41%	39%	
47%	0.7	35%	30%	

Note: Shaded cells show predicted prevalence of underweight among under-threes in 2015; see Table A in the Appendix for detailed calculations

**Figure 16 Predicted prevalence of underweight in 2015, under different economic growth scenarios**



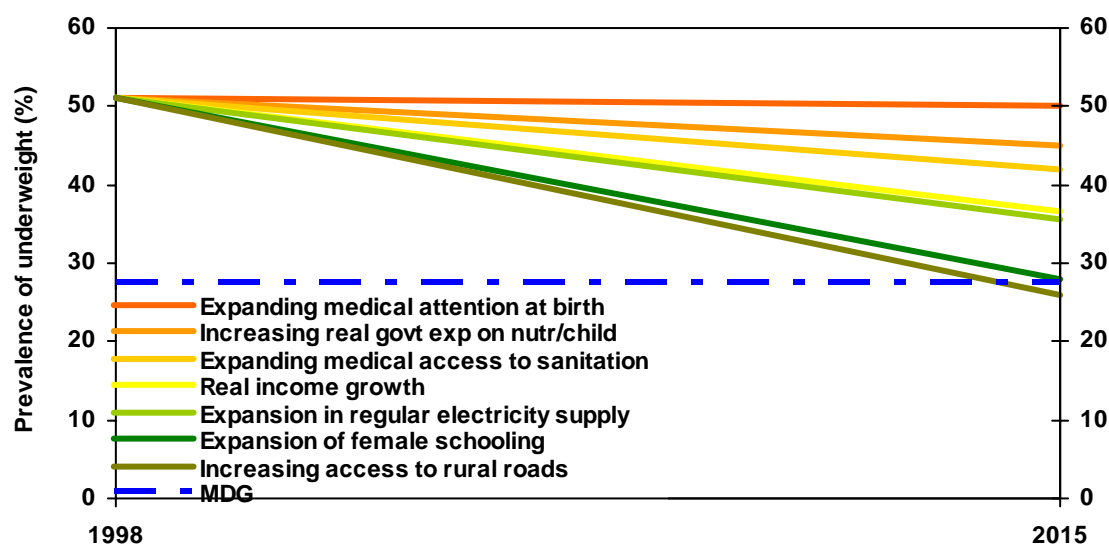
Note: This figure corresponds to the estimates in Table 8

### 1.4.2 MDG projections: the effect of economic growth plus an expanded set of interventions

Projections from a recent World Bank publication<sup>73</sup> combine economic growth assumptions *and* policy interventions. They show that even if poor states were brought up to the national average in terms of coverage of sanitation, road access, electricity, medical attention at time of delivery, female schooling, household income (consumption) and public spending on nutrition per child, the cumulative reduction in the national prevalence of underweight would only be about 8 percentage points (or 15%). If the magnitude of the proposed interventions were further scaled up so as to bring the poor states to the average level prevailing in the non-poor states, the cumulative reduction in the prevalence of underweight rate would be 21 percentage points or

38% – still short of the MDG. Only when seven particular interventions<sup>o</sup> (see Figure 17) are pursued simultaneously can one expect a reduction of 25 percentage points in the child underweight rate in the poor states – enough for them to reach their MD Goal of 27.4% of children being underweight.

**Figure 17 Projected percentage of children under three who are underweight in poor states, under different intervention scenarios, 1998 to 2015**



Source: World Bank 2004a.

Note: Graph shows cumulative effect of each additional intervention

## 1.5 CONCLUSIONS

It is clear that the problem of undernutrition in India is one of alarming magnitude, but also of great complexity. The prevalence of underweight is among the highest in the world, nearly double that in Sub-Saharan Africa, and the pace of improvement lags behind what might be expected given India's economic growth. Modest progress has been seen in reducing undernutrition over the last decade, but most of this progress has been driven by improvements among higher socioeconomic groups. Even if India comes close to achieving the nutrition MDG in 2015 (which it may not), it will still have levels of undernutrition equivalent to those that exist in Sub-Saharan Africa today<sup>74</sup>. Iron, iodine and Vitamin A deficiencies are widespread and have serious consequences for child survival and economic productivity.

<sup>o</sup> The World Bank (2004a) estimates that reaching the 2015 MDG target is feasible under the following combination of economic growth and policy interventions: 0.3% increase in average years of female schooling, a 4% increase in per child government expenditure on nutrition programs, a 3% increase in consumption expenditure per capita, a 1 percentage point increase in the coverage of regular electricity supply, a 1.5 percentage point increase in the population coverage of professionally-assisted deliveries, a 1 percentage point increase in village access to *pucca* roads and a 2 percentage point decrease in the population with no access to toilets since 1998/99.

While aggregate levels of undernutrition are extremely high, the picture is further exacerbated by the significant inequalities across states and socioeconomic groups. Girls, rural areas, the poorest, and scheduled tribes and castes are the worst affected. In Maharashtra, Bihar, Madhya Pradesh, Uttar Pradesh, Orissa and Rajasthan, more than one in two children are underweight. Thus, while undernutrition is a national problem, the problem is clearly more acute among certain groups, and inequalities in malnutrition appear to be increasing.

We now turn to examine India's primary programmatic response to the child malnutrition problem – the Integrated Child Development Services scheme.

## CHAPTER 2 THE INTEGRATED CHILD DEVELOPMENT SERVICES PROGRAM (ICDS) – ARE RESULTS MEETING EXPECTATIONS?

**India’s primary policy response to child malnutrition, the Integrated Child Development Services (ICDS) program, is well-conceived and well-placed to address the major causes of child undernutrition in India. However, more attention has been given to increasing coverage than to improving the quality of service delivery and to distributing food rather than changing family-based feeding and caring behavior. This has resulted in limited impact.**

The ICDS has expanded tremendously over its 30 years of operation to cover almost all development blocks in India and offers a wide range of health, nutrition and education services to children, women and adolescent girls. However, while the program is intended to target the needs of the poorest and the most undernourished, as well as the age groups that represent a significant “window of opportunity” for nutrition investments (i.e. children under three, pregnant and lactating women), there is a mismatch between the program’s intentions and its actual implementation.

Key mismatches are that:

- (iv) The dominant focus on food supplementation is to the detriment of other tasks envisaged in the program which are crucial for improving child nutritional outcomes. For example, not enough attention is given to improving child-care behaviors, and on educating parents how to improve nutrition using the family food budget.
- (v) Older children (between 3-6 years) participate much more than younger ones and children from wealthier households participate much more than poorer ones. The program fails to preferentially target girls, lower castes or poorest villages (all of whom are at higher risk of undernutrition);
- (vi) Although program growth was greater in underserved than well-served areas during the 1990s, the poorest states and those with the highest levels of undernutrition still have the lowest levels of program funding and coverage by ICDS activities.

In addition to these mismatches, the program faces substantial operational challenges. Inadequate worker skills, shortage of equipment, poor supervision and weak M&E detract from the program’s potential impact. Community workers are overburdened, because they are expected to provide pre-school education to four to six year olds as well as nutrition services to all children under six, with the consequence that most children under three—the group that suffers most from malnutrition—do not get micronutrient supplements, and most of their parents are not reached with counseling on better feeding and child care practices.

However, examples of successful interventions (Bellary district in Karnataka) and innovations/variations in ICDS from several states (the INHP in nine states, the Dular scheme in Bihar and the TINP in Tamil Nadu) suggest that the potential for better implementation and for impact does exist.

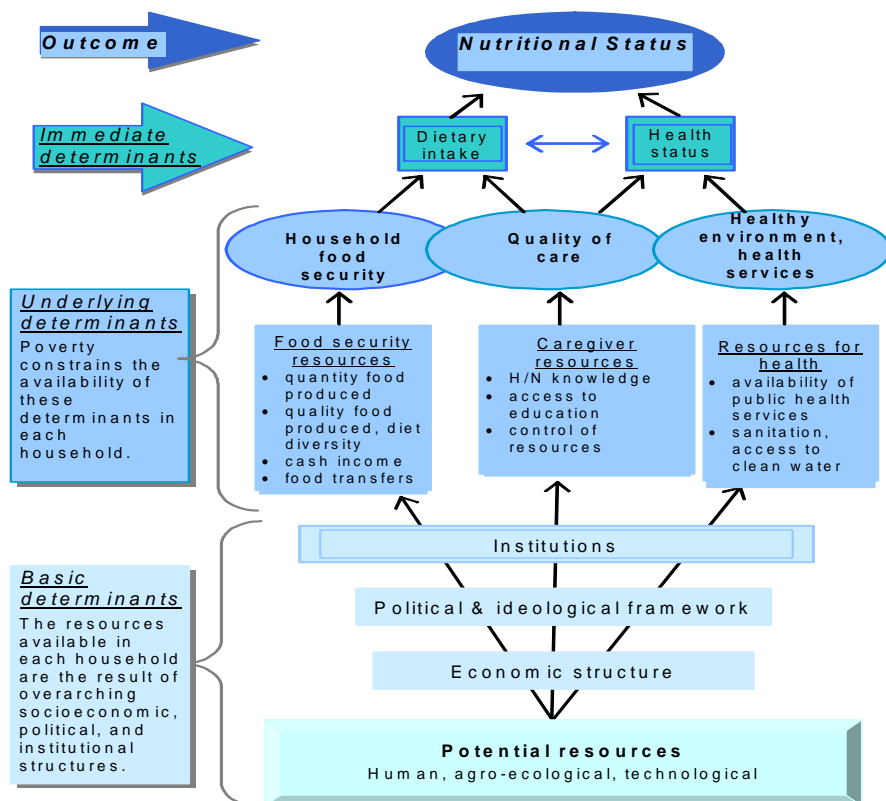
## 2.1 HOW ICDS AIMS TO ADDRESS THE CAUSES OF PERSISTENT UNDERNUTRITION

With strong government commitment and political will, the ICDS program has emerged from small beginnings in 1975 to become India's flagship nutrition program. Using a conceptual framework of the causes of undernutrition, this section shows that many of the ICDS program components are well-designed to address the immediate causes of child undernutrition in India, even though – as will be seen later – substantial shifts in focus and improvements in implementation will be necessary if the program is to realize that potential.

### 2.1.1 A conceptual framework of the causes of undernutrition

Child undernutrition is a consequence of the complex interactions of multiple determinants. One way to conceptualize these interactions is with the use of a framework that traces the causal pathways of undernutrition through different levels – the most immediate, the underlying, and the basic causes.

Figure 18 Conceptual framework: the causes of undernutrition



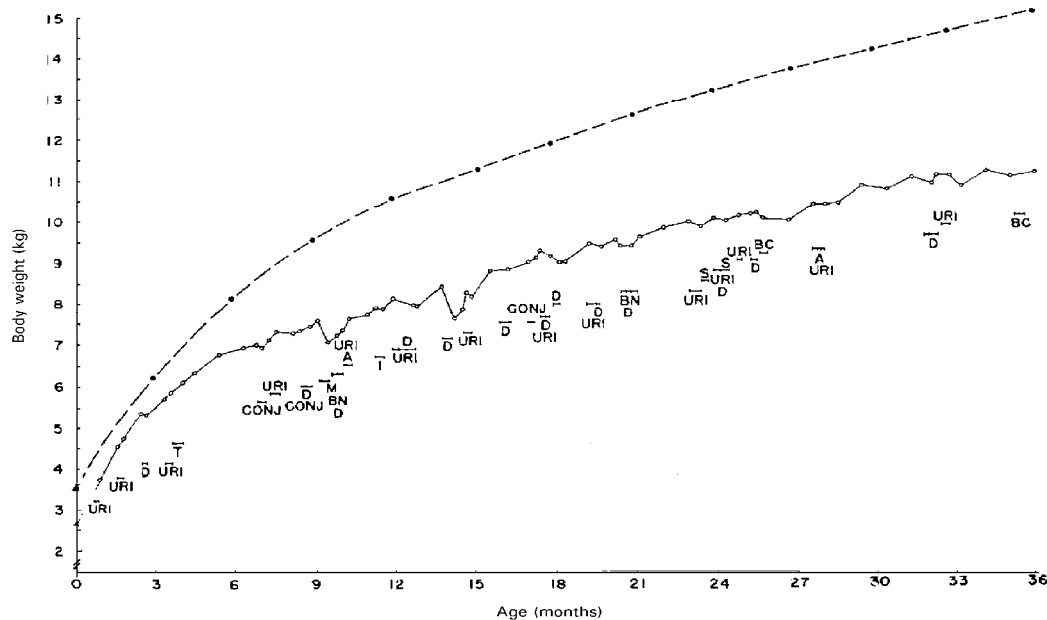
Source: Adapted from UNICEF 1990; Jonsson 1993; Smith and Haddad 2000

### 2.1.1.1 *The immediate causes of undernutrition*

The first level is composed of the most immediate causes of malnutrition and highlights the importance of both food intake *and* the absence of infection for improving child nutritional status. Inadequate dietary intake and infections create a vicious cycle that is responsible for much of the high morbidity and mortality among children in developing countries. On the one hand, when children do not consume enough, immune response is lowered, rendering them more susceptible to infectious diseases. On the other hand, ill children deplete their nutritional stores and are in poor health because of reduced intake, poor absorption of nutrients and the increased demands of combating disease<sup>1</sup>.

Over the past decades, a large body of work has documented the interaction between nutrition and infection. Evidence of the malnutrition-infection syndrome was first reported in studies conducted in India and Guatemala which found that children developed diarrheal infections around the time of weaning from breastmilk to other foods, and that they were subsequently more prone to infections and growth faltering<sup>2</sup>. While the weight loss associated with a single episode of infection can be made up if the diet is adequate, recurrent episodes of infection without sufficient food or inadequate recovery time is a primary cause of poor growth among children in developing countries<sup>3</sup>. Figure 19 clearly shows how periods of infection are associated with subsequent weight loss in children. Following infection, a number of weeks pass before the child's weight returns to that before onset, leaving the child further retarded in weight-for-age. In the case of diarrhea, the degree of growth deficit has been shown to be proportional to the number of days ill<sup>4</sup>. If infections are frequent, high rates of underweight will prevail, even when food intake is adequate. The converse is also true: if infections are less common or less severe, lower rates of child undernutrition will prevail even if average food intake is low. Thus, sufficient food intake is only one determinant of nutritional status.

**Figure 19 How infection compromises growth: the association between repeated episodes of infection and weight gain of a child during the first three years of life**



Source: Reproduced from Calder and Jackson 2000, based on work by Mata et al. 1977.

Notes: (o-o) designates the weight of the child; (•- - •) is the median of the weight-for-age standard curve; A, abscess; BC, bronchitis; BN, bronchopneumonia; CONJ, conjunctivitis; D, diarrhea; I, impetigo; M, measles; S, stomatitis; T, oral thrush; URI, upper respiratory tract infection. The length of the horizontal lines indicates the duration of individual episodes of infectious disease.

### 2.1.1.2 The underlying determinants of undernutrition

The two immediate causes of malnutrition, poor dietary intake and infection, are closely linked to the three underlying determinants of nutritional status: household-level access to food, health resources (such as preventive and curative healthcare, and clean water and sanitation) and the appropriateness of the child care and feeding behaviors that caregivers adopt with respect to their children<sup>a</sup>.

#### A. Household-level food security

This refers to physical and economic access to foods that are socially and culturally acceptable, and of sufficient quality and quantity. This is not necessarily assured by macro-level food security, i.e. sufficient food production at national/regional levels. Food security at the household level is determined by a more complex array of factors than agricultural production, including local prices (of food and other goods), income and an effective trade and transport infrastructure<sup>5</sup>. Moreover, household food security is not in itself sufficient to assure that the nutritional needs of every child, and adult, living in a particular household will be met. Within each household, decisions are made as to the quantity and quality of food that is allocated to each household member and a further

<sup>a</sup> Together these factors constitute the concept of *nutrition security*, which is viewed as the outcome of good health, a healthy environment and good caring practices combined with household level *food security*.

complex range of factors influences this decision. These factors may include the relative bargaining power of household members (which in turn may be related to their individual income, autonomy, gender and education) as well as other characteristics, such as health status of individual members. Consequently, the diets of individual children (or others) within the household may be deficient even though *per capita* caloric intakes are high and even when the household is food secure.

### *B. Access to health resources*

*(i) Access to sufficient clean water, good sanitation and a clean living environment.* Over-crowding, congestion, a shortage of clean water and inadequate facilities for the disposal of human excreta, waste water and solid wastes contribute to the development of gastrointestinal infections, such as diarrhea, and facilitate the spread of infectious disease. Historical studies of the sanitary revolution, for example, show that while mortality rates in urban areas exceeded those of rural areas prior to the revolution, the situation was reversed following the sanitation improvements<sup>6</sup>. Crowding has been shown to be associated with an increased risk of infectious intestinal disease (due to rotavirus group A) in children<sup>7</sup> and tuberculosis infection<sup>8</sup>. Poor water quality, a limited quantity of water, poor excreta disposal practices and poor food hygiene are all associated with increased diarrhea prevalence in infants<sup>9</sup>. Moreover, good water, sanitation and hygiene conditions at the community level generate important externalities for individual households in the community: in Peru<sup>10</sup> and Andhra Pradesh<sup>11</sup>, it has been shown that good water and sanitation at the neighborhood level has a positive effect on the height of children in a particular household independent of whether that household itself has a healthy environment<sup>12</sup>.

*(ii) Access to health services, including vector and disease control.* In section 2.1.1, it was established that the presence of infection, and particularly communicable disease, is a direct cause of malnutrition. Consequently, efforts to prevent exposure to infection and cure disease should stand central to any strategy aimed at combating malnutrition, including regular deworming, the use of bed nets in malaria areas and access to regular and affordable health check-ups.

### *C. Adopting appropriate childcare behaviors*

Providing appropriate care, which can mitigate the impact of the malnutrition-infection cycle for vulnerable groups such as children and pregnant and lactating women, means adopting child-care and feeding behaviors that direct available resources towards promoting child nutritional well-being. For example, adequate care during pregnancy and delivery can reduce the incidence of maternal death, miscarriage, stillbirth and low birth weight among infants. Likewise, adequate feeding of young children (initiation of breastfeeding within an hour of birth, exclusive breast-feeding for the first six months of life and adequate and timely complementary feeding starting at 6 months while continuing to breastfeed) is critical for child growth.



