Improving Child Nutrition? The Integrated Child Development Services in India

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ABSTRACT

Levels of child malnutrition in India have fallen only slowly during the 1990s, despite significant economic growth and considerable expenditure on the Integrated Child Development Services (ICDS) programme, of which the major component is supplementary feeding for malnourished children. To begin to unravel this puzzle, this article assesses the programme's placement and its outcomes, using NFHS data from 1992 and 1998. The authors find that programme placement is clearly regressive across states. The states with the greatest need for the programme — the poor Northern states which account for nearly half of India's population and which suffer from high levels of child malnutrition — have the lowest programme coverage and the lowest budgetary allocations from the central government. Programme placement within states is more progressive: poorer and larger villages have a higher probability of having an ICDS centre, as do those with other development programmes or community associations. In terms of outcomes, the authors find little evidence of programme impact on child nutrition status in villages with ICDS centres.

INTRODUCTION

India is in the curious position of having very high levels of malnutrition despite large stocks of foodgrains resulting from increased agricultural productivity. Moreover, the country experienced rapid economic growth during the 1990s, but this has been accompanied by a very modest decline in child malnutrition. Estimated levels of moderate or severe

under-nutrition amongst children below the age of three were 52 per cent in 1992 and 47 per cent in 1998 (IIPS and ORC Macro, 2000: Table 7.17 and Figure 7.3).[1]

There are two factors responsible for this outcome. Firstly, a significant proportion of the population remains unable to buy enough food; secondly, the whole population is vulnerable to becoming malnourished due to exposure to diseases — in particular diarrhoeal diseases and parasitic infections resulting from poor sanitation and living conditions — and malnutrition in turn increases future susceptibility to disease.[2] These synergies take a heavy toll in labour productivity and outlays on health care, as well as mortality.[3]

To ameliorate the situation, the government of India has developed several major programmes for increasing access to food. One approach is through price controls: for example, the Public Distribution System[4] makes some staple foods such as foodgrains and sugar available at controlled prices through 'fair-price shops'. Another thrust has been through income support, such as a range of food-for-work programmes and employment guarantee programmes, where people are paid (often in foodgrains) for working on building or maintaining public infrastructure.[5] A third approach has been to directly feed children: this includes midday meal programmes for school-going children, and nutrition supplementation programmes. By far the biggest nutrition supplementation programme is the Integrated Child Development Services (ICDS).

The ICDS programme aims to monitor child growth and provide supplementary feeding and pre-school education to young children, along with some basic health services to young children, pregnant women and lactating mothers. With support from UNICEF and other donors, it has emerged from small beginnings in 1975 to become India's flagship programme in these areas. It has expanded rapidly: the number of blocks covered rose from 33 in 1975, to 4,200 around the year 2000, and over 5,500 in 2003 (Government of India, 2000; Parliament of India, 2003; Greiner and Pyle, 2000: 5). During the 1990s, there was almost a doubling in the number of

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1. For 1999, the Indian government estimated that 33 per cent of newborns were of low birthweight, constituting 35 per cent of all low-birthweight children in the developing world (Government of India, Department of Women and Child Development, cited in Greiner and Pyle, 2000).
2. On this, see, for example, Esrey et al. (1990); Scrimshaw and SanGiovanni (1997).
3. There is a large literature on this, but see the review and analysis in Behrman et al. (2004).
4. Initiated under wartime rationing during the Second World War, this programme expanded greatly thereafter (Nawani, 1994).
5. Over the years, these programmes have been variously re-named and re-structured, into (for instance) the National Rural Employment Programme and the Rural Landless Employment Guarantee Programme, which were merged in 1989 into the Jawahar Rozgar Yojana, and as of 2001 re-formulated into the Sampoorna Grameen Rozgar Yojana (Government of India, Ministry of Rural Development, n.d.[a], n.d.[b]; Government of India, Planning Commission, n.d.).

beneficiaries as well as in the programme budget (Government of India, 2000). By 1999–2000, the budgetary allocation for the programme was around US$ 170 m (ibid.).[6] This is a substantial budgetary outlay, even if not large in per capita terms, and it is set to increase rapidly in the near future, as the government aims to cover all administrative blocks. It is perhaps the largest programme of its kind in the world.

The combination of economic growth, agricultural surpluses, and a slew of programmes aimed at increasing access to food might be expected to yield more than a modest decline in child malnutrition. To begin to unravel this puzzle, we examine the functioning of the ICDS programme, which seeks to directly provide nutritional supplementation to children in need. Given the importance of the programme's objectives and the size of the budget, it is important to assess whether it is effective in its main objective of enhancing child nutritional status.

One of the crucial determinants of success is programme placement — whether the ICDS centres are allocated to the areas with the highest level of malnutrition. Despite its importance, there has been little formal analysis of this aspect. The effectiveness of programme placement is therefore the main focus of our analysis. Programme efficacy also depends on how well it is implemented once it is in place. This is more difficult to evaluate formally, due to a lack of prospective data on recipients and non-recipients of the programme. Several studies have sought to evaluate programme impact, in spite of this problem, but most compare outcomes between areas where the programme is present and those where it is not, without controlling for differences in the characteristics of the children, households and villages that could bias the estimates of programme effect.[7] We use a more rigorous methodology to ensure that the children in the 'treatment' and 'control' villages are matched along a wide range of dimensions, but conclusive impact evaluation depends on collecting panel data.

This article begins by summarizing findings on the success of nutrition supplementation programmes elsewhere, and information from studies monitoring the implementation of the ICDS programme. We then (1) examine trends in child malnutrition in different socio-economic groups; (2) analyse whether the ICDS programme placement is consistent with its goals of reducing child malnutrition; and (3) evaluate its impact on child anthropometric outcomes to the extent possible given the available data. The analysis is based on the National Family Health Surveys (NFHS) 1992/93 and 1998/99, which contain data on child anthropometry as well as information on the child, the mother, the household and the village,

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6. Estimates vary: according to Greiner and Pyle (2000: 19) in 1998–99, the Central Government expenditure on ICDS was about US$ 230 m.
7. Amongst the national level studies, see Deolalikar (2004); NIPCCD (1992).

including whether an ICDS programme was in place in the village (see IIPS, 1995; IIPS and ORC Macro, 2000).

As a result of this study, we will argue that one major reason for the limited impact of the ICDS programme on aggregate child nutrition levels is the programme's regressive distribution across states: states with the highest prevalence of child malnutrition have the lowest coverage by the programme and receive the lowest funding for it. Within states, the distribution seems to be more progressive. It also appears that where the programme is in place, its impact is hindered by the widely noted problems of implementation: our attempt to evaluate the ICDS provides little evidence of an impact on child nutritional status. These findings suggest that evaluations of nutritional supplementation programmes — and intervention programmes more generally — in India and elsewhere need to carefully examine the effectiveness and political economy of programme placement.

BACKGROUND

The Experience with Nutrition Supplementation Programmes

Nutritional supplementation programmes have been tried in many settings, and their outcomes have been mixed. Among programmes which seek to achieve highly specific forms of supplementation (such as salt iodization or vitamin A doses) there seem to be many examples of success, not only under controlled conditions but also in actual implementation in some large programmes.[8] For example, it is estimated that goitre rates halved in the People's Republic of China after a national salt iodization programme (Gillespie and Haddad, 2001: 25). Broader efforts to improve children's nutritional status through complementary inputs of foods with higher density of energy and/or other nutrients have been successful in some controlled trials, but of limited effectiveness in others (ibid.: 17).

Some longitudinal community-based projects have improved child growth by delivering supplementary feeding through intensive efforts in small areas, which would be very difficult to replicate on a larger scale. A study in Guatemala found that children in villages with supplementary feeding had higher growth than those without it (Guzmán et al., 1968). The same was found in a study in Haiti, which had temporarily targeted supplementary feeding for children with growth faltering (Berggren et al., 1985).

However, reviews of the impact of large-scale programmes for supplementary feeding find little evidence of success due to a variety of problems,

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8. See, for example, the reviews by Allen and Gillespie (2001) and Gillespie and Haddad (2001); see also Rogers and Coates' (2001) annotated bibliography.

including leakage; inadequate institutional capacity to meet the formidable challenges of implementing such programmes on a wide scale; and a failure to target needy children at the optimal ages for influencing growth (see Allen and Gillespie, 2001: 69–87, and Appendix 1; Anderson et al., 1981; Beaton and Ghassemi, 1982; Kennedy and Alderman, 1987). An exception is the *Progresa* programme in Mexico, which is estimated to have had a significant positive impact on the growth of the poor children targeted for the intervention (Behrman and Hoddinott, 2001).

The ICDS Programme

The government of India started the ICDS programme in 1975, with support from UNICEF. The government perceives child development to be hindered by 'poverty, poor environmental sanitation, disease, infection, inadequate access to primary health care, and inappropriate child care and feeding practices' (Government of India, 2000). The ICDS programme aims to alleviate some of these problems by providing a holistic package of services, including:

- supplementary nutrition and some basic health services for children aged below six years, and pregnant and lactating mothers;
- nutrition and health education for mothers;
- growth-monitoring, de-worming, and pre-school education for children.

To do this, ICDS (*Anganwadi*) centres (AWCs) are established in villages in selected administrative blocks. Most of these are in rural and tribal areas: only 6 per cent of the sanctioned ICDS blocks in 2003 were in urban slums (Parliament of India, 2003). The centre is staffed by an *anganwadi* worker (AWW) whose task is to provide some services directly to a rotating roster of children and pregnant women. Health and nutrition education is given via home visits to women who are pregnant or have infant children. The AWWs are expected to liaise with other frontline workers, in particular from the health department, to ensure that children and pregnant women receive key frontline maternal and child health (MCH) services, including immunization, health check-ups, and referral services; they are also responsible for ensuring ancillary health services, such as distributing folic acid to pregnant women, and de-worming children.