Caregiver's time, their knowledge and educational status, autonomy, control over monetary and other resources, and their capacity to make appropriate caring decisions are often the key factors that determine how children (and pregnant women) are cared for.

#### 2.1.1.3 *The basic determinants of undernutrition*

Finally, the framework links these underlying determinants to a set of basic determinants which include the availability of human, economic and organizational resources with which to improve nutrition, the use of which is shaped by how society is organized in terms of economic structure, political and ideological expectations, and the institutions through which activities and resources within society are regulated, social values are met, and potential resources are converted into actual resources.

### **2.1.2 The design of the ICDS program and the underlying causes of child undernutrition**

The Integrated Child Development Services (ICDS) program is potentially well-poised to address some of the *underlying* causes of persistent undernutrition, identified in the framework above.

The program adopts a multi-sectoral approach to child well-being, incorporating health, education and nutrition interventions (Table 9), and is implemented through a network of *anganwadi* centers at the community level. The Department of Women and Child Development's (DWCD) emphasis on a "life-cycle approach" means that malnutrition is fought through interventions targeted at unmarried adolescent girls, pregnant women, mothers and children aged 0 to 6 years. Eight key services are provided, including supplementary feeding, immunization, health checkups and referrals, health and nutrition education to adult women, micronutrient supplementation and preschool education for 3 to 6 year olds. As the program has developed, it has expanded its range of interventions to include components focused on adolescent girls' nutrition, health, awareness, and skills development, as well as income-generation schemes for women.

**Table 9 Range of services that the ICDS seeks to provide to children and women**

	<b>Children under 6</b>	<b>Pregnant women</b>	<b>Lactating women</b>
<b>Health check-ups, and treatment</b>	Health check-ups by AWW, ANM, LHW Treatment of diarrhea Deworming Basic treatment of minor ailments Referral of more severe illnesses	Antenatal check-ups	Postnatal check-ups
<b>Growth-monitoring</b>	Monthly weighing of under-threes Quarterly weighing of 3-6 year olds Weight recorded on growth cards		
<b>Immunization</b>	Immunization against poliomyelitis, diphtheria, pertussis, tetanus, tuberculosis and measles	Tetanus toxoid immunization	
<b>Micronutrient supplementation</b>	IFA and Vitamin A supplementation for malnourished children	IFA supplementation	
<b>Health and nutrition education</b>		Advice includes infant feeding practices, child care and development, utilization of health services, family planning and sanitation	Advice includes infant feeding practices, child care and development, utilization of health services, family planning and sanitation
<b>Supplementary nutrition</b>	Hot meal or ready-to-eat snack providing 300 calories and 8-10g protein Double rations for malnourished children	Hot meal or ready-to-eat snack providing 500 calories and 20-25g protein	Hot meal or ready-to-eat snack providing 500 calories and 20-25g protein
<b>Preschool education</b>	Early Childhood Care and Preschool Education (ECCE) consisting of "early stimulation" of under-threes and education "through the medium of play" for children aged 3-6 years		

Source: DWCD 2004

Note: In practice, not all of these services are necessarily provided at every AWC

However, as will be discussed later in this chapter, while ICDS has the potential to address many of the underlying causes of malnutrition, there are a number of mismatches between design and implementation within the program (especially with respect to targeting), as well as some serious problems with the quality of implementation. ICDS will, therefore, need some strategic changes for it to effectively combat malnutrition in India.

### 2.1.3 ICDS and the World Bank

Total government expenditure on the program has grown sharply over time. An average of 700 million rupees was spent per year on the program between 1975 and 1992, but this amount rose more than six-fold to average 4,542 million rupees per year between 1992 and 1997. For 1999-2000, the budgetary allocation for the program was over 8,557 million rupees and more than US\$400 million have been allocated under India's Tenth Five-Year Plan (2002-2007). The program has been supported by several donors, including UNICEF, SIDA, WFP, CARE and NORAD.

The World Bank has supported efforts to improve nutrition in India, in general, since 1980 through six projects. With an overall investment of US\$ 712.3 million in the sector, India accounts for the largest volume of Bank Group lending devoted specifically to nutrition programs. Support to ICDS, in particular, has been provided in three overlapping phases:

- Phase I in which the Bank supported the Tamil Nadu Integrated Nutrition Project (TINP) as an alternative to the standard ICDS in the state of Tamil Nadu (TINP I, 1980-89; TINP II, 1990-1997);
- Phase II in which support was extended to the standard government ICDS programs, as well as some additional activities (ICDS I in Orissa and Andhra Pradesh, 1991-1997, and ICDS II in Bihar and Madhya Pradesh, 1993-2000); and
- Phase III in which the primary emphasis has moved from expanding coverage to improving quality of services (through an ICDS component in the Andhra Pradesh Economic Restructuring Program, 1999-2004, and the Woman and Child Development Project<sup>b</sup>, 1999-2004).

## 2.2 EMPIRICAL FINDINGS ON THE IMPACT OF ICDS

The ICDS program has been the subject of a large volume of research. Most evaluations have focused on the quality of infrastructure and inputs, and the execution of activities. There have been few rigorous evaluations of the program's impact on nutritional status or health behaviors, partly because there are few sources of data that permit the comparison of outcomes among recipients and non-recipients of the program. Consequently, authors have been unable to use the statistically rigorous methodologies that would enable them to draw more reliable conclusions about the impact of ICDS. As a result, some studies have found that the program is associated with improvements in nutritional status, while other studies have failed to find a positive effect. In future, to be sure of measuring the impact accurately, it will be necessary to have data on treatment and control populations, preferably over at least two time periods.

The major national-level study of program impact<sup>13</sup> found that the prevalence of underweight was lower among children in areas with the ICDS program in place than elsewhere, for both children under three<sup>c</sup> and children aged 3 to 6<sup>d</sup>, but given the sample sizes of the control and treatment groups both these differences are statistically insignificant<sup>14</sup>.

Three recent studies estimate the association between having an *anganwadi* center in a village and the likelihood that a child is underweight, and find little or no association between the presence of an ICDS center and child nutritional status. Using multivariate analysis of the 1992/93 NFHS data, the World Bank (2004a) estimates that, for boys, having a local ICDS center is associated with a 5% reduction in the likelihood of being underweight, but that there is no significant association for girls. Using both the 1992/93 and the 1998/99 NFHS data, Das Gupta *et al* (2005) find that the program appears to

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<sup>b</sup> The Woman and Child Development Project supports ICDS service delivery in 11 states (Maharashtra, Kerala, Rajasthan, Uttar Pradesh, Tamil Nadu, Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Orissa and Uttaranchal), as well as a component that supports training for ICDS officials across all of India.

<sup>c</sup> The prevalence of underweight was 29.2% where the program was in place, compared with 32.3% elsewhere.

<sup>d</sup> The prevalence of underweight was 25.3% where the program was in place, compared with 30.2% elsewhere.

have a significant and positive effect on nutritional outcomes. However, on more rigorous exploration, using propensity score matching techniques, they find little significant effect when children in ICDS villages are compared with children with similar demographic, household and village characteristics in non-ICDS villages. In a multivariate model of cross-sectional data collected in Kerala, Rajasthan and Uttar Pradesh between 2000 and 2002, Bredenkamp and Akin (2004) find that children who live in villages with *anganwadi* centers are not significantly less likely to be underweight or ill than other children. When using data on actual attendance at *anganwadi* centers in six states<sup>e</sup>, it is found that only in Kerala is this significantly associated with better nutritional status<sup>15</sup>.

There is also not much evidence that ICDS has been successful in attaining its goal of improving the coverage of specific child health interventions such as de-worming and Vitamin A supplementation, and encouraging mothers to adopt appropriate child care and feeding behaviors (including practices related to breastfeeding, weaning and diet) that have the potential to improve child growth and health outcomes. Data from Kerala, Maharashtra, Rajasthan and Uttar Pradesh show no clear evidence that these behaviors were more common in ICDS areas, with the exception of Maharashtra<sup>16</sup> (Table 10). Although communication for behavior change through the AWW is a crucial weapon against poor health and malnutrition, it appears that any information that the AWW is conveying to mothers is not being communicated effectively enough to impact positively on mothers' behavior.

**Table 10 Comparison of intermediate health outcomes and behaviors across children living in villages with and without an AWC**

	<i>In villages:</i>	Kerala	Maharashtra	Rajasthan	Uttar Pradesh
<b>Percentage over 6 mths receiving Vitamin A supplementation</b>	Without AWCs	81.2	80.5	29.8	18.0
	With AWCs	78.3***	<b>88.5***</b>	22.5***	<b>21.0***</b>
<b>Percentage older than 12 months ever dewormed</b>	Without AWCs	61.1	34.3	3.7	17.7
	With AWCs	<b>66.3***</b>	<b>59.7***</b>	4.1	13.3***
<b>Percentage over 6 mths consuming Vitamin A-rich food within previous 3 days</b>	Without AWCs	78.1	78.1	27.6	36.0
	With AWCs	72.0***	<b>90.5***</b>	26.9	32.5***
<b>Percentage breastfed within 1 hour of delivery</b>	Without AWCs	85.6	54.4	9.4	6.1
	With AWCs	80.0***	41.2***	10.3	6.7
<b>Percentage consuming colostrum</b>	Without AWCs	98	18.9	74.1	53.4
	With AWCs	96.9***	<b>28.7***</b>	<b>80.4***</b>	37.3***
<b>Percentage under 6 mths who are exclusively breastfed</b>	Without AWCs	67.1	21.5	38.4	99.7
	With AWCs	58.2***	11.3***	<b>43.3*</b>	84.6***
<b>Percentage aged 6-9 mths consuming complementary food</b>	Without AWCs	84.1	67.3	93.8	0.3
	With AWCs	87.7	<b>73.6</b>	93.7	<b>19.1***</b>
<b>Mean duration of breastfeeding, among children who have been weaned</b>	Without AWCs	13.4mths	16.3mths	8mths	23.7mths
	With AWCs	12.5mths***	17.4mths***	7.1mths***	22.8mths***

Source: Calculated from ICDS III baseline/ICDS II endline survey 2000-2002 in Bredenkamp and Akin 2004

Notes: \* statistically significant at the 10% level; \*\* 5% level; \*\*\* 1% level

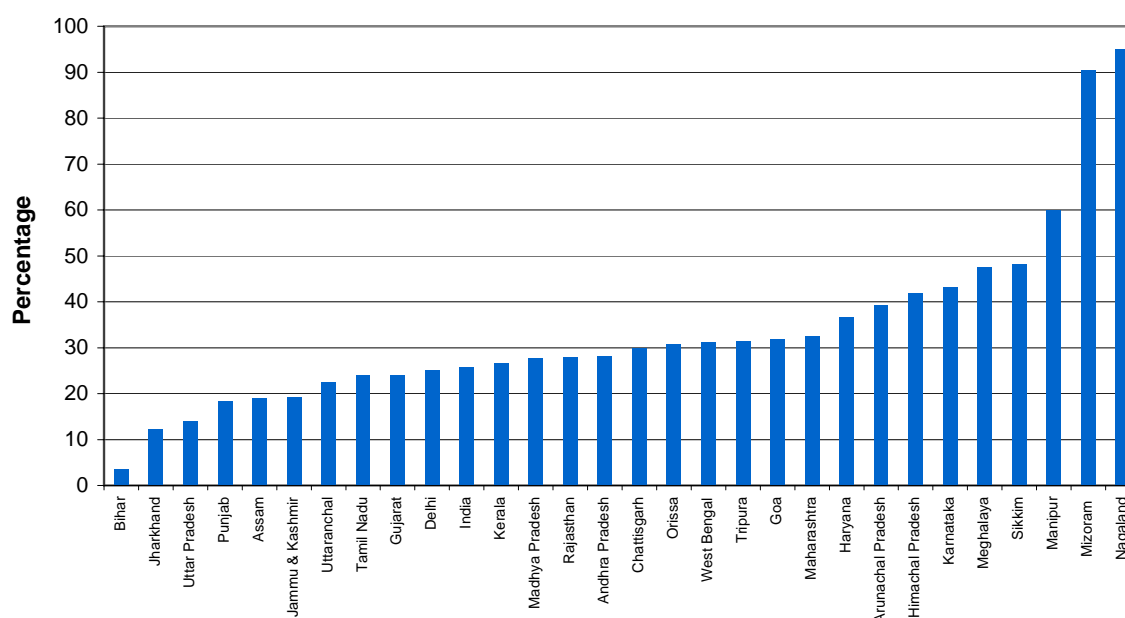
For clarity, **boldface** indicates where outcomes are significantly *better* in villages with AWCs

<sup>e</sup>These six states are Kerala, Maharashtra, Rajasthan, Uttar Pradesh, Madhya Pradesh and Chhattisgarh.

## 2.3 GEOGRAPHICAL TARGETING: THE PLACEMENT OF ICDS PROGRAMS ACROSS STATES AND VILLAGES

The percentage of administrative *blocks* covered by ICDS has reached almost 90% (see Table C in the Appendix). However, the percentage of children who actually take up the services provided by the program is lower and varies considerably across states. By December 2002 only one quarter of children aged between 6 months and 6 years benefited from the supplementary nutrition (SNP) component<sup>f</sup> of ICDS, on average, with this figure ranging from little more than 10% to over 90% across the states. Coverage is particularly high in the north-eastern states.

**Figure 20 Inter-state variation in the percentage of children enrolled in the SNP component, 2002**



Source: DWCD enrolment data (updated 2004); Census of India 2001

Note: Figures are calculated from data on the number of children aged 6 months to 6 years who were SNP beneficiaries in December 2002 (DWCD data) and from population data for children under 6 in 2001 (Census of India 2001). The use of different age categories may result in a slight underestimation of the number of beneficiaries while the use of population data from 2001 may result in a slight overestimation of the percentage of beneficiaries, so that the net magnitude and direction of the bias is hard to predict.

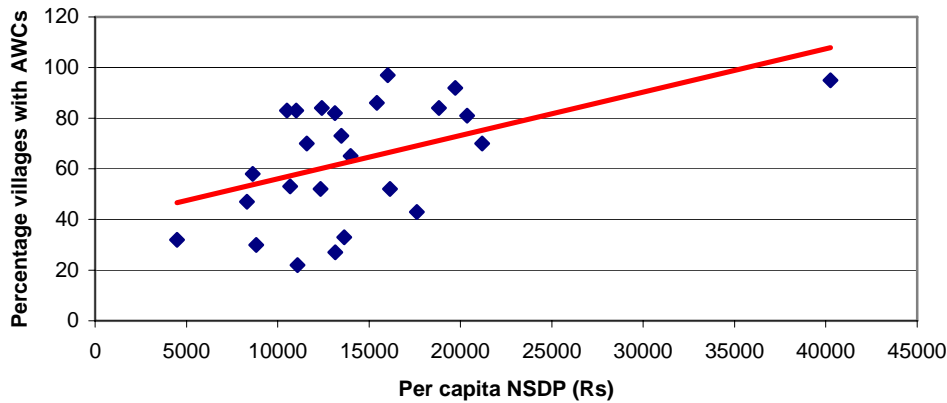
### 2.3.1 The relationship between state income and ICDS coverage

ICDS policy stipulates that there should be one *anganwadi* center in place per 1000 population, with more intensive placement of one per 700 population in tribal areas, where poverty tends to be more prevalent. While this policy aims to promote an equitable distribution of centers, in reality, the coverage of villages by ICDS is much more

<sup>f</sup> The percentage of children who receive *any* of the six main ICDS services is difficult to estimate and, so, the percentage of SNP beneficiaries is used as an indicator for the number of ICDS beneficiaries.

pronounced in wealthier states, as can be seen by the steep slope of the curve in Figure 21 below. States with lower per capita Net State Domestic Product (NSDP) have a smaller percentage of villages covered by the ICDS program than those with higher NSDP. However, the *growth* of program coverage from 1992 to 1998 was more rapid in the poorest villages of the country<sup>17</sup>.

**Figure 21 Relationship between *per capita* net state domestic product (NSDP) and ICDS coverage**



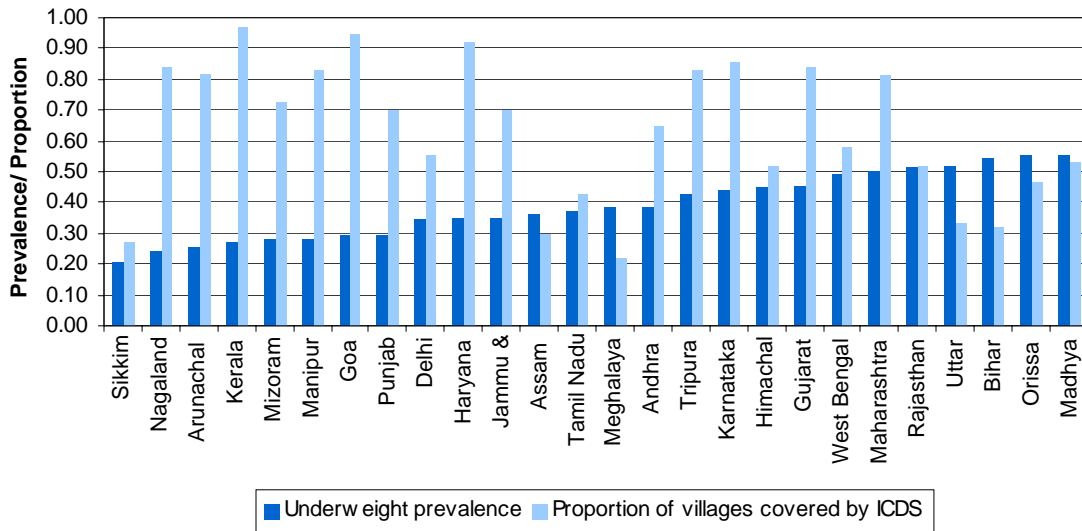
Source: Coverage calculated from NFHS II data; NSDP from Indiatat.com  
 Note: Per capita NSDP (net state domestic product) is in current prices for 1998/99

### 2.3.2 The relationship between state malnutrition prevalence and ICDS coverage

Regardless of the indicator of ICDS coverage used, whether it be (a) the percentage of villages with an *anganwadi* center, (b) the number of ICDS beneficiaries or (c) public expenditure on ICDS, access to the ICDS program appears to be poorest in the states with the worst nutrition indicators:

- a) Examining the percentage of villages with an *anganwadi* center it can be seen that the five states with the highest underweight prevalence, namely Rajasthan, Uttar Pradesh, Bihar, Orissa and Madhya Pradesh, all rank in the bottom ten in terms of ICDS coverage.