A large number of monitoring studies indicate that the ICDS programme has many problems with implementation, as well as programme design (see, for example, Allen and Gillespie, 2001; Bredenkamp and Akin, 2004; Greiner and Pyle, 2000; NCAER, 2001; NIPCCD, 1992). One major implementation problem is that AWWs are inadequately trained, supervised and supported, while their duties require considerable understanding of

nutrition, pre-school education, and MCH issues. A second problem is erratic provision of supplies,[9] and leakage in food procurement. Thirdly, the food supplementation is poorly targeted: it is not confined to malnourished children, and mostly reaches children aged between four and six years old, who are past the optimal window for influencing growth (Allen and Gillespie, 2001: 36).[10]

Problems of programme design include a lack of community participation (Greiner and Pyle, 2000). The programme is run in a very top-down fashion, with all the logistical and implementational inefficiencies and rigidities that such an approach entails, and workers are not accountable to the communities they serve. Also, the heavy focus of the ICDS on nutritional supplementation leads to the relative neglect of other more cost-effective approaches to improving nutrition outcomes, including efforts to improve environmental hygiene and domestic health management practices, so that children are less exposed to disease which takes a toll on child growth.[11]

DATA AND DEFINITIONS

This paper uses data from the two rounds of the National Family Health Surveys (NFHS) conducted in India during 1992/93 and 1998/99 (see IIPS, 1995; IIPS and ORC Macro, 2000). The surveys cover all the states of India (with the exception of Sikkim in 1992/93, a total of twenty-six states at the time of survey), and the survey samples are designed to ensure that the data are representative at the state level.[12] Both surveys target about 90,000 households each, and approximately the same number of ever-married women were interviewed. NFHS-1 (1992/93) and NFHS-2 (1998/99) use three types of questionnaire: the Village, the Household, and the Woman's Questionnaire.

The Village Questionnaire collected information on the availability of various facilities and amenities in the village, such as electricity and telephone connections, and the type of drainage system. Respondents to the

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9. A national evaluation in 1992 (NIPCCD, 1992) found that the average AWC was without food for 20 per cent of the time; for more than a quarter of the AWCs, this was true for over 30 per cent of the time.

10. Many of these problems were addressed in Tamil Nadu's modification of the ICDS programme (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 (Greiner and Pyle, 2000; Heaver, 2002).

11. See, for example, Allen and Gillespie (2001: 26); Black et al. (1982); Esrey et al. (1990); Scrimshaw and SanGiovanni (1997); and the review of studies in Bhan et al. (2001).

12. The 1998/99 survey is also intended to provide estimates at the regional level for four states (Bihar, Madhya Pradesh, Rajastan, and Uttar Pradesh) and estimates for three metro cities (Calcutta, Chennai, Mumbai), as well as slum areas in Mumbai.

Village Questionnaire were also asked about development and welfare programmes operating in the village. In particular, the Village Questionnaire identifies the villages that received the ICDS programme.

The Household Questionnaire includes information on age, sex, education, employment status, occupation, marital status, and relationship to the head of the household for each household member. It inquires about household dwelling conditions and the ownership of various assets. Information is also obtained on religion and caste/tribe of the household head. However, the Household Questionnaire does not include any direct measures of household income or consumption expenditure.

The Woman's Questionnaire gathers information from all ever-married women aged from fifteen to forty-nine who were usual residents of the sample households or visitors who stayed in the sample households the night before the interview. This questionnaire collects information about women's education, age at marriage, reproductive behaviour, child feeding practices and other background characteristics. In addition, measurements of height and weight were obtained for all young children in a household to assess their nutritional status.[13] Information on access to ICDS programmes is available only at the village level: there is no information on which households and children within the village have actually benefited from the programme.

Main Constructed Variables

To assess household economic status in the absence of household income or expenditure data we construct, following the methodology of Filmer and Pritchett (2001), a linear index from a set of asset indicators, using principal components analysis to derive the weight for each asset indicator. Our economic status index is the first principal component of a number of household assets such as ownership of clock, radio, TV, VCR, refrigerator, bicycles, motorbikes, cars, as well as the type of utilities used in the household. The first principal component is an unobserved vector that explains the largest amount of variability in the observed data. The household assets based first principal component derived from NFHS-1 data accounts for 29.6 per cent, and from NFHS-2 for 28.3 per cent of the total variance of the

13. While NFHS-1 collected measurements of weight and height for children born in the *four* years preceding the survey, NFHS-2 did it for children born in the *three* years preceding the survey. In NFHS-2, 13 per cent of eligible children were not measured, either because the child was not at home, or because the mother refused to allow the measurement. Also excluded from the analysis are respondents whose month and year of birth are not known, and those with grossly improbable height or weight measurement. NFHS-2 also collected anthropometrical information on the mothers. NFHS-1 did not collect the height measurement data in five states: Andhra Pradesh, Himachal Pradesh, Madhya Pradesh, Tamil Nadu and West Bengal.

relevant variables.[14] Availability of electricity, flush toilet, TV, and ceiling fan are the most influential variables in the estimation of the index. This finding is consistent across both surveys. The distribution of other factors in relation to the economic status index also makes economic sense. For example, households with a higher wealth index are more likely to live in *pucca* (brick) houses, and have such amenities as refrigerator, motorbike and radio. They are less likely to use kerosene for lighting and wood for cooking, or to utilize unsafe drinking water.

Our main indicators of children's nutritional status are two indices that are commonly used to assess this from anthropometrical data. These indices are expressed in standard deviation units (z-scores) from the median for the international reference population (Dibley et al., 1987a, 1987b).[15] Height-for-age z-score (HAZ) and weight-for-age z-score (WAZ) are defined as $(m_i - m_r)/\sigma_{rm}$, where m_i is the observed height (weight) of a child of a specified age and gender, m_r is the median height (weight), and σ_r is the standard deviation of the corresponding measurement for the reference population of children in that age–gender group. Low height-for-age (stunting) reflects *chronic* under-nutrition and/or repeated bouts of illness. Low weight-for-age (underweight) reflects either or both *acute and chronic* malnutrition and/or illness. Children who are more than two standard deviations below the median of the reference population in terms of these indices are considered to be severely to moderately under-nourished (stunted or underweight). Anthropometric measurements are, of course, just one way of measuring nutrition outcomes: their use has been debated (see, for example, Kumar and Stewart, 1992), but they remain the simplest measure to obtain with any accuracy from a large population, and therefore the most commonly used by both researchers and clinicians.

TRENDS IN CHILD MALNUTRITION BETWEEN 1992 AND 1998: THE GAINERS AND LOSERS

It is striking to see how widespread the incidence of underweight is amongst children in India. Even amongst boys (the sex in which parents invest the most) in the highest wealth tertile in 1998, over a third were underweight.

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14. The first principal component based on NFHS-1 data in Filmer and Pritchett (2001) explains 25.6 per cent of total variation. However, their calculation used a slightly different and smaller set of variables.
15. This standard is recommended by the World Health Organization, and the Nutrition Foundation of India (Agarwal et al., 1991) has concluded that it is generally applicable to Indian children (NFHS-2; see IIPS and ORC Macro, 2000: 265). The use of this reference group is based on the empirical finding that well-nourished children in all population groups for which data exist follow very similar growth patterns (Martorell and Habicht, 1986).

This tertile has an average caloric consumption of around 2500 calories per day,[16] so child malnutrition cannot be attributed to shortage of food. High burdens of disease are the probable cause of the high proportions of underweight children.

Children's nutritional status deteriorates sharply among lower socioeconomic groups (Table 1). Looking at differences by *mother's education level*, in 1998 the share of stunted boys amongst mothers with no education was 53 per cent, compared with 29 per cent among mothers with secondary or higher levels of education. The corresponding shares of underweight boys were 54 per cent and 32 per cent, respectively. The differences by *household*

Table 1. *Share of Stunted (HAZ < −2) and Underweight (WAZ < −2) Children[a] by Various Characteristics*

Characteristic	Boys				Girls			
	1992		1998		1992		1998	
	Mean	*Std. Err.*	*Mean*	*Std. Err.*	*Mean*	*Std. Err.*	*Mean*	*Std. Err.*
Height-for-age								
Mother's Education								
None	0.546	*0.007*	0.533	*0.006*	0.525	*0.007*	0.564	*0.007*
Primary	0.446	*0.013*	0.438	*0.011*	0.445	*0.012*	0.454	*0.011*
Secondary	0.314	*0.009*	0.293	*0.007*	0.328	*0.009*	0.316	*0.007*
Household's Wealth Tertile								
Poorest	0.567	*0.009*	0.554	*0.009*	0.537	*0.010*	0.579	*0.010*
Middle	0.504	*0.009*	0.469	*0.008*	0.489	*0.009*	0.501	*0.008*
Richest	0.361	*0.007*	0.340	*0.006*	0.378	*0.008*	0.368	*0.006*
Mother's Caste								
Scheduled caste	0.545	*0.013*	0.505	*0.010*	0.529	*0.014*	0.529	*0.011*
Scheduled tribe	0.513	*0.015*	0.523	*0.012*	0.447	*0.015*	0.535	*0.012*
Other	0.463	*0.006*	0.408	*0.005*	0.461	*0.006*	0.438	*0.006*
All	0.478	*0.005*	0.438	*0.004*	0.469	*0.005*	0.467	*0.005*
Weight-for-age								
Mother's Education								
None	0.592	*0.006*	0.536	*0.006*	0.587	*0.006*	0.578	*0.007*
Primary	0.512	*0.011*	0.488	*0.011*	0.509	*0.010*	0.493	*0.011*
Secondary	0.380	*0.008*	0.315	*0.007*	0.350	*0.008*	0.343	*0.007*
Household's Wealth Tertile								
Poorest	0.624	*0.008*	0.570	*0.009*	0.593	*0.008*	0.598	*0.010*
Middle	0.563	*0.007*	0.491	*0.008*	0.558	*0.007*	0.532	*0.008*
Richest	0.409	*0.007*	0.353	*0.006*	0.411	*0.007*	0.386	*0.007*
Mother's Caste								
Scheduled caste	0.568	*0.012*	0.517	*0.010*	0.572	*0.012*	0.548	*0.010*
Scheduled tribe	0.590	*0.012*	0.551	*0.012*	0.559	*0.012*	0.574	*0.012*
Other	0.520	*0.005*	0.424	*0.005*	0.509	*0.005*	0.459	*0.006*
All	0.532	*0.004*	0.455	*0.004*	0.522	*0.004*	0.489	*0.005*

Note: [a]Children aged 0–4 in the 1992 survey, and 0–3 in the 1998 survey.
Sources: NFHS 1 and 2 (IIPS, 1995; IIPS and ORC Macro, 2000).