**Figure 22 Relationship between the proportion of villages covered by ICDS and underweight prevalence, by state, 1998/99**

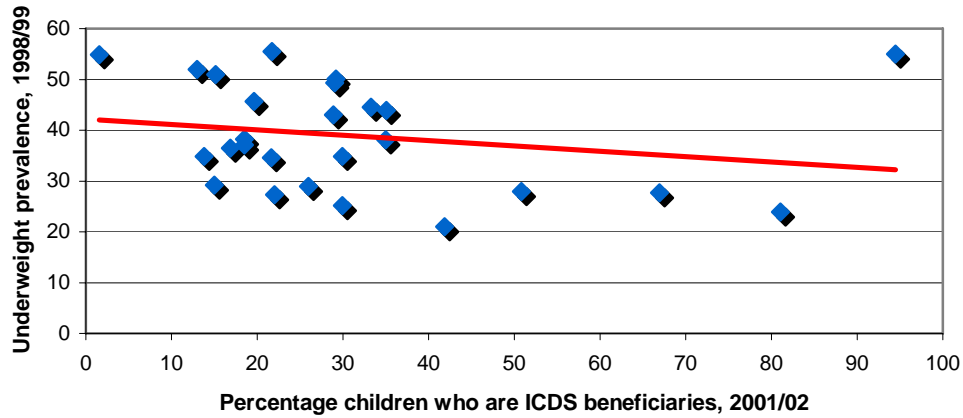


Source: Underweight prevalence calculated from NFHS II; villages covered calculated from NFHS II data in Das Gupta et al. 2005 (see Table C in the Appendix)

Village-level data reveal that ICDS placement is less regressive within a given state than across states. In 1998, for example, while only half of the villages from the lowest two deciles of the all-India wealth distribution had the ICDS program in place, the program covered about 80% of the richest villages in India. However, the difference in program coverage between the poorest and the wealthiest villages within the states is much smaller – about 60% of the poorest villages in every state were covered by the ICDS program compared with 70% of the wealthiest villages<sup>18</sup>.

- b) Also, states with a greater percentage of underweight children tend to have a smaller percentage of children enrolled in the ICDS program (Figure 23). Worst is Bihar where, despite an underweight prevalence of 55%, only 1.5% of children benefit from the ICDS program. At the other end of the spectrum, Manipur, Mizoram, Nagaland and Sikkim exhibit an underweight prevalence that is among the lowest in India (between 20% and 30%), yet are among the five states with the highest percentage of ICDS beneficiaries. The clear exception to this pattern is Orissa, which has a very high underweight prevalence of 47% and has managed to enroll as many as 95% of children in the program.

**Figure 23 Inverse relationship between the percentage of underweight children and the percentage of children who are ICDS beneficiaries, by state**



Source: Calculated from NFHS II, DWCD statistics and Census 2001 data

- c) The states where the prevalence of malnutrition is highest are also the states that are most poorly funded by the Government of India (GOI) and state financial allocations to ICDS. GOI per child expenditure in support of states' ICDS programs appears to be strongly and inversely proportional to the states' underweight prevalence (see dark blue bars in Figure 24 below).

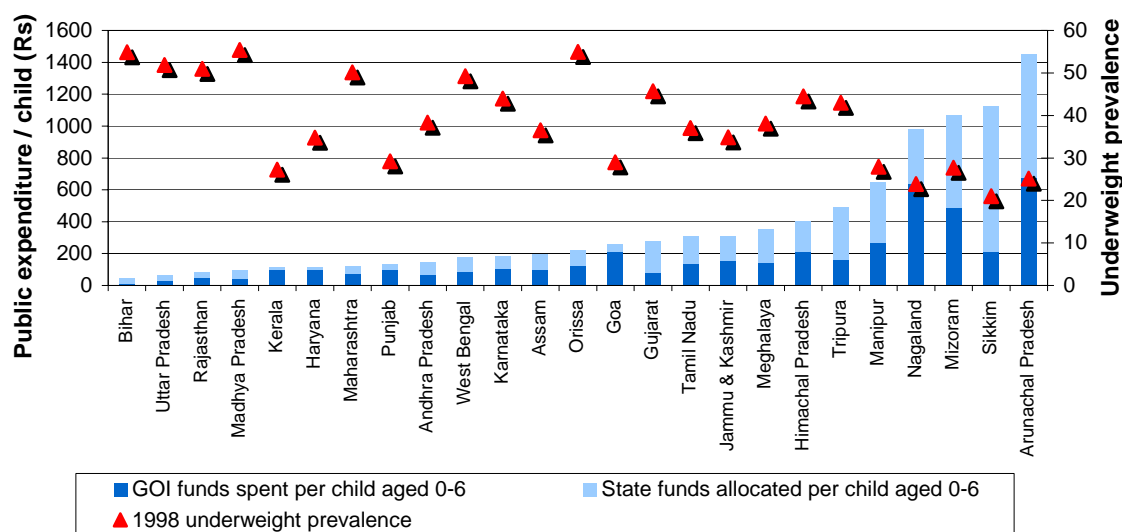
In addition, the (per child) amount allocated by state governments to ICDS – most of which is spent on the supplementary feeding component – is lowest in the states with the highest underweight prevalence and highest in the states with the lowest underweight prevalence (see light blue bars in Figure 24). Total public expenditure<sup>g</sup> figures (see stacked bars in Figure 24) show that four of the states that rank in the top five for underweight prevalence (namely Bihar, Uttar Pradesh, Rajasthan and Madhya Pradesh) are also the four states that receive the least for ICDS, on a per child basis. This regressive relationship holds true at the other end of the spectrum, too, where the five largest per child allocations are made to and by the five states that have the lowest underweight prevalence.

Since, as these expenditure figures indicate, poorer states find it difficult to mobilize resources for ICDS, the Government of India has recently proposed to provide additional central financing to all states to cover 50 per cent of the cost of the supplementary nutrition component.

<sup>g</sup> This public expenditure estimate combines GOI expenditure on ICDS with state allocations to ICDS. It excludes any expenditure on ICDS by local government institutions.



**Figure 24 Relationship between state underweight prevalence and GOI and state public expenditure allocations, 1998/99**



Source: Underweight prevalence calculated from NFHS II data; expenditure data from DWCD

## 2.4 INDIVIDUAL TARGETING: CHARACTERISTICS OF BENEFICIARIES

Effective targeting restricts nutrition interventions to those individuals or groups that are most vulnerable to malnutrition. In so doing, it maximizes the social returns and minimizes costs. However, the high generalized malnutrition prevalence in India and the administrative costs associated with excluding those who are relatively well-off means that rigorous targeting of ICDS benefits to particular socioeconomic groups is unlikely to prove a feasible strategy. Instead, ICDS policy follows the general guideline that a “special effort” should be made to reach children from lower income families or scheduled tribe and schedule caste groups, viz. “children ...belonging to poorest of the poor families and living in disadvantaged areas including backward rural areas, tribal areas and urban slums”<sup>19</sup>. There is also some explicit targeting of the severely malnourished who are supposed to receive double food rations.

This section examines whether those children who are most in need of the ICDS program do have access to its services and utilize them on a regular basis. We present the findings from survey data on children’s attendance<sup>h</sup> at *anganwadi* centers<sup>i</sup> (AWCs), collected in Kerala, Maharashtra, Rajasthan, Uttar Pradesh, Madhya Pradesh and Chhattisgarh during 2000-2002 (and henceforth referred to as the ICDS III baseline/ICDS II endline survey). The information is disaggregated by age, gender, caste, household wealth and location.

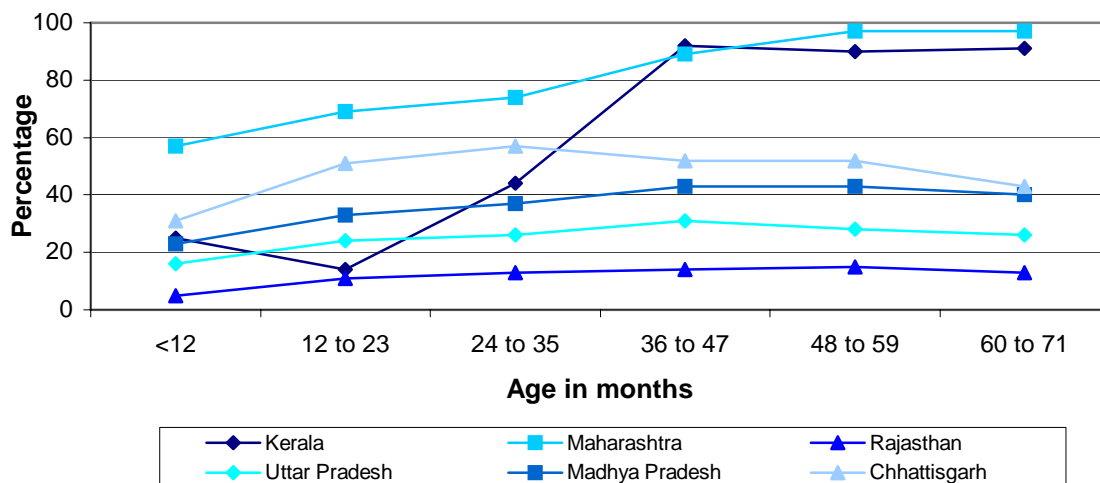
<sup>h</sup> Unless otherwise stated, attendance is operationalized as visiting the AWC at least once a month, conditional on there being an AWC in the village. In addition to the graphs in this section, actual figures on children’s attendance can be found in Table D in the Appendix.

<sup>i</sup> Since the villages and blocks in which households are located were not sampled randomly, the absolute levels of participation cannot be generalized to the entire state, but only to the sampled blocks. The differentials in relative access by subgroup are likely to more representative, however.

## 2.4.1 By age

Early childhood is a crucial developmental period during which there is considerable scope to influence the growth of malnourished children – through growth-monitoring, which is supposed to be performed monthly, and through encouraging sound child-care and feeding practices. However, it is precisely this group of children – infants and children under three – that are least likely to attend the *anganwadi* center. Attendance is lowest among the youngest children, then increases steadily – sometimes fairly dramatically as in the case of Kerala and Maharashtra – until the age of three after which it remains more or less constant (Figure 25). In Kerala and Maharashtra, almost every child aged 4 to 6 (in this sample) attended the AWC at least once a month. Attendance rates are less than half of that in the other four states.

**Figure 25 Percentage of children (of those living in villages with AWCs) who attend the AWC at least once a month, by age**



Source: ICDS aseline/endline survey 2000-2002

When daily, rather than monthly, attendance figures are examined, the gap between the attendance rates of children under three and children aged 4 to 6 is much larger (see Figure B in the Appendix).

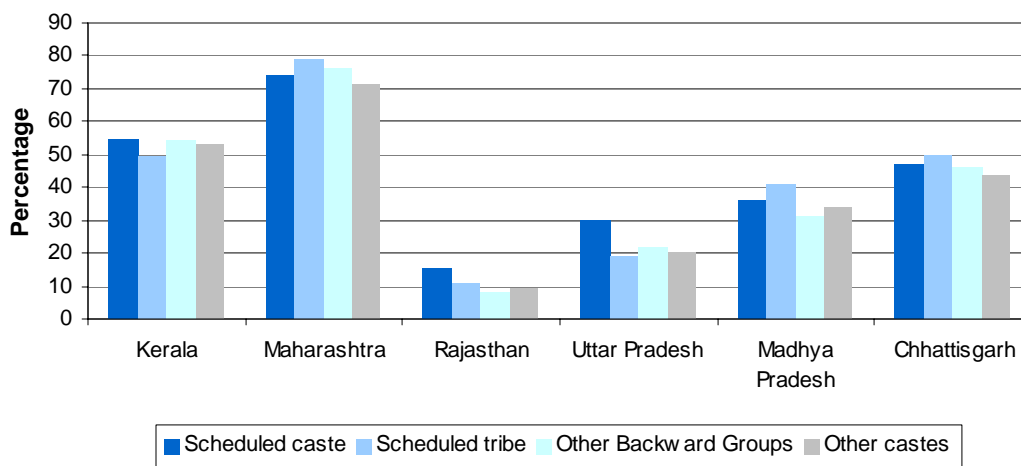
## 2.4.2 By gender

There is no statistically significant difference in the participation rates of boys and girls, either among the group that attends the *anganwadi* center on a daily basis or among those who attend at least once a month. There, thus, appears to be no gender discrimination in the reach of ICDS services.

### 2.4.3 By caste

The ICDS scheme places special emphasis on the participation of children of lower castes. Some *anganwadi* centers have been constructed in close proximity to scheduled caste and schedule tribe colonies, and *anganwadi* workers are expected to take steps to encourage the recruitment of these children into the program. Consequently, it is encouraging to see that in all states the attendance rates of scheduled caste and scheduled tribe children are in line with or slightly better than that of other castes (Figure 26). In Maharashtra, Madhya Pradesh and Chhattisgarh, the percentage of scheduled tribe children attending the AWC is higher than any other caste, while in Kerala, Rajasthan and Uttar Pradesh, a greater percentage of scheduled caste children than other children attend. These data are supported by qualitative evidence of high take-up among scheduled tribes relative to forward castes, perhaps partly because of social stigma associated with the receipt of benefits among the upper castes<sup>20</sup>. The relative caste composition of *anganwadi* centers differs from center to center, though, and attendance by children of a particular caste appears to also be influenced by the caste of the *anganwadi* worker and the caste that is most dominant in the local community.

**Figure 26 Percentage of children (of those living in villages with AWCs) who attend the AWC at least once a month, by caste**



Source: ICDS III baseline/ICDS II endline survey 2000-2002

### 2.4.4 By household wealth

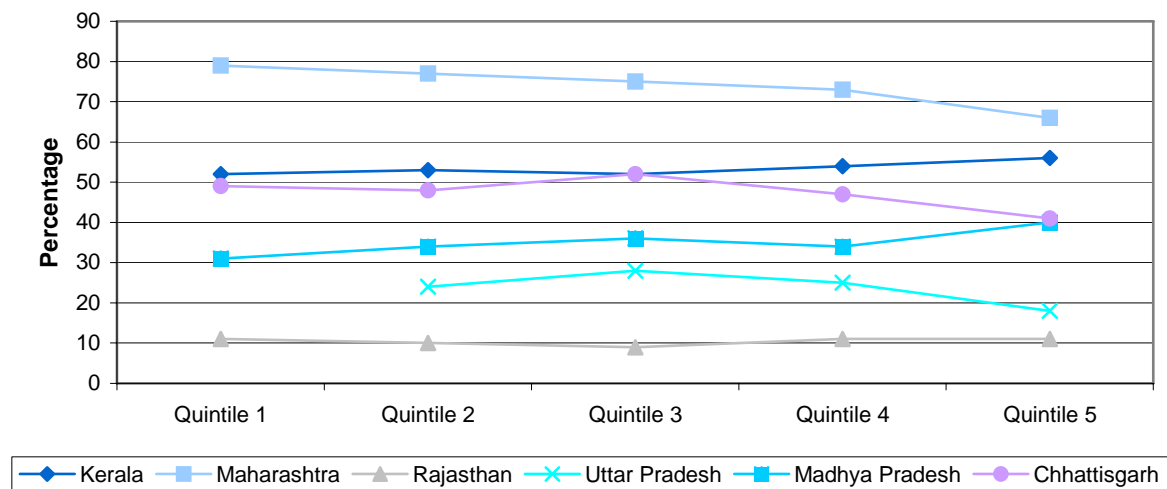
Among children living in villages with *anganwadi* centers, remarkably little variation is found in participation rates across wealth quintiles (Figure 27). Within each state, there is not much more than a 10 percentage point difference across the quintiles in the percentage of children attending. On the one hand, this implies that a poor economic background does not present too formidable an obstacle to ICDS attendance. On the other hand, since poorer children are more likely to be malnourished, it is desirable that ICDS attracts a larger share of lower quintile than upper quintile children. Maharashtra is the only state where attendance does decline steadily as wealth increases; in Chhattisgarh

and Uttar Pradesh, attendance is slightly lower in the top quintile; in Kerala and Madhya Pradesh, however, attendance is more regressive, with higher attendance rates in the upper quintiles.

A similar picture is obtained when one examines daily attendance figures: with the exception of Maharashtra, the percentage of upper quintile children attending centers is either as high or higher than the percentage of lower quintile children (see Table D in the Appendix for actual figures).

It is important to note that the state-level enrolment figures discussed above may obscure low enrolment among economically disadvantaged children in specific villages. Field visits to Uttar Pradesh, for example, found that the poorest of the poor were frequently excluded from ICDS interventions and underrepresented at *anganwadi* centers.<sup>21</sup>

**Figure 27 Percentage children (of those living in villages with AWCs) who attend the AWC at least once a month, by asset quintile**



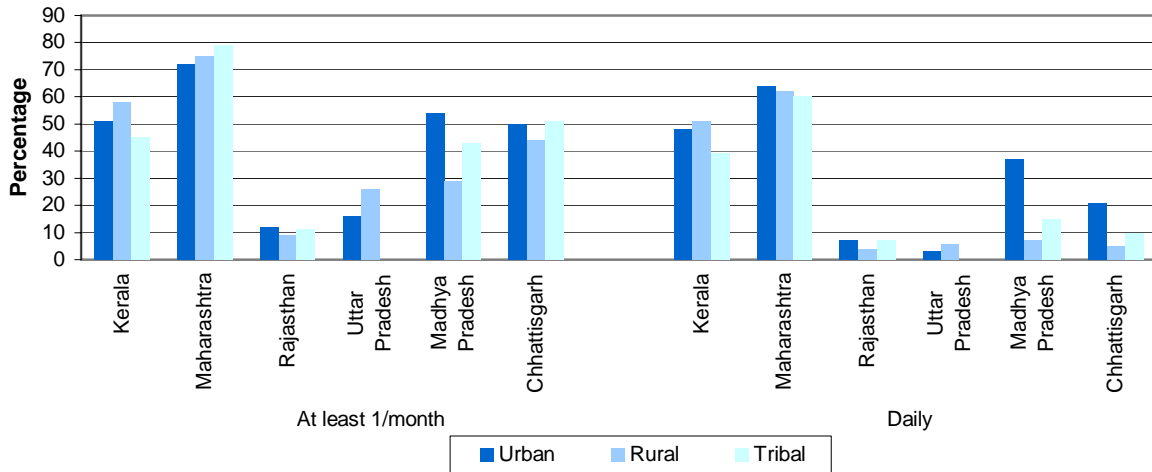
Source: ICDS III baseline/ICDS II endline survey 2000-2002

Note: Insufficient observations are available for Quintile 1 in the Uttar Pradesh data; unlike the quintiles used in Chapter 1 that were based on the national wealth distribution, these quintiles reflect the household's position in the state's wealth distribution

### 2.4.5 By urban-rural location

There is much heterogeneity across states in the attendance rates of children living in urban, rural and tribal areas. For example, in Madhya Pradesh and Chhattisgarh attendance rates are highest in urban areas, followed by tribal areas, while in Kerala and Uttar Pradesh attendance rates are highest in rural areas.