16. World Bank (2005), citing data from the National Sample Survey Organization, 2001.

wealth tertiles are equally sharp: for example in 1998, 35 per cent of boys from the richest tertile were underweight, compared with 57 per cent amongst the lowest tertile. Differences *between castes* are less sharp, though the boys of upper castes show better outcomes than lower castes or tribes.

The higher socio-economic groups also made stronger gains in child nutrition status during 1992–98 than the lower groups. The gains are especially marked amongst the boys of mothers with secondary school education and above, compared with lower education groups. The same applies to the upper castes versus the lower castes and tribes. There were less differences in improvement amongst different household wealth groups during this period.

The position of girls deteriorated relative to boys between 1992 and 1998: there were similar or marginally lower proportions of stunted and underweight girls compared to boys in 1992, but by 1998 girls were nutritionally more disadvantaged than boys across all socio-economic groups. Girls from the highest socio-economic groups showed improvement in nutritional status between 1992 and 1998. Amongst most of the other socio-economic groups, there was a much more modest decline in the prevalence of underweight girls. There was an *increase* in the proportion of underweight girls in the poorest wealth tertile and the scheduled tribes, and in the prevalence of stunting amongst girls in all the lower socio-economic groups.

This suggests that levels of discrimination against girls may actually have *risen* amongst the lower socio-economic status groups between 1992 and 1998, including poorer households and those with uneducated mothers. It has risen sharply amongst the tribal populations. This could be because people are reducing family size in India, which — combined with strong son preference — puts pressure on reducing the number of girls in the family (Das Gupta and Bhat, 1997).[17] Higher socio-economic groups have greater access to sex-selective abortion, and are therefore in a position to care more equally for the children that are born. Lower socio-economic groups have limited access to pre-natal sex selection technology, and this may lead to unequal treatment of children who are unwanted. There is, for example, considerable evidence that girls are less likely than boys to be taken for medical treatment, and the quality of treatment sought also differs, which could impact on their anthropometric status.

ASSESSMENT OF THE ICDS PROGRAMME PLACEMENT

Coverage of the ICDS programme is high: coverage rose sharply during the 1990s and a substantial proportion of India's villages are covered by the ICDS today. Of the villages sampled by the NFHS, a third had an ICDS programme in place in 1992, and the figure had risen to more than half in

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17.   On son preference more broadly, see Das Gupta (1987); Dyson and Moore (1983); Miller (1981). On gender differentials in tribal populations, see Maharatna (2000).

1998 (Table 2). A few states, notably Kerala, already had virtually complete coverage by 1992. Programme coverage is especially high in the southern region, the northeastern region, and the non-poor states of the northern region. The apparent decline in coverage in Tamil Nadu during the 1990s is probably the result of re-classification of the nutritional supplementation programme to the TINP (Tamil Nadu Integrated Nutrition Programme), which is broadly similar in concept to the ICDS.

Programme Placement Across States

For ease of discussion, we have grouped India's states by region: the South, the Northeast,[18] and the North. Since the Northern region is vast and highly heterogeneous — comprising both the poorest and the richest states in the country — we have divided it further into the 'poor North' (Bihar, Uttar Pradesh, Orissa, Madhya Pradesh and Rajasthan), 'rich North' (Punjab, Haryana, Gujarat and Maharashtra)[19] and 'other North' (Himachal Pradesh, Jammu and Kashmir, and West Bengal). The poor Northern states have some of the worst outcomes in the country not only in nutrition, but also in terms of education and child survival, reflecting a history of poor governance.

The need for the programme varies substantially across states (see Table 2). It is especially high in the poor Northern states, where over half of the children below three years of age were moderately or severely underweight. These are large states, comprising well over 40 per cent of the population of the country, and therefore contribute a high proportion of the total number of malnourished children in the country. At the other end of the spectrum are states such as Kerala and several of the Northeastern states, with the lowest levels of child malnutrition. The Northeastern states tend also to have good human development indicators in terms of levels of education and child survival, despite being relatively poor in terms of State Domestic Product per capita.

It is apparent that the programme is regressively distributed between states. The states with the highest prevalence of stunted and underweight children tend to have the lowest programme coverage (Figure 1). Table 2 shows very low coverage especially in Bihar and Uttar Pradesh in 1992, and despite increases in coverage by 1998, these states still lagged far behind others. The other three poor Northern states are more on par with the country averages in terms of ICDS coverage — although given their high levels of malnutrition they should in fact have above average coverage.

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18. Sikkim is not included where data are required for 1992, since these are not available.
19. By the time of the 2001 Census, Uttar Pradesh, Madhya Pradesh, and Bihar had some additional states carved out of them: Uttaranchal, Chhattisgarh, and Jharkhand respectively. To facilitate inter-survey comparison, we use the old state definitions.