**Figure 28 Percentage of children (of those living in villages with AWCs) who attend the AWC at least once a month, by location**



Source: ICDS III baseline/ICDS II endline survey 2000-2002

Thus, although large proportions of vulnerable groups are indeed taking-up the ICDS benefits for which they are eligible, there is also substantial program capture by the less needy, which may be at the expense of more vulnerable children. Specifically, although attendance by lower castes is found to be relatively high, there is still scope to attract a greater percentage of this group, and additional effort needs to be made to reach younger children and children from asset-poor households, who are not only under-represented at *anganwadi* centers, but also most at risk for malnutrition<sup>j</sup>.

## 2.5 CHARACTERISTICS AND QUALITY OF ICDS SERVICE DELIVERY

Central to the ICDS objective of reducing the prevalence of malnutrition are two services: growth promotion and the provision of supplementary food. This section examines the delivery of these services, especially with respect to the availability of equipment and supplies, and the frequency with which these services are accessed. It also looks at the quality of AWC infrastructure, the training and competencies of AWWs and the coordination between the ICDS program and the Reproductive and Child Health program (RCH).

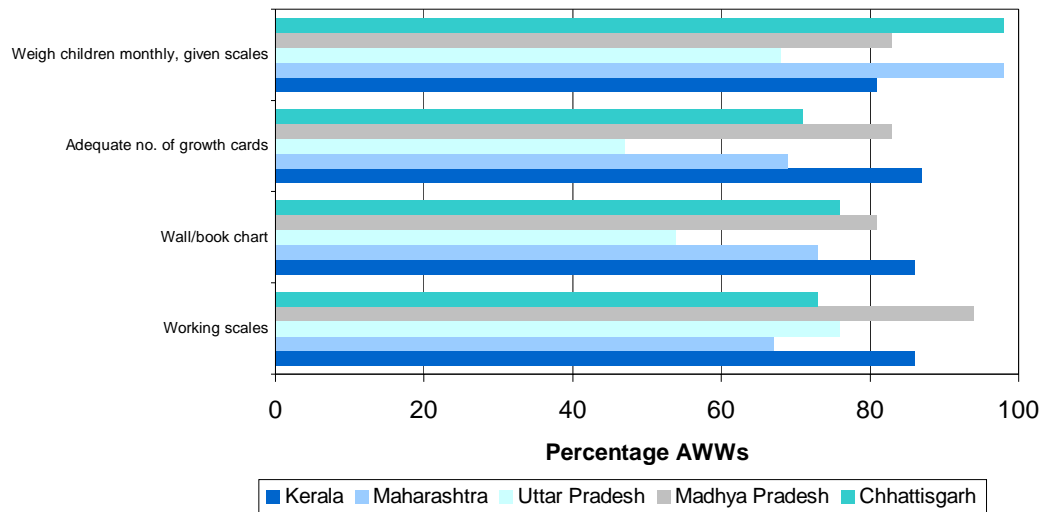
### 2.5.1 Growth promotion

Growth monitoring activities are hampered by poor access to appropriate equipment, such as weighing scales, growth cards and wall or book charts. Often the equipment is nominally present, but not of sufficient quantity or quality. AWCs in Kerala and Madhya Pradesh, while also experiencing equipment shortages, are generally better-equipped than those in the other three states (Figure 29). Even in AWCs with working scales, many AWWs report that they do not weigh young children (under three) every month. In all

<sup>j</sup> Disaggregated attendance rates, by state, subgroup and frequency of attendance are in Table D in the Appendix.

states, growth-monitoring performance appears to be superior in tribal areas, where children are weighed with greater frequency, and AWCs in urban and tribal areas are better-equipped with weighing equipment than rural AWCs.

**Figure 29 Percentage of AWWs with growth-monitoring equipment in place**



Source: ICDS III baseline/ICDS II endline survey 2000-2002

Even with regular weighing, growth monitoring is effective only if accompanied by communication for behavior change that results in improved growth of the malnourished child. Previous studies of ICDS have noted that this does not often occur, perhaps because many AWWs are not fully competent with respect to the interpretation of growth cards/curves<sup>22</sup> or because AWWs fail to effectively communicate the meaning of children’s growth patterns to mothers<sup>23</sup>. Indeed, the ICDS III baseline/ICDS II endline survey reveals a very large discrepancy between the child’s measured weight and the mother’s subjective assessment of her child’s growth status: in Kerala, all mothers think that their children are experiencing normal growth, and in Uttar Pradesh where underweight prevalence in the ICDS III baseline/ICDS II endline sample is 46%, 94% of women describe their children’s nutritional status as “normal”<sup>24</sup>.

### 2.5.2 Targeting and take-up of the supplementary nutrition component

The supplementary nutrition component (SNP) is one of the most well-known of ICDS interventions. Food is financed and procured by the states and provided to children at the AWC either in the form of a ready-to-eat snack or a meal cooked by the AWW. Through it, many children receive food at the AWC, with state averages ranging from about 20 to 80 children per AWC depending on the location of the AWC. In addition, in most states, there is a take-home food component from which about 20 to 25 children per AWC benefit.

Despite the resources and energy devoted to it, the SNP appears to perform rather poorly, especially in terms of providing a regular supplementary source of nutrition to the needy, while simultaneously excluding the non-needy. Irregularities in the food supply (see Table 11) and leakage to non-targeted individuals are major problems.

The most commonly reported reasons why children do not receive supplementary food from the AWC relate to inadequacies on the supply-side, especially issues of access, information and the irregularity of the food supply. These include, in decreasing order of importance, that food is not available for distribution, the mother is not aware of the food program or the eligibility of her child, the AWW fails to contact the mother or children when food is available and the AWC is too far away<sup>k</sup>. This is a very strong indication that ICDS needs to improve the regularity of the food supply – indeed, in three out of the five states surveyed in 2000-2002, the majority of AWCs reported irregularities in their food supply during the preceding three month period<sup>25</sup>. Another evaluation reported that disruptions in food distribution occurred for periods of over 90 days in 27 percent of AWCs<sup>26</sup>. There is also some evidence that household attitudes and behaviors are important determinants of children’s access to ICDS food: some mothers think that their children do not need the food (even though the same children were assessed by researchers as malnourished), some mothers fail to collect the food from the AWC and sometimes families prohibit the collection of food. Surveys revealed negligible complaints about food quality or quantity<sup>27</sup>, but field visits have shown that food is sometimes badly cooked, dry and salty<sup>28</sup> and should be supplemented by sugar, rice or vegetables, perhaps procured locally, to be more wholesome and palatable to children.

**Table 11 Regularity of food supply to AWCs and the availability of the take-home food program**

	Kerala	Maharashtra	Uttar Pradesh	Madhya Pradesh	Chhattisgarh
<b>% AWCs with no recent irregularities in food supply</b>	60%	41%	68%	27%	17%
<b>% AWCs with a take-home food program</b>	15%	28%	42%	95%	75%

Source: ICDS III baseline/ICDS II endline survey 2000-2002

Leakage of the supplementary food benefit to non-targeted beneficiaries seems fairly widespread. The first obvious source of leakage is in the attendance at the AWC: in many states, attendance rates are higher among children from relatively wealthy than from relatively poor households (see section 2.4.4). Also, it appears that in practice, there is little targeting of children from disadvantaged groups for supplementary feeding or of malnourished children for double rations of supplementary food. Food is often distributed to all those who come to the center<sup>29</sup>, and in cases where the AWC is located on school premises, to grade 1 children as well as preschool children, so that the number of SNP beneficiaries often exceeds the number of children actually enrolled at the AWC and children often receive less than the recommended 300 kcal of food. In some instances, food is also distributed to indigent adults and it is common practice for AWHs, and occasionally AWWs, to take home cooked food<sup>30</sup>. In addition to the leakage in the

<sup>k</sup> In all India, AWCs are located an average of 100 to 200 meters away from beneficiary households with an average travel time of 5 to 10 minutes (NCAER 2001).

distribution of supplementary feeding at the AWW, there is additional, and substantial, leakage in the “take-home food” component of ICDS since many children share the ICDS food with siblings or elders. In Madhya Pradesh, for example, only about a third of children consume all take-home food themselves. One third of children consume less than a quarter of the food and 6% of children consume none of the food taken home from the AWC<sup>31</sup>. It is telling that most *anganwadi* workers surveyed describe the take-home food component as “not useful”.

Despite the irregularity of the food supply and the leakage of food to the non-needy, one way in which the SNP is effective is as an incentive to attract children to the centers – where they can then receive other health- and nutrition-related services. Without the SNP, attendance at the *anganwadi* centers may be much lower. Community-based monitoring mechanisms have recently been introduced in some areas in an attempt to improve the delivery of supplementary nutrition.

### 2.5.3 Providing a safe and hygienic environment for ICDS service delivery

Growth promotion, the provision of supplementary food and other ICDS services are sometimes performed in adverse environments.

*Location of anganwadi centers:* Most AWCs in urban areas (but not those in rural areas) are located in rented buildings (Table 12), especially community buildings such as primary schools, religious centers and *panchayat* buildings, which, while potentially improving community scrutiny of ICDS, may render the regular functioning of the AWC vulnerable to the competing uses that the community has for these buildings. Moreover, the budgetary allocation to rent is low with the consequence that AWCs are frequently found in small or unclean locations. Some ICDS programs are run from the houses of ICDS functionaries.

*Construction of anganwadi centers:* About one-third of AWCs in India have *pucca*<sup>1</sup> buildings, about another third have semi-pucca construction, less than one-third are in *kutch*a buildings, and a handful of AWCs function from open spaces, such as under trees<sup>32</sup>. Cooking space is typically inadequate, as reported by 55% of AWWs across the country<sup>33</sup>.

*Toilet:* Most AWCs have no toilet facilities<sup>m</sup>, especially in rural and tribal areas (Table 12). Of those AWCs with toilets, flush toilets are more common in urban areas and pit-latrines are more common in rural and tribal areas.

*Drinking water:* The majority of AWCs obtain their drinking water from a tap or hand-pump, but the water source varies substantially across state and rural-urban-tribal location.

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<sup>1</sup> Brick and mortar type of construction

<sup>m</sup> Similar findings were obtained in a country-wide study (NCAER 2001) which showed that as few as 17% of AWCs had toilet facilities.



**Table 12 Anganwadi center infrastructure, by location**

	Kerala			Maharashtra			Uttar Pradesh		Madhya Pradesh			Chhattisgarh		
	urban	rural	tribal	urban	rural	tribal	urban	rural	urban	rural	tribal	urban	Rural	tribal
<b>Percentage of AWCs with drinking water that is from:</b>														
Piped or pumped	69	44	50	21	44	41	54	70	100	58	83	73	83	72
Open well	27	41	17		20	34		8					4	
Other	4	15	33	79	36	25	46	22	0	42	17	27	13	28
<b>Percentage of AWCs with toilets that are:</b>														
Flush	27	15			2		8	7	50	19	14	36	13	16
Pit/latrine	20	26			13	10	29	10	8	15	7	9	9	4
None	53	59	100	100	85	90	63	84	42	65	79	55	78	80
<b>% AWCs with rented building</b>														
	64	41	50	96	19	41	92	15	92	46	21	82	17	44
<b>No. of AWCs in sample</b>														
	45	27	6	24	54	29	24	61	12	15	29	11	23	25

Source: ICDS III baseline/ICDS II endline survey 2000-2002

## 2.5.4 Anganwadi worker training, workload and status

Undoubtedly, the skills of the AWW and her capacity to mobilize the community to support ICDS and recruit eligible children stand central to quality service delivery and ICDS effectiveness. Too often, though, performance is constrained by poor quality training and the pressure of a large and diverse workload.

### 2.5.4.1 Skills training

While AWWs tend to be well-educated, they are often poorly trained for ICDS tasks. Survey data show that while almost all AWWs have at least matriculated from high school and half of those in urban areas have even received some college education; pre-service training is scarce with most women undergoing short-term in-service training<sup>34</sup>. Recently, more resources have been directed towards strengthening the capacity at the central, state and block levels to provide high quality support and training to functionaries of ICDS programs. In 2002, a new training program, *Udisha* (“first rays of the new dawn”), was initiated with funding from the World Bank and attempts to shift the focus of training away from the mere transfer of knowledge and towards the strengthening of AWW competencies.

### 2.5.4.2 AWW workload, status and remuneration

AWWs can spend up to 40% of their time on supplementary nutrition-related activities and a further 39% on preschool education<sup>35</sup>, which does not leave much time for other important ICDS activities such as growth-promotion, health and nutrition education, home visits, referral services and meeting with the community. In addition, AWWs must

maintain at least 12 different types of records<sup>n</sup>. AWWs are also often given other responsibilities outside of ICDS: when AWCs are located on school premises, for example, some AWWs have the additional responsibility of teaching Class 1<sup>36</sup>; in other communities, AWWs are required to meet family-planning and sterilization targets; or, AWWs are called upon to assist in other government programs for women and children, such as the Pulse Polio campaign. Home visits, to advise on matters related to antenatal care and to promote breast-feeding, timely immunization and regular weighing, appear to be one of the more neglected of ICDS tasks with only 78% AWWs in Maharashtra, 68% in Chhattisgarh, 43% in Madhya Pradesh, 38% in Uttar Pradesh and 35% in Kerala undertaking the equivalent of at least once visit per day<sup>37</sup>.

The low status that the community attaches to the position of *anganwadi* worker and the irregularity with which AWWs are paid are demotivating factors. Despite the importance of her work, the AWW is often held in rather low regard by the community<sup>38</sup>, viewed as a “mere” provider of child-care, rather than a valuable healthcare worker. There are also frequent lags in payment of honoraria which need to be resolved. In Uttar Pradesh, for example, as many as 67% of urban AWWs report that they do not receive their honoraria regularly<sup>39</sup>.

### **2.5.5 Collaboration between ICDS and the Reproductive and Child Health Program**

The objectives of the Reproductive and Child Health program (RCH) and ICDS are intertwined and, so, the promotion of linkages between the activities of the two would be mutually beneficial. Already some of these linkages are recognized in the job descriptions of the *anganwadi* workers and auxiliary nurse-midwives (ANMs). AWWs are supposed to promote awareness of national immunization days (NIDs) and maintain immunization records, refer sick children to healthcare facilities and encourage mothers to seek antenatal care. In their turn, ANMs, employed by the Department of Health, are supposed to conduct general health check-ups of ICDS beneficiaries, give immunizations, dispense medicines and contraceptives, and provide assistance and guidance to AWWs in the discharge of their health-related duties.

In practice, cooperation between the ICDS and RCH appears to be somewhat limited, partly because of the absence of a designated person or body to oversee the promotion of this collaboration. Site visits reveal that AWWs take little interest in finding out whether mothers are registered with the ANM and receiving antenatal care, and the ICDS III baseline/ICDS II endline survey (2000-2002) shows that ANM visits to the AWC are not very regular. In Kerala, for example, only 50% of urban AWCs and no rural AWCs had received an ANM visit in the previous month<sup>40,o</sup>. As a result, it is perhaps not too surprising that some *anganwadi* workers, and as many as one-third of those surveyed in rural Uttar Pradesh, are inclined to believe that the ANM does not perform anything

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<sup>n</sup> These include records for daily attendance, preschool education, supplies, supplementary nutrition program, births, deaths, immunization, weight, pregnancy, health referral, a daily diary, a monthly progress report and a survey of households in the area covered by the AWC.

<sup>o</sup> In some states, performance is better. In Chhattisgarh, for example, almost all AWCs (95%) report being visited by an ANM every month.

significant during her visits. That the provision of health services is not consistently better in villages with AWCs than without AWCs seems to suggest that there is currently little coordination or convergence between the two. As was seen in section 2.2, deworming is more frequent in villages with AWCs in Kerala and Maharashtra, but not in Rajasthan and Uttar Pradesh. More children receive Vitamin A supplementation in villages with AWCs than without AWCs in Maharashtra and Uttar Pradesh, but not in Kerala or Rajasthan. Although the immunization function is being performed with some regularity (e.g. at least 80% of AWCs in Kerala, Maharashtra, Madhya Pradesh and Chhattisgarh have immunization registers that have been regularly used), previous studies suggest that ICDS has had little to do with any improvements in immunization coverage<sup>41</sup>.

### **Box 1 Getting things right in Bellary district, Karnataka: A report from the field**

‘Venkatamma\* is quick to list the characteristics of a good AWC. “It should be a spacious place with clean surroundings, the building should have good ventilation, enough play materials and teaching aids, a mirror for the children to come and have a look, a small garden in front of the centre, and they should be received with love...” she pauses a while and continues with a grin. “Of course, most of these things are not there in my center but children attend regularly in good numbers.” She says it is the relationship with children, a good preschool component and food that attract children to the center.

The AWW, Venkatamma, and helper Rankamma\* both belong to the scheduled caste community and live close to the AWC. The AWC has its own building with a 12x20 classroom, storeroom and kitchen; there are enough vessels for cooking and serving; the water tank is very close to the centre, although supply is erratic and water sometimes has to be fetched from a bore-well nearby. A toilet has been built recently, although no one has yet begun to use it.