Table 2. ICDS Coverage, Nutrition Levels, Allocation and Use of ICDS Funds, and State Domestic Product, by State

	Share of villages covered by ICDS[a]			Share of stunted		Share of underweight		Allocation and use of ICDS funds		
	(1) 1992	(2) 1998	(3) % change 1992–98	1992	1998	1992	1998	% spent from the funds allocated by the GoI to the states for the ICDS programme, 1992–2003[b]	GoI spending on the ICDS programme, per underweight child age 0–6 years, 2000/01–2001/02[c]	Per capita SDP (average of 1990–91 and 1998–99)[d]
North (poor)										
Bihar	0.14	0.32	129	0.56	0.54	0.63	0.55	76	25	7,440
Madhya Pradesh	0.27	0.53	96	–	0.51	0.60	0.55	102	72	15,480
Orissa	0.42	0.47	12	0.46	0.44	0.53	0.55	99	231	11,490
Rajasthan	0.36	0.52	44	0.42	0.52	0.45	0.51	105	95	17,231
Uttar Pradesh	0.20	0.33	65	0.54	0.56	0.58	0.52	65	60	12,570
North (rich)										
Gujarat	0.61	0.84	38	0.44	0.44	0.49	0.46	101	173	25,158
Haryana	0.64	0.92	44	0.43	0.50	0.35	0.35	101	280	27,437
Maharashtra	0.66	0.81	23	0.41	0.40	0.52	0.50	114	154	27,968
Punjab	0.39	0.70	79	0.38	0.39	0.46	0.29	98	334	29,361
North (other)										
Himachal Pradesh	0.39	0.52	33	–	0.42	0.46	0.45	96	469	21,387
Jammu & Kashmir	0.44	0.70	59	0.38	0.39	0.43	0.35	116	446	16,215
West Bengal	0.45	0.58	29	–	0.42	0.57	0.49	105	174	18,713
South										
Andhra Pradesh	0.30	0.65	117	–	0.39	0.48	0.38	99	178	18,809
Karnataka	0.63	0.86	37	0.41	0.37	0.51	0.44	100	234	20,395
Kerala	1.00	0.97	−3	0.26	0.22	0.27	0.27	99	351	21,139
Tamil Nadu	0.77	0.43	−44	–	0.29	0.47	0.37	82	357	23,154

Table 2. (Continued)

|	Share of villages covered by ICDS[a]			Share of stunted		Share of underweight		Allocation and use of ICDS funds		
	(1) 1992	(2) 1998	(3) % change 1992–98	1992	1998	1992	1998	% spent from the funds allocated by the GoI to the states for the ICDS programme, 1992–2003[b]	GoI spending on the ICDS programme, per underweight child age 0–6 years, 2000/01–2001/02[c]	Per capita SDP (average of 1990–91 and 1998–99)[d]
North-East										
Arunachal Pradesh	0.65	0.82	26	0.49	0.27	0.38	0.25	95	2,689	18,360
Assam	0.39	0.30	−23	0.51	0.51	0.50	0.37	100	257	13,258
Manipur	0.60	0.83	38	0.25	0.32	0.27	0.28	95	958	14,416
Meghalaya	0.07	0.22	214	0.47	0.45	0.45	0.38	102	380	16,034
Mizoram	0.97	0.73	−25	0.37	0.35	0.28	0.28	101	1,766	18,335
Nagaland	0.54	0.84	56	0.29	0.32	0.28	0.24	94	2,690	18,301
Sikkim	–	0.27	–	–	0.32	–	0.21	125	1,001	18,371
Tripura	0.76	0.83	9	0.42	0.41	0.46	0.43	89	377	15,252

Notes:
[a]*Sources*: NFHS 1 and 2 (IIPS, 1995; IIPS and ORC Macro, 2000).
[b]Under the budget heading 'ICDS (General)'. *Sources*: Responses to Parliamentary Questions: Yi-Kyoung Lee and Selvaraju, from Lok Sabha Unstarred Question No 89 dated 18 February 2003, and Rajya Sabha Unstarred Question No4417, dated 2 May 2003.
[c]Under the budget heading 'ICDS (General)'. *Sources*: Responses to Parliamentary Questions: Yi-Kyoung Lee and Selvaraju, from Lok Sabha Unstarred Question No1241, dated 31 July 2003, and calculated using the number of children aged 0–6 years from the Census of India 2001 (* prevalence of more than 2SD underweight from the NFHS-2).
[d]*Source*: Government of India, Ministry of Finance (2003–04). The data are at current prices at the time of the Economic Survey.