By and large, Venkatamma’s pride in her center is validated by our visit. Forty-seven children were present at the AWC when we went there unannounced. This was true for each of the three days we visited the centre. By about 10.30am all the children would troop in, some marching in confidently, others brought in crying by grandmothers or older siblings. We were intrigued by the fact that attendance continued to be high even after Venkatamma left to take over her new role as supervisor and the centre was being run only by the helper, Rankamma, with the help of two adolescent girls from the village. Even though she cannot handle the preschool component, Rankamma keeps the children engaged with songs and games. They weigh the children regularly, mark their weight in registers, explain to mothers how the children’s growth is progressing and makes suggestions on how to improve growth. Venkatamma and Rankamma work well together and the entire community appreciates and respects them. Women often visit the centre to informally interact with the AWW. Mothers could tell us how children should be breastfed and about pregnancy risks. It seemed as if the centre has acquired a status on a par with the school, where parents sent their children regularly.

The AWC follows a varied menu decided for the week by the state level authorities. All children are made to wash their hands before they start eating and in other AWCs in the same village, they even use soap to do so. Thereafter, the children are constantly reminded not to touch the floor or dirty their hands before eating. The AWW said that in her 14 years of service she had never experienced any major gaps in the supply of food, and there was always something or the other for the children to eat. For instance, if the supply of rice were delayed, there would be sprouted green-gram or energy food ready for the children. This was actively confirmed by mothers.

The AWW and the health unit coordinate well with each other. The village has placed its AWC and health unit close together. Problem health cases are referred by the AWW to the health center and many mothers now voluntarily bring their children to the health centre. Although the women we spoke to did not remember the names of medicines or immunizations given to children, nor the immunization cycle, they nevertheless took the children to the AWC on the immunization days with the result that immunization coverage is good.’

Summary of a field visit to Karnataka  
(Educational Resource Unit 2004)

\*Names have been changed

## 2.6 MONITORING AND EVALUATION

A strong monitoring and evaluation (M&E) system helps program managers track whether project implementation is proceeding as desired and, subsequently, make informed decisions to correct any problems. Periodically, it allows an assessment to be made of the extent to which the program is having the desired impact and, in so doing, promotes the most effective and efficient use of resources. The current M&E system faces many challenges, but there have been some notable accomplishments in recent years.

Given the size of the ICDS program, M&E is a daunting task. A standardized data collection procedure is employed in all states, but it is complex and for the most part relies on manual entries and compilations. Each AWW maintains as many as 10-25 different registers<sup>p</sup> into which information is entered, some of it on a daily basis. Once a month, the AWW compiles this information into a standardized Monthly Progress Report (MPR) that contains a number of input, process and impact indicators. These MPRs are then sent to the supervisors (each of whom supervise about 20 AWCs) who consolidate the reports and forward them to the Child Development Project Officers (CDPOs), who assemble reports by project/block and remit them all to the state headquarters and Central ICDS Monitoring Cell. At the Central level, some of the key indicators<sup>q</sup> are analyzed and Quarterly Progress Reports (QPRs) are prepared (for the World Bank-funded states) which are used by the DWCD, Planning Commission, Health and Family Welfare department and others. States are also ranked with respect to progress made and detailed feedback is sent to state headquarters. However, there is hardly any feedback down the line from the state headquarters to lower levels of program implementation so that local action is seldom taken in response to information, thus rendering the feedback system rather ineffective.

In light of the important role that an effective M&E system can play in bringing about improvements in child health, strengthening the M&E system is essential. There have been some significant improvements in M&E in some states, in part due to the commitment and effort of the GOI<sup>r</sup> and in part due to the presence of bilateral and international agencies, such as CARE, the World Food Program and the World Bank<sup>s</sup>, but some major impediments remain.

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<sup>p</sup> Most of these registers contain information on the take-up of different ICDS services, but AWWs are also frequently charged with collecting information for other government programs, such as old age schemes, too.

<sup>q</sup> These key indicators include figures on personnel, operationalization of blocks and AWCs, supply of supplementary nutrition, preschool education, the number of births and deaths, and malnutrition status - using the IAP (Gomez) classification.

<sup>r</sup> Specific activities in this regard include issuing clearer M&E guidelines to states, annual and periodic review meetings at the central level, small supplementary financial allocations to M&E activities at the local level and a pending revision of monitoring formats and the number of AWC registers.

<sup>s</sup> In World Bank project states, ICDS input, process *and* impact indicators that are compatible with the project's development objectives were defined at the outset of the project; adequate financial allocations were made to the M&E component of ICDS; and, M&E activities are broad, including field visits, periodic reviews, operations research, continuous social assessments, baseline and endline surveys - in addition to the standard ICDS monitoring activities.

### **2.6.1 Low prioritization of monitoring and evaluation activities**

There is too little emphasis on M&E, in part due to a poor understanding of what it entails and its potential contribution to program effectiveness. The primary focus of the program management (both in central and state governments) seems to be on the timely release of allocations to the implementing agencies and the recording of expenditures, with very little emphasis on assessing the quality of service delivery and impact of the program. At the local level, few AWWs are aware of the purpose and utility of data collection and, instead, view their data collection tasks as routine, boring and burdensome. The result is that although the ICDS program is being monitored – in the sense that information is regularly collected on inputs and outputs - the system is not oriented towards using that information to inform action, i.e. it is not used to improve service delivery, beneficiary recruitment or, eventually, modify program design. Consequently, there have been delays and bottlenecks in the replenishment of supplies, the neediest beneficiaries are often not reached and it is difficult to know which elements of the program are most effective.

### **2.6.2 Personnel capacity in monitoring and evaluation**

The number of appropriately qualified people assigned to the M&E activities of ICDS is relatively small at almost all levels of program implementation and those involved are usually not exclusively dedicated to monitoring, but are required to take it on as an additional responsibility. Overall monitoring of ICDS rests with the highest positions in the government (at the Director/Secretary level), but these officials face severe time constraints, with many other programs to oversee. Vacancies in M&E positions are also problematic, with many positions remaining unfilled for extended periods, and frequent personnel turnover at senior levels, common throughout the Indian bureaucratic system. The next incumbent takes a while to become familiar with the issues, thus wasting valuable time that could be used for program implementation.

At the field level, positions are more stable, but vacancies and irregular supervision are pervasive. While, in the sample of blocks included in the ICDS III baseline/ICDS II endline survey (2000-2002), supervisors had been appointed to all urban AWCs in the sample and were fairly active in ICDS activities (with at least 96% of the AWCs in five of the six states<sup>t</sup> reporting that they had been visited by supervisors in the preceding month), 10% of rural AWWs were not linked to a supervisor<sup>u</sup>. Moreover, many of those who had been appointed did not visit regularly: at least 30% of the rural AWCs that had supervisors in Uttar Pradesh and Chhattisgarh had not been visited by them in the preceding month<sup>42</sup>.

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<sup>t</sup> In Madhya Pradesh, only 58% of urban AWCs had been visited by supervisors in the preceding month.

<sup>u</sup> As many as 43% of AWWs were not linked to supervisors in Chhattisgarh

An M&E curriculum is included in the training syllabi for field level ICDS functionaries, but it has deficiencies: the value of M&E and the importance of collecting data on key project indicators are typically not adequately communicated.

### **2.6.3 Inadequate use of information systems and qualitative data**

The information system is central to keeping track and making sense of so much data, but is held back by insufficient utilization of computer networks. Almost all information that is collected by AWWs, supervisors and CDPOs and forwarded to the state level is transmitted by hand with very limited use of computers. Software programs are seldom used to analyze the data collected at the state and central level, except in some of the states covered under World Bank ICDS Projects. Availability of the necessary computer hardware up to the district/block levels still remains a problem, partly due to inadequate financial allocations to M&E.

There is also an inherent quantitative bias in the whole monitoring system that comes at the expense of the collection of some qualitative information that could assist in the construction of the causal narratives that explain patterns in the quantitative data. For example, continuous social assessments, which collect qualitative information through community meetings, focus groups and open-ended questionnaires, are currently being implemented in ICDS in the states that are supported by the World Bank, but are not used in other states.

If ICDS is to substantially reduce child malnutrition, then program managers need a reliable broad-based and efficient M&E system that enables them to adjust elements of program implementation and design so as to maximize the returns to nutrition investments. Some ways in which the current system could be improved are discussed in Chapter 3.

## **2.7 SUCCESSFUL INNOVATIONS IN ICDS**

There is encouraging evidence that, with relatively small changes in project priorities and design, the impact of the ICDS program on child nutritional status can be substantially enhanced. This can be seen in studies of the successful implementation and performance of regular ICDS projects as well as in studies of projects that experiment with modifications to the ICDS program<sup>43</sup>. Adapting the lessons learnt from these projects and applying them to other ICDS projects can help ensure that the ICDS has the maximum impact – saving money *and* lives.

### 2.7.1 Gains from ICDS-RCH convergence and community change agents: lessons from INHP II

CARE India's<sup>v</sup> Integrated Nutrition and Health Project II (INHP II), now active in nine states<sup>w</sup>, highlights the gains from targeting behavior change interventions at the very youngest children (under two) and at pregnant women, i.e. concentrating energies on those critical periods in the lifecycle when the greatest impact on health status can be made<sup>44</sup>.

One innovation is the promotion of closer convergence between the ICDS program of the DWCD and the Reproductive and Child Health program (RCH) of the Department of Health and Family Welfare (DHFV) to encourage mothers to utilize RCH services<sup>x</sup>. The underlying premise of convergence is that by working together these programs are more likely to achieve their shared objectives of reducing infant mortality, combating child malnutrition and improving the health status of women. An example of this is the facilitation of well-publicized "Nutrition and Health Days" (NHDs) on which the AWW (from ICDS) and ANM (from RCH) provide immunizations to children under two and/or antenatal care (including check-ups, provision of IFA supplementation and TT immunization) to pregnant women at the AWC. Health talks are another important element of these days, and take-home rations of supplementary food (sufficient for a few weeks) are provided as an incentive for attendance. The process of setting up the NHDs is facilitated by the community, e.g. through engaging mothers' groups, self-help groups and *panchayati raj* institutions.

Another key activity is the appointment and training of "change agents" within the community. Volunteers<sup>y</sup> are assigned to families, and provide health and nutrition information, promote positive health behaviors and encourage ICDS participation. The activities of these agents start at the birth of the child, if not before, when they advise on appropriate newborn care and then follow up with regular home visits until the child is two years of age. Many of these visits are timed to coincide with critical periods in the lifecycle (e.g. at weaning) and serve as cues to action at times when mothers should initiate new health behaviors, failing which children might be especially vulnerable to undernutrition or disease.

The INHP approach appears to be having a significant effect. For example, 53% of pregnant women in the intervention areas received three or more antenatal checkups, compared to 38% in the non-intervention areas. Other aspects of antenatal care were also better in the intervention areas, such as the consumption of IFA tablets and the receipt of

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<sup>v</sup> This project is implemented in partnership with the DWCD and the DHFW of the GOI, NGOs and CBOs, with support from USAID and technical assistance from BASICS II.

<sup>w</sup> These states are Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and West Bengal.

<sup>x</sup> These interventions include antenatal care, plus nutrition counseling and birth preparedness; home-based newborn care; maternal and child immunization; child feeding advice; Vitamin A for children; and supplementary nutrition.

<sup>y</sup> These can be women, men, adolescent girls or boys, or traditional birth attendants, each serving 10-15 families.



tetanus toxoid doses (see Table E in the Appendix). Childcare was also improved substantially. 65 percent of women in the intervention areas initiated breastfeeding within one hour of delivery, compared with 38 percent in the non-intervention areas. Similarly, higher proportions of children in the intervention areas were breastfed exclusively for six months, introduced to complementary feeding appropriately, given more nutritious complementary foods, vaccinated against measles by the age of 12 months and received Vitamin A supplementation (see Table F in the Appendix). There appears to be no difference in behavior by children's gender. Some of the greatest differences between intervention and non-intervention areas are found among people of low socioeconomic status, indicating that this intervention is progressive in its reach.

### **2.7.2 Gains from community-based interventions: the Dular strategy<sup>z</sup>**

As outlined above, the INHP II program made successful use of community participation to promote better health practices and implement the ICDS-RCH programs. The Dular program, undertaken by State governments in Bihar and Jharkhand, with the assistance of UNICEF, has also developed several innovative approaches to improving early childhood nutrition, care and development. Active in 8 of 60 districts, it focuses on intensive upgrading of ICDS operations, including the collection of birth weight data and the monitoring of care practices, Dular has creatively addressed many of the past failings of the ICDS program in Bihar.

As part of the strategy, the *anganwadi* worker in every targeted village teams up with a small group of local resource people who are then given basic training in nutrition, childcare and hygiene. Once trained, the team visits pregnant women and mothers of newborns in their homes to educate them about safe delivery, breastfeeding, immunization, and other essential care practices during pregnancy and early childhood. Since the team is made up of local people from the community, parents respond positively.

Though still young, Dular appears to be having an impact. For example, an evaluation using a sample of 450 households indicates that after one year of intervention there was an 8% decline in the prevalence of underweight among children under three, a 20% increase in the use of colostrum feeding within one hour of birth, a 20% decline in the episodes of diarrhea in under-threes during the three months prior to the interview, and a 30% increase in the consumption of adequately iodized salt by participating families<sup>aa</sup>.

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<sup>z</sup> This section draws on research by the International Food Policy Research Institute (IFPRI 2003).

<sup>aa</sup> These data have been provided by UNICEF, drawing on an evaluation by Tufts University.

### 2.7.3 Gains from community participation: Mothers' Committees in Andhra Pradesh

Lessons from another innovative program can be drawn upon to help build greater community participation into ICDS implementation. For example, in 1998, the state of Andhra Pradesh began establishing mothers' committees in villages with the ICDS program as a means of integrating the program into the community and stimulating demand for improved service quality. Mothers' committees are informal committees of eight nominated village members, established in line with the guidelines of the general ICDS program that required the formation of a *Mahila Mandal* (women's group), but registered as committees to allow formal participation in ICDS as well as to enhance legitimacy and accountability. Members serve three-year terms.

Currently, more than 50,000<sup>bb</sup> committees have been established in 351 development blocks in the state. Committee members are given three rounds of a week-long capacity-building training course that focuses on nutrition, health, education, group formation and economic empowerment, as well as relevant and state-specific social and legal issues. In collaboration with the State AIDS Control Society, 20,000 members of mothers' committees and 10,000 adolescent girls have been trained to serve as "change agents" in the promotion of HIV awareness and healthy sexual attitudes and behaviors.

The roles and responsibilities of these committees with respect to the ICDS program have evolved considerably over time. Originally they were involved in the civil works components of the World Bank-assisted ICDS I project - selecting construction sites for *anganwadi* centers, monitoring construction and releasing funds to cover construction costs. More than 15,000 *anganwadi* buildings were completed under the supervision of mothers' committees. Today the range of responsibilities includes recruiting AWWs and helpers, paying honoraria, monitoring community-based performance indicators for AWCs, establishing local food units to prepare and distribute supplementary food to the AWCs, and ensuring that eligible beneficiaries receive services. The mothers' committee members may also play an active role in motivating adolescent girls to join bridging courses and skills development programs, encouraging school enrolment, especially among girls who have dropped out, and motivating parents to send children to *anganwadi* preschool.

The evaluation of the mothers' committees indicates that the program has potential, but needs reinforcing. Only 40% of mothers' committees are formally involved in the ICDS program and only 31% of all mothers report actually having heard of the committees<sup>45</sup>. Awareness of the committees is higher in tribal areas (49% of women and 34% of adolescent girls) than in rural areas (25% of women and 15% of girls) and urban areas (20% of girls). Nevertheless, a survey of AWWs<sup>46</sup> showed that they appreciate the mothers' committees with three-quarters of workers describing the functioning of the mother's committees as "good" and another 11% as "satisfactory".

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<sup>bb</sup> The target number of committees is 53,144 which will cover all AWCs in Andhra Pradesh.

To increase the positive impact of the mothers' committees on maternal and child health and nutrition, it has been proposed that their role as 'change agents' be strengthened through further training. Such training would assist them in promoting appropriate infant feeding practices and attendance at the AWC. Another possibility is to increase the extent to which mothers' committees are genuinely empowered to manage aspects of the ICDS system, rather than simply helping program staff to promote healthy behaviors. This would involve delegating more powers to them to manage aspects of the program (such as organizing food distribution, appointing AWWs and improving AWC infrastructure) – subject to the external monitoring of the outcomes they achieve.

This effort has sought a much more ambitious role for community participation than the INHP II and Dular programs. The latter efforts hinged on involving community members as behavioral change agents. In addition to this, the Andhra Pradesh program tried to involve mothers' committees in the actual management of ICDS resources, such as overseeing civil works and releasing funds for construction costs, managing food preparation and distribution, and recruiting and monitoring AWWs. To carry out these tasks effectively, community members need a substantial degree of leadership training, support, and oversight, as well as clear designation of the needed powers. These requirements need to be built explicitly into the program design.

Other lessons from this effort include the need to assure stability in what is expected of community participants, as well as from AWWs. Shifting expectations, combined with lack of authority and project support, can make it difficult for community members to play an active role in program implementation. Similarly, AWWs may under-perform need to know to whom they are accountable, and for what tasks.

#### **2.7.4 The Tamil Nadu Integrated Nutrition Program (TINP)<sup>47</sup>**

This variation of the regular ICDS program focused on targeting high-risk groups and limited itself to a relatively small number of interventions. Project activities included regular growth monitoring, nutrition education and health checks-ups for all children. Therapeutic supplementary feeding was provided to moderately and severely malnourished children, children whose growth was faltering (especially those below 36 months of age) and high-risk pregnant and lactating women.

The TINP also placed more emphasis than the regular ICDS on the training of workers, supervision and managerial capacity, and an efficient management and information system. Information was analyzed and fed back into the project implementation. For example, when it was found that families were not changing the way they fed the children under two years of age, the project targeted more of its information and education to the parents of this youngest group. Mothers who took part in the project knew much more about good nutrition and health practices than other mothers, they breastfed for longer, and fewer of their children needed supplementary feeding.

Community participation was also substantially enhanced. The staff were encouraged to develop active and close collaboration with local women's and girls' groups from the

community to achieve behavioral change in the community as a whole. Efforts were made to engage the community members actively in project implementation. They were taught to promote birth weight recording, regular monthly weighing, and spot-feeding. They were also encouraged to participate in community assessment, analysis and problem-solving.