Figure 1. *The Relationship Between ICDS Programme Participation and*
States' Economic and Malnutrition Levels
(State Domestic Product per capita,[a] and prevalence of stunting and under-
weight amongst children, non-parametric Lowess-type regression estimates)
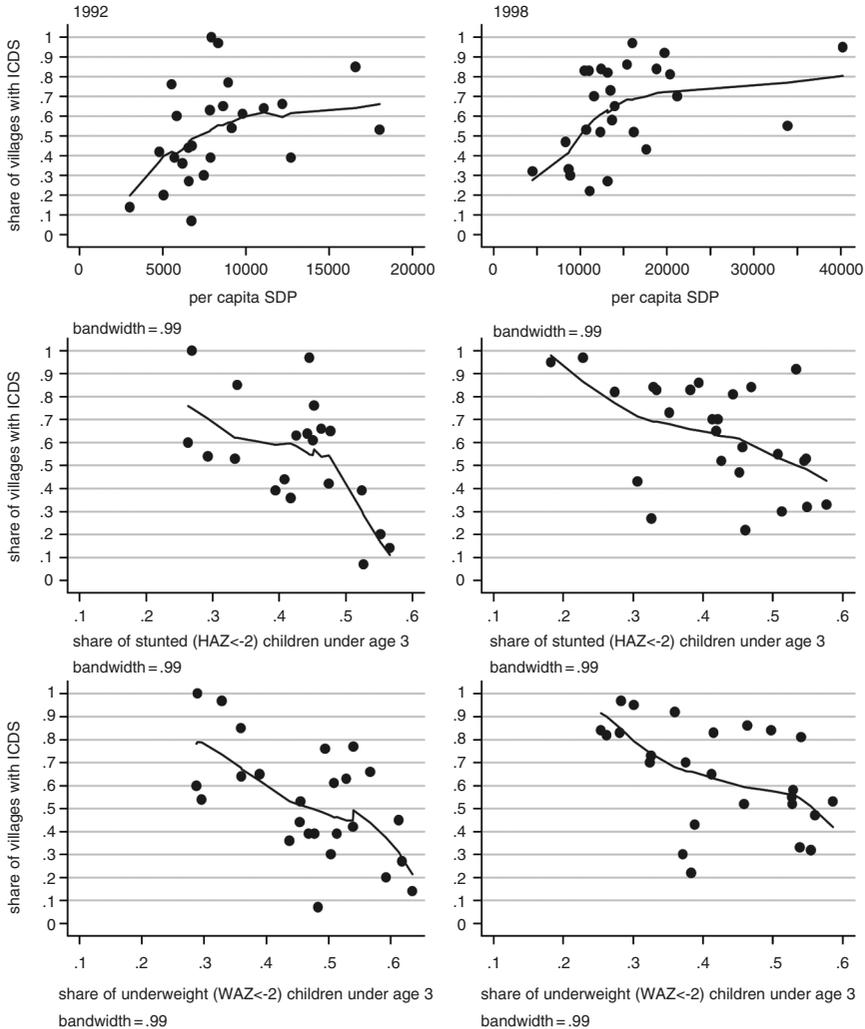
Notes: [a]The State Domestic Product per capita are for the years 1993–94, and 1998–99, to
correspond roughly to the two survey years.
Sources: NFHS 1 and 2 (IIPS, 1995; IIPS and ORC Macro, 2000); State Domestic Product
data from the Government of India, Ministry of Finance (2003–04).

The overall distribution of the ICDS programme across states is also regressive when compared with the states' economic level, as measured by State Domestic Product per capita (Figure 1). The picture is even more regressive when we look at inter-state differentials in government budgetary allocations for the ICDS programme per malnourished child (Table 2). Even allowing for some differences in the purchasing power of a rupee in different states, the contrasts are sharp. Except for Orissa, the poor Northern states receive by far the lowest budgetary allocations in the country. For example, Bihar (the poorest state) receives only Rs 25 per malnourished child, while Punjab (the richest state) receives Rs 334. The Northeastern states are especially well-funded (despite low levels of child malnutrition), and some of them receive a hundred times as much per malnourished child as Bihar.[20]

To make matters worse, Bihar and Uttar Pradesh do not spend all the money allocated to them (Table 2). In line with their history of poor governance, they spent only 76 per cent and 65 per cent of their allocations, respectively. Almost all the other states use up their full allocations. Thus children across the poor Northern states with high levels of malnutrition suffer multiple disadvantages: ICDS coverage is low, because central government budgetary allocations per malnourished child are much lower than the rest of the country; and if they live in the vast populous states of Bihar or Uttar Pradesh, their state government does not even use the budgets allocated for them. Rajasthan, Madhya Pradesh and Orissa use their allocations, but they too receive very little relative to their needs.
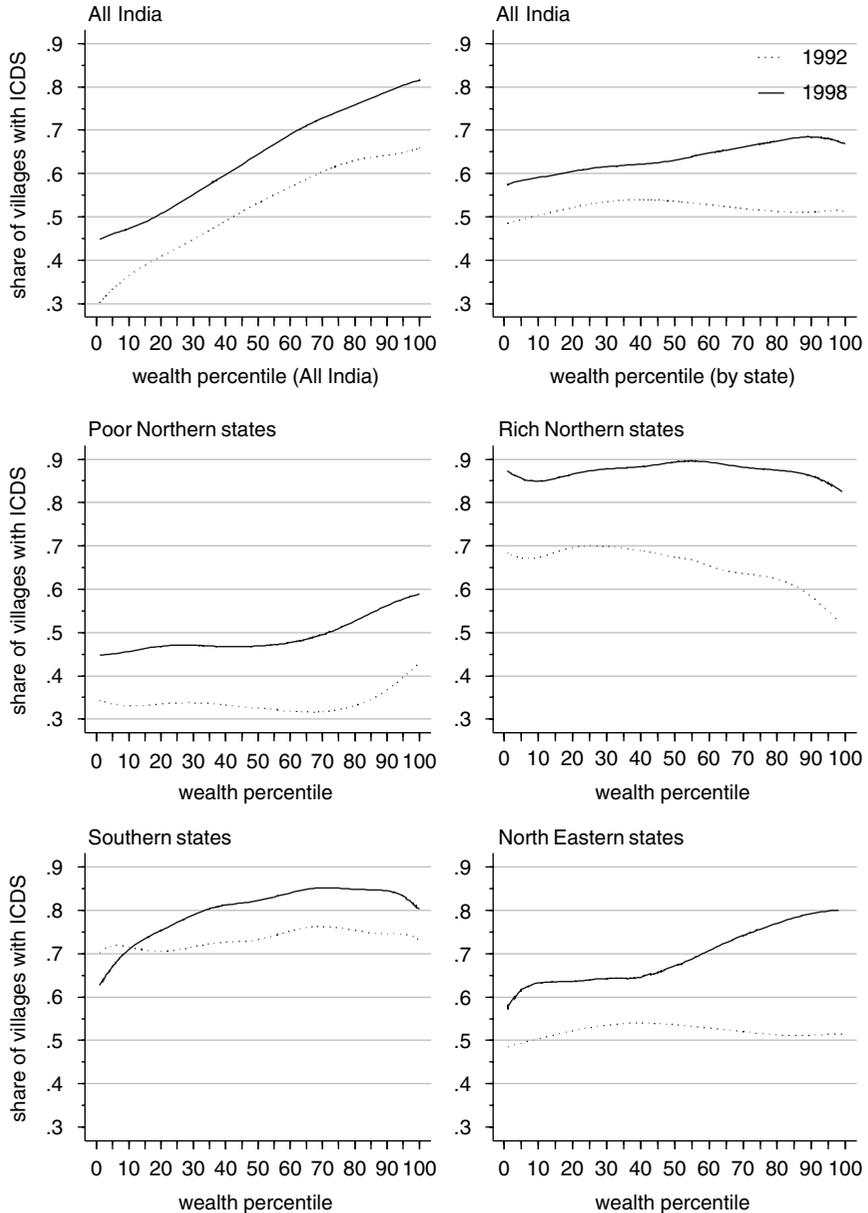
Programme Placement Across Villages