This program halved the prevalence of severe malnutrition in the villages in which it was implemented. Universal feeding was shown not to be necessary to achieve substantial nutritional and health gains. However, it did not fully meet its objective of reducing moderate malnutrition. The project evaluation concluded that to reduce moderate malnutrition TINP interventions must include a greater focus on home-based actions and proactive integration of nutrition activities with the health system.

## CHAPTER 3 – HOW TO ENHANCE THE IMPACT OF ICDS?

Urgent changes are needed to bridge the gap between the policy intentions of ICDS and its actual implementation. This is probably the single biggest challenge in international nutrition, with large fiscal and institutional implications and a huge potential long-term impact on human development and economic growth.

ICDS was designed to address the multidimensional causes of undernutrition. As the program expands to reach more and more villages, it has tremendous potential to impact positively on the nutritional and health status and well-being of the millions of women and children who are eligible for participation. The key constraint on its effectiveness is that its actual implementation deviates from the original design. There has been an increasing emphasis on the provision of supplementary feeding and preschool education to children four to six years old, at the expense of other components that are crucial for combating persistent undernutrition. Because of this, most children under three—the group that suffers most from malnutrition—are not reached, and most of their parents do not receive counseling on better feeding and child care practices. Realizing ICDS’ potential, therefore, will require substantial commitment and resources in order to realign its implementation with its original objectives and design:

- The first immediate step should be to resolve the current ambiguity about the priority of different program objectives and interventions;
- To reduce malnutrition, ICDS activities need to be refocused on the most important determinants of malnutrition. Programmatically, this means emphasizing disease control and prevention activities, education to improve domestic child-care and feeding practices, and micronutrient supplementation. Greater convergence with the health sector, and in particular the Reproductive and Child Health (RCH) program, would help tremendously in this regard;
- Activities need to be better targeted towards the most vulnerable age groups (children under three and pregnant women), while funds and new projects need to be redirected towards the states and districts with the highest prevalence of malnutrition;
- Supplementary feeding activities need to be better targeted towards those who need it most, and growth-monitoring activities need to be performed with greater regularity, with an emphasis on using this process to help parents understand how to improve their children’s health and nutrition;
- Involving communities in the implementation and monitoring of ICDS should be used to bring in additional resources into the *anganwadi* centers, improve quality of service delivery and increase accountability in the system;
- Monitoring and evaluation activities need strengthening through the collection of timely, relevant, accessible, high-quality information, — and this information needs to be used to improve program functioning by shifting the focus from inputs to results, informing decisions and creating accountability for performance.

### 3.1. STRENGTHS AND WEAKNESSES OF ICDS

Studies of the ICDS program, including this one, have repeatedly raised concerns about its design and implementation. Three major mismatches in the implementation of ICDS can be identified. These relate to the type of services that ICDS actually delivers; the characteristics of the beneficiaries that ICDS reaches; and the geographic areas that ICDS targets. These mismatches undermine ICDS potential to address child undernutrition effectively, efficiently and equitably.

**Mismatch I:** Although the design of ICDS recognizes the multidimensional determinants of undernutrition, too much emphasis is currently given to providing food security through the supplementary nutrition program. Not enough attention is given to the most effective interventions for child nutritional outcomes, e.g. improving child-care behaviors and educating parents how to improve nutrition using the family food budget.

**Mismatch II:** Service delivery is not sufficiently focused on the youngest children (under three), who can potentially benefit most from ICDS interventions. In addition, children from wealthier households participate much more than poorer ones and ICDS is only partially succeeding in preferentially targeting girls and lower castes.

**Mismatch III:** Although the increase in program coverage was greater in underserved than well-served areas during the 1990s, the poorest states and those with the highest levels of undernutrition still have much lower levels of program funding and coverage.

Table 13 summarizes the main strengths and weaknesses of ICDS and suggests a menu of options to increase its impact on the nutritional status of priority groups.

**Table 13 Summary of strengths and weaknesses of ICDS**

POSITIVE FEATURES	AREAS NEEDING IMPROVEMENT	HOW TO DO IT
<b>Overall program</b>		
Designed to address the multiple determinants undernutrition, i.e. food security, health services and caring and feeding behavior	<b>Mismatch I</b>	
	<ul style="list-style-type: none"> <li>▪ Wide gap between original intention/design and actual implementation – food supplementation dominates and linkages with health sector and counseling of parents are neglected</li> </ul>	<ul style="list-style-type: none"> <li>▪ Rationalize design and improve implementation                             <ul style="list-style-type: none"> <li>✓ Define priority objectives</li> <li>✓ Identify cost-effective interventions to achieve those objectives</li> <li>✓ Implement activities to deliver those interventions</li> <li>✓ Monitor execution and evaluate impact</li> </ul> </li> </ul>
Designed to address the intergenerational cycle of undernutrition, i.e. pregnant women and young children – although the initial design focus was on children 3-6 years, over the last decade the design focus has shifted towards children 0-3 years.	<b>Mismatch II</b>	
	<ul style="list-style-type: none"> <li>▪ Service delivery remains focused on older children (3-6 years)</li> <li>▪ Some of the poorest and most vulnerable groups are not reached</li> </ul>	<ul style="list-style-type: none"> <li>▪ Improve targeting of children under three and pregnant women                             <ul style="list-style-type: none"> <li>✓ Strengthen nutrition and health education activities</li> <li>✓ Increase home visits</li> </ul> </li> <li>▪ Improve targeting of poorest and most vulnerable households                             <ul style="list-style-type: none"> <li>✓ Introduce mini-AWCs (<i>poriawadis</i>)</li> <li>✓ Increase outreach activities</li> </ul> </li> </ul>
Designed to target poor	<b>Mismatch III</b>	
	<ul style="list-style-type: none"> <li>▪ Per child spending is higher in richer states</li> </ul>	<ul style="list-style-type: none"> <li>▪ Address regressive distribution of financing across states by targeting future expansions to districts and blocks with highest prevalence of malnutrition</li> </ul>

states and poor people within these states	<b>Other issues</b>	<ul style="list-style-type: none"> <li>▪ Quality of services is poor</li> <li>▪ Develop capacity to deliver all nutrition interventions <ul style="list-style-type: none"> <li>✓ Increase external participation in service delivery (e.g. mothers' groups)</li> <li>✓ Increase synergy with other programs (e.g. RCH, primary education, etc.)</li> <li>✓ Add a second AWW</li> <li>✓ Contract private sector for specific activities</li> </ul> </li> </ul>
Strong grass-roots presence		<ul style="list-style-type: none"> <li>▪ Optimize use of available resources <ul style="list-style-type: none"> <li>✓ Improve skills of AWWs and AWHs</li> <li>✓ Introduce supportive supervision</li> <li>✓ Improve supply of inputs</li> </ul> </li> <li>▪ Strengthen focus on results and accountability <ul style="list-style-type: none"> <li>✓ Decentralize responsibility and management of the program to state governments and PRIs through performance-based financing</li> <li>✓ Reform the Management Information System (MIS)</li> <li>✓ Reward performance at all levels of the administration</li> <li>✓ Strengthen community ownership and enhance accountability to local communities</li> <li>✓ Involve PRIs in monitoring service delivery</li> </ul> </li> </ul>
Wide coverage		<ul style="list-style-type: none"> <li>▪ Design is standardized and does not reflect local needs</li> <li>▪ Introduce flexibility through bottom-up planning</li> </ul>
<b>By determinant of malnutrition</b>		
<b>A. Food security</b>		
Designed to fill the "food gap" in the intake of young undernourished children	<ul style="list-style-type: none"> <li>▪ Food supplementation is universal and absorbs much of the financial and time resources in the AWC</li> <li>▪ Food availability is irregular; quality is often poor</li> <li>▪ Leakage to non-priority groups</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ensure that malnourished children are reached by SNP</li> <li>▪ Improve the efficiency of procurement and distribution of SNP so that resources can be freed up to strengthen other nutrition interventions</li> <li>▪ Improve procurement and distribution of food <ul style="list-style-type: none"> <li>✓ Decentralize procurement of food to community level</li> <li>✓ Contract the private sector (e.g. for food distribution)</li> </ul> </li> <li>▪ Strengthen MIS</li> <li>▪ Encourage community ownership and monitoring</li> </ul>
<b>B. Health</b>		
Designed to link with health services for immunization, Vitamin A supplementation and referral of high-risk children and pregnant women	<ul style="list-style-type: none"> <li>▪ Weak articulation with health system</li> <li>▪ Poor focus on counseling and behavior change</li> </ul>	<ul style="list-style-type: none"> <li>▪ Strengthen convergence with RCH Program <ul style="list-style-type: none"> <li>✓ Introduce joint ICDS-RCH bottom-up planning process</li> <li>✓ Provide better training of ANMs in nutrition issues and best practices</li> </ul> </li> <li>▪ Reset priorities and redirect resources towards disease prevention/control</li> </ul>
<b>C. Care</b>		
Designed to support effective nutrition counseling and growth promotion linked to regular growth monitoring	<ul style="list-style-type: none"> <li>▪ AWW is overburdened with many other tasks that take priority over nutrition promotion</li> <li>▪ AWW has received little training to develop skills needed for counseling parents</li> <li>▪ Poor quality of equipment for weighing/growth promotion</li> <li>▪ Poor focus on counseling and behavior change</li> </ul>	<ul style="list-style-type: none"> <li>▪ Foster community support (e.g. mothers' groups)</li> <li>▪ Increase manpower in AWCs</li> <li>▪ Improve training</li> <li>▪ Strengthen MIS and improve the supply system</li> <li>▪ Reset priorities and redirect resources towards promoting appropriate breastfeeding, home-based complementary feeding and caring behaviors</li> <li>▪ Training</li> </ul>
<b>D. Micronutrients</b>		
Center-based interventions are potentially useful for supplementation of Vitamin A and IFA.	<ul style="list-style-type: none"> <li>▪ Inadequate articulation with RCH Program</li> </ul>	<ul style="list-style-type: none"> <li>▪ Strengthen convergence with RCH Program</li> </ul>

## **3.2 ELEMENTS OF SUCCESS IN PUBLIC HEALTH: HOW CAN ICDS REACH ITS FULL POTENTIAL?**

This section examines some key issues in ICDS that are central to achieving results. To do so we use the findings of “Millions Saved. Proven Successes in Global Health”, a recent report that documents 17 cases in which large-scale national, regional and global efforts have succeeded in improving health status in developing countries<sup>1</sup>. In order to be labeled successful, these cases had to meet a set of rigorous selection criteria: be of large scale, have a duration of five years or more, employ a cost-effective intervention, and have an impact on an important health problem. Although no single recipe emerges from the review of the successful programs, a consistent set of ingredients contributes to success: (i) predictable, adequate funding from both international and local sources; (ii) political leadership and champions; (iii) technological innovation within an effective delivery system, at a sustainable price; (iv) technical consensus about the appropriate biomedical approach; (v) good management on the ground; and (vi) effective use of information. Moreover, in most cases, community participation was also a contributing factor.

Below, we review how ICDS scores with respect to the elements of success outlined above and we present options that the Department of Women and Child Development could consider to realign the design and implementation of ICDS and improve the chance of maximizing its impact<sup>a</sup>. Particular attention is given to what can be done to fix the three mismatches identified in Table 13 above.

### **3.2.1 Predictable, adequate funding – further expansion or consolidation of impact?**

Availability of funds has not been a major problem for ICDS, which has received extensive financing from both national and international sources. Over the years, absolute spending, as well as the spending per child on various ICDS components, has increased substantially<sup>2</sup>. For example, the GOI’s contribution increased from Rs 329.8 crores in 1992/93 to Rs 1311.2 crores in 2001/02. The expenditure on supplementary nutrition, which is financed by the state governments, also increased by almost four times during the same period. However, it is not clear that the increased funding has had a measurable impact on children’s nutritional status, and it might be more beneficial to allocate funds to improving service delivery within existing AWCs projects, rather than to expand coverage.

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<sup>a</sup> In the case of ICDS, we do not consider the element of technological innovation since, unlike in other public health programs, the development of a technology like a drug, vaccine or pesticide, is unlikely to play a key role in nutrition interventions.



### **3.2.2 Political leadership and commitment – do malnutrition in India and ICDS really matter to the key decision-makers?**

High-level political commitment to the cause is key to all successful public health programs. Although India has one of the highest proportions of underweight children in the world and the Government has often expressed its commitment to reducing malnutrition, this is not adequately reflected in current policy discussions. Several factors may explain the failure to implement an *effective* nutrition intervention, including lack of awareness of the most cost-effective interventions; a tendency to view malnutrition interventions as transfers to the poor and to under-estimate their economic impact for the country as a whole; the multiplicity of organizational stakeholders involved; and the relatively muted voice of the poor.

Building commitment and effectively mobilizing political leadership towards supporting changes in the existing array of nutrition programs in India will require engaging several public and private stakeholders in understanding the size and characteristics of the undernutrition problem in India, the devastating human, social and economic consequences of failing to address it and the large human, social and economic benefits associated with the correct implementation of available, affordable and cost-effective nutrition interventions.

### **3.2.3 Technical consensus about the right approach – can the mismatches in ICDS be fixed?**

Agreement among technical experts about the right strategy to combat malnutrition is a central factor in the appropriate design of a program. In the case of the ICDS program, however, the program has not succeeded in implementing the most cost-effective nutrition interventions and in reaching the priority groups. Substantial changes in program implementation need to be introduced to fix the three most important mismatches in ICDS.

#### *3.2.3.1 Fix mismatch I: bridge the gap between program design and implementation so that the most important causes of undernutrition in India are addressed*

(i) Feeding and caring practices. Although exclusive breastfeeding in the first months of life is important to avoid infection, water and other supplements are frequently given in early infancy<sup>3</sup>. The Breastfeeding Promotion Network in India (BPNI)<sup>4</sup> conducted a study in 49 districts in 2003 that revealed that only 39.7% of infants were exclusively breastfed during the first six months. Studies also indicate that the quality of complementary foods can be poor, due to local customs and beliefs<sup>5</sup>, and much needs to be done to reduce this source of nutritional deprivation during this crucial growth period. The situation regarding the introduction of semi-solid complementary foods is even worse. According to the NFHS II, only one-third of children in India were offered any semi-solid food between six and nine months and in Uttar Pradesh, Bihar, Madhya Pradesh this figure was approximately 40%. Even in prosperous Punjab and Haryana,

more needs to be done to encourage the feeding of children with modified family food. Along with infections, delayed introduction of semi-solid foods is an important trigger of malnutrition, which is worst between six months and one-and-a-half to two years. The AWW should devote much more attention to encouraging exclusive breastfeeding for the first six months and adding semi-solid complementary food three to four times a day in appropriate quantities thereafter<sup>6</sup>.

Another key way to improve child growth is to show women how to use their own resources to feed their children more effectively. This approach has been used in many settings including the Republic of Korea, China and Vietnam<sup>7</sup>. An intervention in Haiti<sup>8</sup> taught mothers to use inexpensive local foods to prepare nutritious food for their children. This was highly successful in helping mothers rehabilitate their malnourished children: the children of mothers who received demonstration-education had mortality rates that were 68% of the mortality rates experienced by children of mothers who had received growth-monitoring and counseling services but no demonstration-education. In households in which the mother participated in demonstration-education, the younger siblings of malnourished children were also less likely to become malnourished and had significantly lower mortality rates than did the younger siblings of malnourished children whose mothers had not participated in demonstration-education. Similar positive effects of growth promotion on maternal knowledge and child caring practices have been found in Bangladesh<sup>9</sup>. The promotion of feeding and caring practices is an aspect of ICDS that very much needs to be strengthened.

(ii) Disease control and prevention. Recognizing that child growth and health can be enhanced by improving environmental hygiene and domestic health management practices, the ICDS program has components for de-worming, iron supplementation for children and home visits to improve childcare practices, but these policies need to be implemented much more rigorously given the high prevalence of worm infestations and gastro-enteric infections in India. Some of these interventions clearly lie within the scope of the AWWs' work, but AWWs need to be given more training and encouragement to implement these interventions and work with communities to improve their sanitary practices.

Collaboration between ICDS and the health delivery system has improved in recent years, one consequence of which has been better immunization coverage. However, the partnership between the AWW and the ANM has been less successful with respect to identifying high-risk pregnancies, providing prenatal and postnatal care, and conveying adequate health and nutritional messages to women. Increased collaboration will also help to ensure the provision of broader child and maternal health services. Strengthening convergence of ICDS and RCH should be a priority for the concerned departments.

(iii) Micronutrient supplementation. ICDS can also be used to facilitate children's access to national micronutrient supplementation programs for iron, Vitamin A and iodine. These interventions have been shown to be exceptionally cost-effective in a number of settings<sup>10</sup>, and their benefits for child growth, health, and cognitive development are well-documented. So far, the micronutrient interventions in India, namely the distribution

of iodized salt, the administration of a semi-annual massive dose of vitamin A to young children, and the distribution of iron-folic acid tablets to vulnerable groups, appear to have had little effect<sup>11</sup>. These programs need to be strengthened.

(iv) Supplementary feeding. ICDS functionaries, at all administrative levels, as well as program beneficiaries, appear to consider the supplementary nutrition program (i.e. food distribution) to be synonymous with the full set of nutrition interventions of ICDS, often using the two concepts interchangeably. This is indicative of the pervasiveness of the food bias in the ICDS program. The food bias is also evident in the allocation of expenditure across ICDS components: the supplementary feeding program currently accounts for about two-thirds of the total cost of the ICDS program<sup>12</sup>. It is important to use supplementary feeding strategically – as an incentive for poor and malnourished children to attend the AWC where they, and their mothers, can receive health and nutrition education interventions. Rather than being used for supplementary feeding, resources could be redirected towards effecting improvements in the delivery of other ICDS services. It is absolutely crucial that ICDS implementation emphasizes the multi-dimensional nature of malnutrition and that food intake be understood as only one, and most often not the main, determinant of child nutritional status.

### *3.2.3.2 Fix mismatch II: increase impact by reaching the youngest children*

Because of the type of services provided and the focus on center-based activities, ICDS tends to reach 3 to 6 year olds more easily, to the neglect of pregnant women and children under three. Young children need to be accompanied to the AWC and require more time and attention than the AWW has available. Thus, interventions often miss the most critical groups, and the prevalence of stunting and underweight remains very high. Failing to reach young children is of particular concern in light of the evidence that most growth faltering occurs during the first two years of life and that it negatively affects children's development throughout their lives. A more concerted effort needs to be made to recruit young children into the program, perhaps through reaching out to women effectively while they are still pregnant or at birth. Succeeding in this effort would produce a shift towards preventing malnutrition instead of just treating it, when it is often already too late to recover the growth trajectory. The advantage of some of the cost-effective measures described above is that they can effectively reach children under three because, unlike food supplementation, they are occasional interventions and so (1) do not require regular attendance at the AWC, and (2) can even be delivered to people's homes.

In this context, conditional cash-transfers have been very successful in increasing the demand for healthcare for young children, educating parents about adequate caring and feeding practices and, ultimately, improving child nutritional and health status quite rapidly in other countries, such as Mexico<sup>13</sup>, Honduras<sup>14</sup> and Colombia<sup>15</sup>. The possibility of introducing such programs in India should be explored thoroughly.

The supplementary feeding program is not effectively targeted at children during the early childhood years, i.e. during the optimal window for influencing growth<sup>16</sup>. Instead, it

has attracted children aged four to six years, presumably largely because of the preschool activities that are offered concurrently<sup>b</sup>.

### 3.2.3.3 Fix Mismatch III: improve targeting by increasing coverage in poorer states and districts

Another source of poor targeting lies in the regressive distribution of the ICDS program across states. The poorest states tend to receive the lowest government budgetary allocations per malnourished child. Thus, the states with the highest prevalence of stunting and underweight tend to have the poorest program coverage. However, there are some encouraging signs. First, the poorest states have shown the highest rate of *growth* of program coverage during the 1990s. Second, the program is more evenly distributed within states than across states – about 60 percent of the poorest villages in every state are covered by ICDS programs compared with 70 percent of wealthiest villages. Controlling for other village characteristics, we find that program placement is progressive within a given state.

The ICDS program will continue to expand the extent of its coverage and the Government of India has an action plan to construct another 188,000 *anganwadi* centers over the next few years. Given the high degree of concentration of child malnutrition observed in India, any future investment in ICDS should be driven by careful targeting of high-prevalence districts, villages and habitations across the countries<sup>c</sup>. Unfortunately, currently available data cannot yet shed light on which villages should be chosen because the available sample surveys are not large or representative enough at the village level. However, promising new methodologies, based on the merging of household survey and census data, can help identify villages that are likely to have the highest prevalence of malnutrition. Targeting resources at villages based on their need is desirable not only for equity reasons; it will also be the most effective strategy to reduce the prevalence of malnutrition<sup>17</sup>.

### 3.2.4 Good management on the ground – can service delivery be improved?

Good and effective service delivery requires that trained and motivated workers are in place and have the supplies, equipment, transportation and supervision to do their job well. This requires both adequate funding and good management – and in some instances strong management can partially compensate for budgetary restrictions.

A large number of studies have shown that ICDS experiences many difficulties with its implementation<sup>18</sup>. As mentioned earlier, this is in part due to the rapid expansion of the program, which has been faster than the institutional capacity necessary to manage it<sup>19</sup>. Under these circumstances, for example, it has not been possible to provide adequate

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<sup>b</sup> Many of these problems were addressed in Tamil Nadu's modification of the ICDS program (TINP), which halved the prevalence of severe malnutrition in the villages in which it was implemented by targeting the food to the needy and requiring them to eat it on the premises instead of taking it home to share with others (Heaver 2002; Greiner and Pyle 2000).

<sup>c</sup> For example, a mere 10% of districts and villages account for 27-28% of the overall number of malnourished children. See World Bank 2004a for more details and caveats.

AWW training, so many workers have been sent to their workplace with little or no prior training, and have had to learn on the job itself. Refresher training is also scarce. Nor is there the degree of supervision that might help AWWs to acquire the skills to perform their duties. ICDS support services at state level are also inadequately staffed. As a result, the AWW has very little technical or other support in providing ICDS services – a job that requires not inconsiderable understanding of nutrition, preschool education, and maternal and child health issues. Moreover, the AWW is charged with a multiplicity of tasks, not all of them related to the central ICDS objectives, and which may force her to divert some of her energies from the most important interventions. It is imperative that the AWW is perceived and treated as the core input for ICDS service delivery and given the right tools and support to perform her tasks effectively.

The supply of food in ICDS is erratic: the national evaluation in 1992<sup>20</sup> found that the average AWC was without food for 20% of the time, and more than a quarter of AWCs experienced shortages that lasted longer than 3 months. Leakages in the distribution of ICDS food are substantial at many levels, notably in the procurement of food supplies<sup>21</sup>. In the absence of localized food insecurity (such as drought or crop failure), local procurement may be a more effective means of supplying food: the supply would be more regular since it is easier to hold local providers accountable for delivery and local inhabitants would have a vested interest in the well-being of the children in their community. Moreover, local procurement provides a source of income to local inhabitants and promotes community involvement in and awareness of ICDS activities.

Clearly, the lack of growth-monitoring equipment needs to be addressed. Many AWCs do not have weighing scales that are in working condition, many lack growth charts, others have insufficient numbers of growth cards and the current monitoring and evaluation system fails to remedy shortfalls in supply. What is more crucial, though, is that growth-monitoring activities are used as communication tools to educate and encourage mothers to adopt behaviors that promote the growth of their children. It is in this area that the ICDS program is found to be most lacking. The training of AWWs needs to pay urgent attention to ensuring that AWWs are competent and effective in growth-monitoring and growth promotion activities.

### **3.2.5 Effective use of information – can information be used for action?**

Information is important in three ways. First, information about the extent of a problem raises awareness and focuses political and technical attention on finding solutions. Second, research on health behaviors and on the effectiveness of different service delivery approaches can help shape the design of a program and increase its prospects for success. Third, information creates accountability and motivates.

It is generally recognized that the monitoring and evaluation activities related to ICDS need strengthening, and a concerted effort is currently being made to do so. To this end, the DWCD might consider applying the monitoring and evaluation framework that they use for World Bank-funded ICDS projects to the general ICDS projects. What is crucial is an emphasis on collecting high quality information that is relevant, in the sense that the

data that is collected clearly reveals something about the functioning of important aspects of the program, and is of a manageable quantity, since large volumes of information are unlikely to be utilized to inform decisions.

In this regard, it may be helpful to revisit the guidelines and instructions issued for the monitoring and evaluation of ICDS in the past, and streamline and fine-tune them. This would cut down on the volume of superfluous information, and person-hours needed to process it. The number of registers currently collected by AWWs, for example, far exceeds the existing capacity to use this information for program management. Simultaneous with an effort that streamlines and standardizes the indicators that are collected across states, the development of a standard template with which to display information would make ICDS data more immediately accessible – at more levels and to more people in the project management system. Standardization would also facilitate comparisons to be made across states, highlighting the states from which lessons can be learned in key areas of implementation. It would also promote the analysis of trends within states and the aggregation of data at the national level.

Computerization and electronic processing of information would greatly facilitate monitoring and evaluation. The challenge is to find a way of processing the data into a form that is usable, so that a program manager or other interested party can find out what the status of activities (e.g. percentage of target group receiving benefits, percentage of AWCs with weighing scales, whether food was received by AWCs in the previous month) is at any point in time, present or past. Ideally, he or she should have easy access not only to aggregate indicators, but also to block and district level information. It is only then that data collected at the AWC level and aggregated further up the chain of implementation becomes potentially usable information that can be utilized to identify problem areas and take ameliorating action.

In general, more human resources need to be devoted to M&E. One way to do this is to increase the awareness of the importance of monitoring at all levels of implementation so that in the portions of their tasks that are allocated to M&E-related activities, functionaries give M&E the attention it deserves. This is challenging and requires a substantial mind-shift for functionaries - towards outcomes, results and performance, rather than inputs. In addition, some strengthening of community monitoring is desirable, either through existing community institutions or more informally, e.g. through encouraging community members to be alert to AWC opening hours and attendance and demand improvements where needed. Periodically, quality control checks on monitoring data should be undertaken to uncover any systematic errors in reporting, and the sources of any discrepancies resolved.

### **3.2.6 Community participation and decentralization – can they introduce flexibility, attract more resources and create accountability?**

With few exceptions, ICDS remains a highly standardized intervention that follows rules and regulations set centrally. Given the heterogeneity of malnutrition patterns observed in

India, state governments should be encouraged to tailor the basic model to local needs and assume responsibility for the management of the overall program rather than focus almost exclusively on the procurement and distribution of supplementary food, i.e. the only activity in the program that they finance directly. A budget line that is specific to the financing of ICDS should be introduced in the state budgets so that the planning and monitoring of investments in ICDS becomes an explicit activity of State governments.

The program is also run in a very top-down fashion, with all the logistical and implementation inefficiencies and rigidities that such an approach entails. A program to provide daily services to young children and pregnant women requires strong participation and supervision by the community. There does appear to be some empirical association between the strength of community support for ICDS, in the form of financial contributions from the *panchayat* and the performance of AWCs<sup>22</sup>. However, country-wide, only about 25% of states receive support from *panchayat* leaders, and this support has mainly been in the form of the provision of space for the AWC and the recruitment of beneficiaries<sup>23</sup>.

Despite statements of intent to involve communities in the process, there is little sense of community ownership<sup>24</sup>. This impression is reinforced by the fact that, in most places, the AWW is hired and paid by the government, and is not made accountable to the community in which she works. Also, equipment, food and other supplies are provided directly by the government. As discussed above, because of her daily presence in the village, the AWW is asked to take on many additional duties to support the field outreach staff of other government agencies (education, health and rural development in particular), but they are not encouraged to work as closely with community organizations such as the *Gram Panchayat* or *Mahila Mandal*. Given the extensive decentralization that has been underway in India over the past decade, there is considerable scope for involving locally-elected village committees much more actively in implementing the ICDS program. The experience of the mothers' committees in Andhra Pradesh could be replicated in other states.

Finally, one important way to enhance the responsiveness of the ICDS program and cultivate a sense of local ownership is to always select the AWW from the community that she is intended to serve. Although identified as a recommended policy in DWCD guidelines, this does not always occur in practice – appointments are sometimes political, or compassionate (made to women in difficult circumstances) and sometimes even for sale. Also, in many cases, the AWW is from a forward caste which may affect the access of scheduled caste and schedule tribe children since, by their own admission, some AWWs from forward castes only make infrequent home visits to scheduled caste hamlets<sup>25</sup>.

### 3.3 NEXT STEPS: RATIONALIZE DESIGN AND IMPROVE IMPLEMENTATION

That ICDS has great potential to improve the nutritional status of India's children is undeniable, but it needs to overcome some challenges if this potential is to be realized. One challenge is the large and ever-increasing range of duties that AWWs are expected to fulfill. Since, unlike most government workers, their workplace is located right at the grassroots, they are asked to help implement a multiplicity of government programs in addition to ICDS. However, this diverts attention away from their core duties, which are already too onerous and rarely can be performed satisfactorily. Moreover, the changing scope of the ICDS program has resulted in considerable ambiguity among higher-level officials as to ICDS objectives, and the capacity of both the central and state units to manage and deliver the program is being stretched. Finally, three major mismatches between what an effective nutrition intervention should do and what ICDS is currently doing are preventing the program from achieving better results. Consequently, despite its national infrastructure, ICDS is not making the expected contribution to reducing the prevalence of malnutrition. It may be time to reconsider the approach that should be taken by ICDS.

Some alternatives include:

- Retain the present structure whereby a preschool function for older children (4 to 6 years), on the one hand, and maternal and child health and nutrition interventions with special emphasis on younger children (0 to 3 years), on the other hand, are offered within the same program. If this option is pursued, then the difficulties in simultaneously carrying out these disparate tasks need to be resolved. At the moment, this dual objective tends to result in AWWs devoting most of their day to preschool education and older children, to whom educational activities are directed, squeezing out the attendance of younger children. Since AWHs devote most of their day to food preparation, human resources are skewed even further away from health interventions and counseling parents about feeding and caring practices. If the present structure is maintained, introducing a system of two workers – one charged with health and nutrition functions and one charged with the preschool function – may be a good option. The National Health Mission that is planned for fiscal year 2005-2006 is considering introducing an additional village health worker (ASHA) to focus on maternal and neonatal health issues. If this option is pursued, such a worker can be assigned the needs of 0 to 3 year old children, including nutrition. The AWW would focus on preschool education of older children and the AWH would continue supporting the preparation of food. Coordination with the work of the Auxiliary Nurse Midwife of the RCH program also needs to be carefully studied, articulated and monitored.
- A more radical alternative would be to separate services provided to 4 to 6 year old children from those provided to 0 to 3 year olds and pregnant and lactating women.



The demand for preschool education, and for feeding the older children, could be met by devolving these responsibilities to the Department of Education or to local authorities. The District Primary Education Program (DPEP) already delivers preschool education services in some districts, and the feeding of 4 to 6 year olds could become part of the National Mid-day Meals Program<sup>26</sup>. In this manner, more of the AWW's time could be freed up for nutrition and health education and growth promotion, increasing the prospect of achieving better nutrition outcomes. In this case as well, the coordination between the AWW, the ANM and the ASHA (in the event that the proposal by the National Health Mission is implemented) will be crucial for the success of the programs.

To conclude, greater clarity and focus is needed if ICDS program is to make a substantial dent in the problem of persistent undernutrition in India. In particular, the three mismatches identified earlier need to be resolved so that a nutrition intervention is implemented that (i) provides the most effective services to address the most important determinants of malnutrition; (ii) reaches the younger children and the most vulnerable segments of the population; and (iii) is well targeted to areas where the prevalence of undernutrition is highest.

Moreover, leadership and commitment are necessary to address some of the structural inefficiencies of ICDS and many other public programs in India, including a weak information system, limited orientation towards results and lack of accountability for performance at all levels, which are hindering the success of the program.

Bridging the gap between the policy intentions of ICDS and its actual implementation is probably the single biggest challenge in international nutrition, with large fiscal and institutional implications and a huge potential long-term impact on human development and economic growth.

## ENDNOTES

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### Chapter 1

- <sup>1</sup> UNICEF 2003b; WHO 2000; UNICEF and MI 2004a
- <sup>2</sup> IIPS and ORC Macro 2000; UNICEF 2003b
- <sup>3</sup> World Bank 2004a
- <sup>4</sup> Horton 1999; Pelletier *et al.* 1995; Pelletier and Frongillo 2003
- <sup>5</sup> Black *et al.* 2003; Caulfield 2004.
- <sup>6</sup> Murray and Lopez 1997
- <sup>7</sup> Calder and Jackson 2000.
- <sup>8</sup> Allen 1994
- <sup>9</sup> WHO 1995
- <sup>10</sup> Pelletier and Frongillo. 2003.
- <sup>11</sup> ACC/SCN 1997
- <sup>12</sup> Agarwal *et al.* 1998; Agarwal *et al.* 2002, Barker *et al.* 2001, Lucas *et al.* 1999, Popkin *et al.* 2001; UNICEF 1998
- <sup>13</sup> Grantham-McGregor and Ani 2001
- <sup>14</sup> WHO 2002
- <sup>15</sup> Vinutha *et al.* 2000
- <sup>16</sup> West 2002
- <sup>17</sup> Mason *et al.* 2004
- <sup>18</sup> Stephensen 2003
- <sup>19</sup> Beaton *et al.* 1993; Fawzi *et al.* 1993
- <sup>20</sup> Jones *et al.* 2003
- <sup>21</sup> Bentley and Griffiths 2003
- <sup>22</sup> Ross and Thomas 1996
- <sup>23</sup> WHO 2004c; Seshadri 2001
- <sup>24</sup> ACC/SCN 2000
- <sup>25</sup> Black 2003
- <sup>26</sup> Bleichrodt and Born 1994
- <sup>27</sup> Ross and Horton 1998
- <sup>28</sup> Alderman 2005
- <sup>29</sup> Alderman 2005
- <sup>30</sup> Alderman *et al.* 2001
- <sup>31</sup> Glewwe *et al.* 2001
- <sup>32</sup> Daniels and Adair 2004
- <sup>33</sup> Alderman *et al.* 2003
- <sup>34</sup> Horton 1999
- <sup>35</sup> Horton 1999
- <sup>36</sup> Horton and Ross 2003
- <sup>37</sup> Horton 1999
- <sup>38</sup> CARE India and Linkages India 2003
- <sup>39</sup> Bhandari and Zaidi 2004
- <sup>40</sup> Alderman 2005
- <sup>41</sup> Horton 1999
- <sup>42</sup> ASC 1998
- <sup>43</sup> ASC 1998
- <sup>44</sup> UNICEF 2003b; ACC/SCN 2000; DWCD 2003
- <sup>45</sup> Nutrition Foundation of India 1991
- <sup>46</sup> ACC/SCN 2004
- <sup>47</sup> World Bank 2004a

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<sup>48</sup> World Bank 2004a  
<sup>49</sup> IIPS and ORC Macro 2000; Anand *et al.* 1999; Singh and Toteja 2003  
<sup>50</sup> NNMB 2002  
<sup>51</sup> IIPS and ORC Macro 2000; Seshadri 2001; Kapil *et al.* 1999  
<sup>52</sup> IIPS and ORC Macro 2000  
<sup>53</sup> NNMB 2002  
<sup>54</sup> Mason 2003  
<sup>55</sup> UNICEF and MI 2004b  
<sup>56</sup> UNICEF and MI 2004b; West 2002  
<sup>57</sup> ACN/SCN 2004  
<sup>58</sup> UNICEF and MI 2004a  
<sup>59</sup> West 2002  
<sup>60</sup> IIPS and ORC Macro 2000  
<sup>61</sup> UNICEF and MI 2004b; Mason 2003  
<sup>62</sup> DWCD and UNICEF 2001  
<sup>63</sup> Ministry of Industry 2000  
<sup>64</sup> Ministry of Industry 2000; ACC/SCN 2004  
<sup>65</sup> Gopalan 1986  
<sup>66</sup> WHO 2000  
<sup>67</sup> WHO 2004b  
<sup>68</sup> World Bank 2004a  
<sup>69</sup> World Bank 2004a  
<sup>70</sup> Haddad *et al.* 2003  
<sup>71</sup> World Bank 2004b  
<sup>72</sup> Mkenda 2004  
<sup>73</sup> World Bank 2004a  
<sup>74</sup> Shekar *et al.* 2004

## Chapter 2

<sup>1</sup> Esrey *et al.* 1990, Scrimshaw and SanGiovanni 1997; Allen and Gillespie 2001  
<sup>2</sup> Gordon *et al.* 1964, Scrimshaw *et al.* 1968  
<sup>3</sup> Schürch and Scrimshaw 1989  
<sup>4</sup> Martorell *et al.* 1975  
<sup>5</sup> Bouis and Hunt 1999  
<sup>6</sup> Collins and Thomasson 2002  
<sup>7</sup> Sethi *et al.* 2001  
<sup>8</sup> MacIntyre 1997  
<sup>9</sup> Esrey *et al.* 1990; Moe *et al.* 1991  
<sup>10</sup> Alderman *et al.* 2003  
<sup>11</sup> Alderman *et al.* 2003; Gordon and Dunleavy 2001  
<sup>12</sup> Alderman *et al.* 2003; Gordon and Dunleavy 2001  
<sup>13</sup> NIPCCD 1992.  
<sup>14</sup> Das Gupta *et al.* 2004  
<sup>15</sup> Bredenkamp and Akin 2004  
<sup>16</sup> Bredenkamp and Akin 2004  
<sup>17</sup> Das Gupta *et al.* 2004  
<sup>18</sup> Das Gupta *et al.* 2004.  
<sup>19</sup> DWCD 2003  
<sup>20</sup> Educational Resource Unit 2004  
<sup>21</sup> Educational Resource Unit 2004  
<sup>22</sup> Gopalan 1992  
<sup>23</sup> Vasundhara and Harish 1993  
<sup>24</sup> Bredenkamp and Akin 2004  
<sup>25</sup> Bredenkamp and Akin 2004

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- <sup>26</sup> NIPCCD 1992  
<sup>27</sup> Bredenkamp and Akin 2004  
<sup>28</sup> Educational Resource Unit 2004  
<sup>29</sup> Educational Resource Unit 2004  
<sup>30</sup> Educational Resource Unit 2004  
<sup>31</sup> Bredenkamp and Akin 2004  
<sup>32</sup> NCAER 2001  
<sup>33</sup> NCAER 2001  
<sup>34</sup> Bredenkamp and Akin 2004  
<sup>35</sup> NCAER 2001  
<sup>36</sup> Educational Resource Unit 2004  
<sup>37</sup> Bredenkamp and Akin, 2004  
<sup>38</sup> Educational Resource Unit 2004  
<sup>39</sup> Bredenkamp and Akin 2004  
<sup>40</sup> Bredenkamp and Akin 2004  
<sup>41</sup> See for example, Kulkarni and Pattabhi 1998  
<sup>42</sup> Bredenkamp and Akin 2004  
<sup>43</sup> See for example, SIDA 2000 and Johri 2004  
<sup>44</sup> CARE India 2004  
<sup>45</sup> Mid-term survey for the Andhra Pradesh Economic Restructuring Project (APERP)-Nutrition/ICDS component.  
<sup>46</sup> Mid-term survey for the Andhra Pradesh Economic Restructuring Project (APERP)-Nutrition/ICDS component.  
<sup>47</sup> Heaver 2002; World Bank 1998

### Chapter 3

- <sup>1</sup> Levine 2004  
<sup>2</sup> World Bank 2004d  
<sup>3</sup> IIPS and ORC Macro 2000  
<sup>4</sup> BPNI 2003  
<sup>5</sup> Roy 1997  
<sup>6</sup> Ghosh 2004  
<sup>7</sup> Whang 1981; Allen and Gillespie 2001  
<sup>8</sup> King *et al.* 1978; Berggren *et al.* 1983; Scrimshaw 1995  
<sup>9</sup> Karim and Lamstein 2003  
<sup>10</sup> Behrman *et al.* 2004  
<sup>11</sup> Vijayaraghavan 2002  
<sup>12</sup> Radhakrishna *et al.* 1998  
<sup>13</sup> Skoufias 2001  
<sup>14</sup> Rawlings and Rubio 2003  
<sup>15</sup> Attanasio 2004  
<sup>16</sup> Allen and Gillespie 2001  
<sup>17</sup> See World Bank 2004a for an exhaustive explanation of the concentration of child malnutrition and possible methodologies for improving targeting.  
<sup>18</sup> NIPCCD 1992; Greiner and Pyle 2000; NCAER 2001; Allen and Gillespie 2001; Educational Research Unit 2004; Bredenkamp and Akin 2004.  
<sup>19</sup> World Bank 1998  
<sup>20</sup> NIPCCD 1992  
<sup>21</sup> Greiner and Pyle 2000  
<sup>22</sup> Bredenkamp and Akin 2004  
<sup>23</sup> NCAER 2001  
<sup>24</sup> Greiner and Pyle 2000  
<sup>25</sup> Educational Resource Unit 2004  
<sup>26</sup> Measham and Chatterjee 1999

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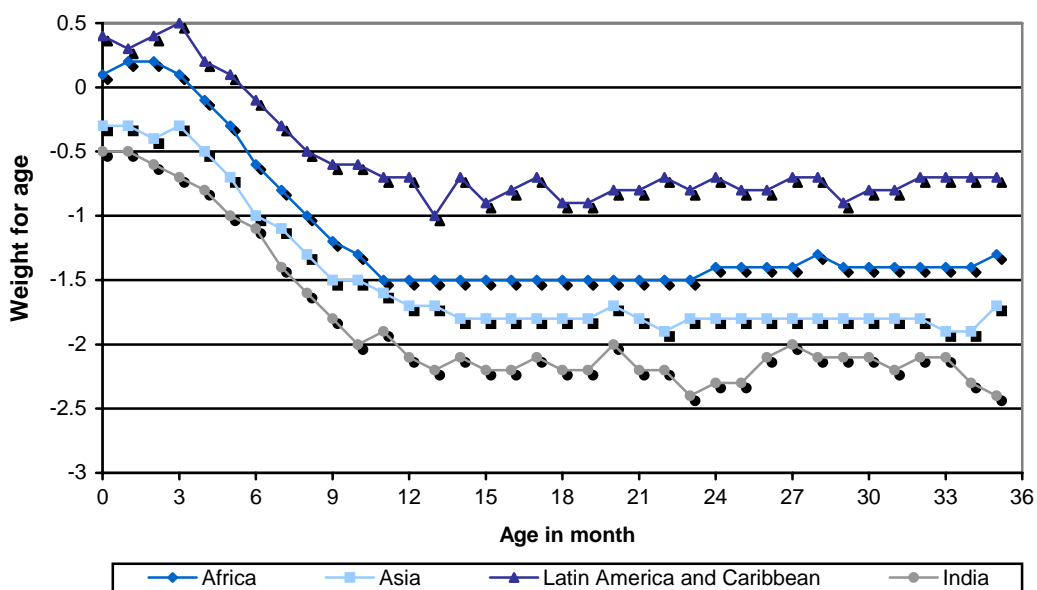
## APPENDIX: ADDITIONAL FIGURES AND TABLES

**Table A Sample calculation of the responsiveness of malnutrition (underweight) to rising incomes**

	GDP <i>per capita</i> (billions)*	Annual growth rate	Prevalence of malnutrition	Exogenous income elasticity of malnutrition^^	Percentage change in prevalence of malnutrition
2002	487.00	0.03	47.00	0.51	
2003	501.61	0.03	46.28	0.51	0.02
2004	516.66	0.03	45.57	0.51	0.02
2005	532.16	0.03	44.88	0.51	0.02
2006	548.12	0.03	44.19	0.51	0.02
2007	564.57	0.03	43.51	0.51	0.02
2008	581.50	0.03	42.85	0.51	0.02
2009	598.95	0.03	42.19	0.51	0.02
2010	616.92	0.03	41.55	0.51	0.02
2011	635.42	0.03	40.91	0.51	0.02
2012	654.49	0.03	40.28	0.51	0.02
2013	674.12	0.03	39.67	0.51	0.02
2014	694.35	0.03	39.06	0.51	0.02
2015	715.18	0.03	<b>38.46</b>	0.51	0.02

*Source: Authors' own calculations*

**Figure A Weight-for-age estimates of the change in nutritional status as children age**



*Source: Regional estimates from personal communication with Shrimpton R and Victor C; India data from IIPS & ORC Macro 2000*

**Table B Prevalence of anemia among children and women, by state, 1998/99**

	Children <3 years				Ever-married women 15-49 years			
	Mild	Moderate	Severe	Total	Mild	Moderate	Severe	Total
Andhra Pradesh	23.0	44.9	4.4	72.3	32.5	14.9	2.4	49.8
Arunachal Pradesh	29.1	24.7	0.7	54.5	50.6	11.3	0.6	62.5
Assam	31.0	32.2	0.0	63.2	43.2	25.6	0.9	69.7
Bihar	26.9	50.3	4.1	81.3	42.9	19.0	1.5	63.4
Delhi	22.2	42.9	3.9	69.0	29.6	9.6	1.3	40.5
Goa	23.5	27.9	2.0	53.4	27.3	8.1	1.0	36.4
Gujarat	24.2	43.7	6.7	74.5	29.5	14.4	2.5	46.3
Haryana	18.0	58.8	7.1	83.9	30.9	14.5	1.6	47.0
Himachal Pradesh	28.7	39.0	2.2	69.9	31.4	8.4	0.7	40.5
Jammu and Kashmir	29.1	38.5	3.5	71.1	39.3	17.6	1.9	58.7
Karnataka	19.6	43.3	7.6	70.6	26.7	13.4	2.3	42.4
Kerala	24.4	18.9	0.5	43.9	19.5	2.7	0.5	22.7
Madhya Pradesh	22.0	48.1	4.9	75.0	37.6	15.6	1.0	54.3
Maharashtra	24.1	47.4	4.4	76.0	31.5	14.1	2.9	48.5
Manipur	22.6	21.7	0.9	45.2	21.7	6.3	0.8	28.9
Meghalaya	23.4	39.8	4.3	67.6	33.4	27.5	2.4	63.3
Mizoram	32.2	22.7	2.3	57.2	35.2	12.1	0.7	48.0
Nagaland	22.0	18.7	3.0	43.7	27.8	9.6	1.0	38.4
Orissa	26.2	43.2	2.9	72.3	45.1	16.4	1.6	63.0
Punjab	17.4	56.7	5.9	80.0	28.4	12.3	0.7	41.4
Rajasthan	20.1	52.7	9.5	82.3	32.3	14.1	2.1	48.5
Sikkim	28.4	40.7	7.5	76.5	37.3	21.4	2.4	61.1
Tamil Nadu	21.9	40.2	6.9	69.0	36.7	15.9	3.9	56.5
Uttar Pradesh	19.4	47.8	6.7	73.9	33.5	13.7	1.5	48.7
West Bengal	26.9	46.3	5.2	78.3	45.3	15.9	1.5	62.7
India	22.9	45.9	5.4	74.3	35.0	14.8	1.9	51.7

Source: IIPS and ORC Macro 2000

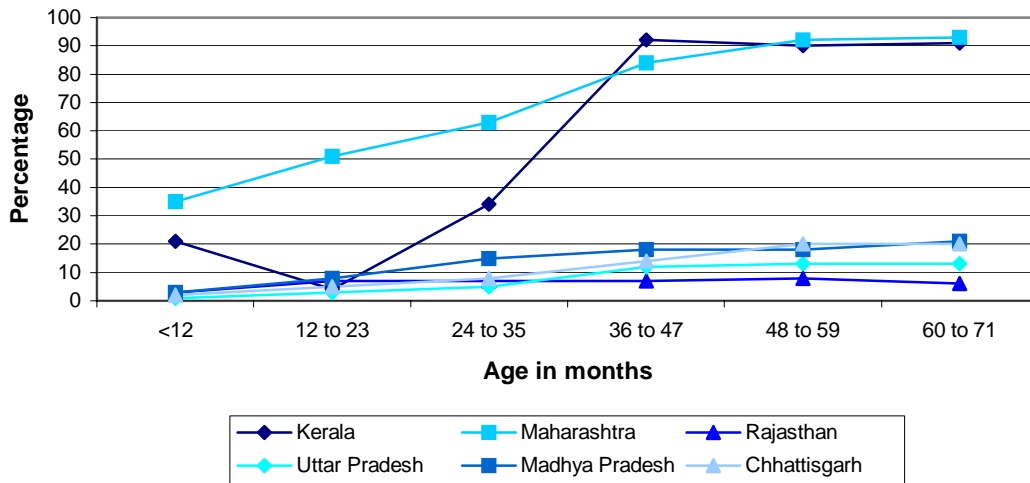


**Table C Share of villages covered by ICDS, by state, 1992-1998**

State	1992	1998
Andhra Pradesh	0.30	0.65
Assam	0.39	0.30
Bihar	0.14	0.32
Goa	0.85	0.95
Gujarat	0.61	0.84
Haryana	0.64	0.92
Himachal Pradesh	0.39	0.52
Jammu	0.44	0.70
Karnataka	0.63	0.86
Kerala	1.00	0.97
Madhya Pradesh	0.27	0.53
Maharashtra	0.66	0.81
Manipur	0.60	0.83
Meghalaya	0.07	0.22
Mizoram	0.97	0.73
Nagaland	0.54	0.84
Orissa	0.42	0.47
Punjab	0.39	0.70
Rajasthan	0.36	0.52
Sikkim		0.27
Tamil Nadu	0.77	0.43
West Bengal	0.45	0.58
Uttar Pradesh	0.20	0.33
Delhi	0.53	0.55
Arunachal Pradesh	0.65	0.82
Tripura	0.76	0.83
Total	0.35	0.52

*Source: Calculated from NFHS 1992/93 and NFHS 1998/99 in Das Gupta et al. 2004*

**Figure B Percentage of children attending AWC on a daily basis, by age**



**Table D Percentage of children attending the AWC, conditional on an AWC in the village**

	Kerala		Maharashtra		Rajasthan		Uttar Pradesh		Madhya Pradesh		Chhattisgarh	
	>1/mth	daily	>1/mth	daily	>1/mth	daily	>1/mth	daily	>1/mth	daily	>1/mth	daily
Total	54	49	75	62	10	6	24	6	35	12	47	10
By quintile												
Quintile 1	52	47	79	63	11	6	*	*	31	9	49	6
Quintile 2	53	48	77	60	10	7	24	6	34	10	48	9
Quintile 3	52	48	75	62	9	4	28	6	36	11	52	10
Quintile 4	54	49	73	69	11	5	25	7	34	11	47	11
Quintile 5	56	51	66	52	11	6	18	4	40	24	41	13
By age												
Three years and under	30	22	67	50	10	6	22	3	30	8	46	5
Four to six years old	91	91	94	90	14	7	29	12	42	19	49	18
By gender												
Male	54	49	75	62	10	5	24	6	34	12	47	10
Female	53	48	75	62	11	6	24	6	36	12	48	10
By caste												
Scheduled caste	55	50	74	64	15	9	30	6	36	13	47	8
Scheduled tribe	49	45	79	65	11	7	19	4	41	14	50	11
Other Backward Groups	54	49	76	58	8	4	22	5	31	11	46	9
Other castes	53	48	71	60	9	5	20	6	34	15	44	11
By locality												
Urban	51	48	72	64	12	7	16	3	54	37	50	21
Rural	58	51	75	62	9	4	26	6	29	7	44	5
Tribal	45	39	79	60	11	7	-	-	43	15	51	10

Source: ICDS III Baseline/ICDS II endline survey, 2000-2002

Note: \* Too few observations

**Table E Receipt of health interventions during pregnancy, under CARE India's Integrated Nutrition and Health Project II**

Indicator	All		Low SES		High SES	
	Intervention areas (%)	Non Intervention areas (%)	Intervention areas (%)	Non Intervention areas (%)	Intervention Areas (%)	Non Intervention areas (%)
	n=189	n=151	n=69	n=83	n=120	n=68
Consumption 90+IFA	59.8	41.1*	62.3	39.8*	58.3	42.6
Tetanus Toxoid (2+)	86.8	73.5*	91.3	69.9*	84.2	77.9
Antenatal Checkups (3+)	52.9	37.7*	53.6	28.9*	52.5	52.9

Source: Personal communication with CARE India

Note: \* Statistically significant differences between intervention and non-intervention areas

**Table F Adoption of appropriate infant feeding behaviors, under CARE India's Integrated Nutrition and Health Project II**

Indicator	All		Low SES		High SES	
	Intervention Areas (%)	Non Intervention areas (%)	Intervention Areas (%)	Non Intervention areas (%)	Intervention Areas (%)	Non Intervention areas (%)
Initiation of breastfeeding (within 1 hour)	65.2 n=181	38.3* n=149	75.4 n=65	42* n=81	59.5 n=116	33.8* n=68
Exclusive breastfeeding for at least 6 months	69.3 n=189	57.6* n=151	69.6 n=69	63.9 n=83	69.2 n=120	50.0* n=68
Complementary feeding (CF) initiated (among 6-9 mth olds)	65.3 n=121	43.6* n=110	66.1 n=55	36.5* n=52	63.6 n=66	50 n=58
Of those who initiated CF, dietary diversity in CF						
Vegetables given	68.0	43.6*	62.9	50.7	71.9	37.0*
Oil added to food	41.9	20.5*	38.2	22.7*	44.7	18.5*
Dal/animal foods given	79.8 n=203	55.8* n=156	73.0 n=89	58.7 n=75	85.1 n=114	53.1* n=81
Appropriate quantity, frequency and diversity in feeding as per age	6.1 n=244	0.5* n=218	2.8 n=106	0 n=109	8.7 n=138	0.9* n=109
Measles immunization by 12 months	55.4 n=121	35.1* n=111	47.3 n=55	25.0* n=52	62.1 n=66	44.1 n=59
Vitamin A (one dose) among children 9-11 months	59.5 n=121	43.2* n=111	49.1 n=55	44.2* n=52	68.2 n=66	42.4* n=59

Source: Personal communication with CARE India

\* Statistically significant differences between intervention and non-intervention areas



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