Programme placement is regressive across villages in India as a whole. The top left panel of Figure 2 is constructed based on the wealth ranking among all villages in India, and shows that richer villages have a higher probability of being covered by the programme than poorer ones. For example, only half of the villages from the lowest two deciles had the ICDS programme in place in 1998, while about 80 per cent of the richest villages in India were covered. Within a given state, programme placement is less regressive, as indicated by the top right panel of Figure 2, which is based on intra-state village wealth rankings. The difference in programme coverage between the poorest and the wealthiest villages within the states is relatively small — about 60 per cent of the poor villages in every state were covered by ICDS programmes, compared with 70 per cent of wealthiest villages.

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20. The Northeastern states also receive a block grant from the central government which helps cover the state portion of the ICDS budget (V. Selvaraju, personal communication to Yi-Kyoung Lee).

Figure 2. The Relationship between Village's Wealth and ICDS Programme Participation

However, there was an overall trend towards greater regressiveness in programme placement between 1992 and 1998. This is evident in the data across states and within states, and by region. In the rich Northern states — also the wealthiest states of the country — the distribution was clearly progressive in 1992, and became fairly neutral across wealth percentiles by 1998 (middle right panel). In other regions of the country, the picture was even less encouraging: from being broadly neutral across village wealth percentiles in 1992, programme placement became more regressive by 1998.

In the poorest Northern states, placement amongst villages was neutral in most wealth percentiles in 1992, except for the disproportionate allocation to the wealthiest villages (middle left panel). By 1998, this had become steadily more regressive across wealth percentiles, with about 45 per cent coverage in the poorest villages, compared with 60 per cent in the richest ones. In the Southern states (bottom left panel), the distribution was fairly neutral in 1992 and became more regressive by 1998, with around 62 per cent of the poorest villages covered compared with 85 per cent of the richer ones. Similarly, in the Northeastern states (bottom right panel), the distribution across wealth percentiles was fairly neutral in 1992, but became clearly regressive by 1998, with around 60 per cent coverage of the poorest villages and nearly 80 per cent coverage of the wealthiest ones.

Growth of Programme Coverage

The *growth* of programme coverage across states between 1992 and 1998 was clearly progressive. States which had the lowest coverage of the ICDS programme in 1992 showed the highest rates of expansion of coverage between 1992 and 1998 (see Table 2). This applies to the poor Northern states, where the average annual growth of coverage within a state was above 6.5 per cent. Coverage was already relatively high in 1992 in the richer Northern states as well as the Southern states, where coverage grew at average annual rates of 4.5 per cent and 1.5 per cent, respectively. This progressive trend is also reflected in the much more rapid growth of the programme in the poorest villages of the country during the period 1992–98 (Figure 3, top left panel).

Within any given state, the picture is more mixed. Looking at the entire sample (Figure 3, top right panel) the growth of programme coverage was quite regressive: with less than 30 per cent growth for villages in the lowest three wealth percentiles compared with 40 per cent growth for the wealthiest villages. Disaggregating the results by region, we find a similar regional dynamic to that described above. The richer Northern states showed a progressive trend, with 7 per cent growth in the poorest villages compared with about 4 per cent in the wealthier percentiles. In the other regions, the trend in growth was regressive. In the poor Northern states the growth was somewhat regressive across most of the village wealth percentiles, except that the wealthiest villages showed lower growth than the others. In the Southern states, the

Figure 3. Growth Incidence Curve for the Share of Villages with ICDS Programme, 1992–1998
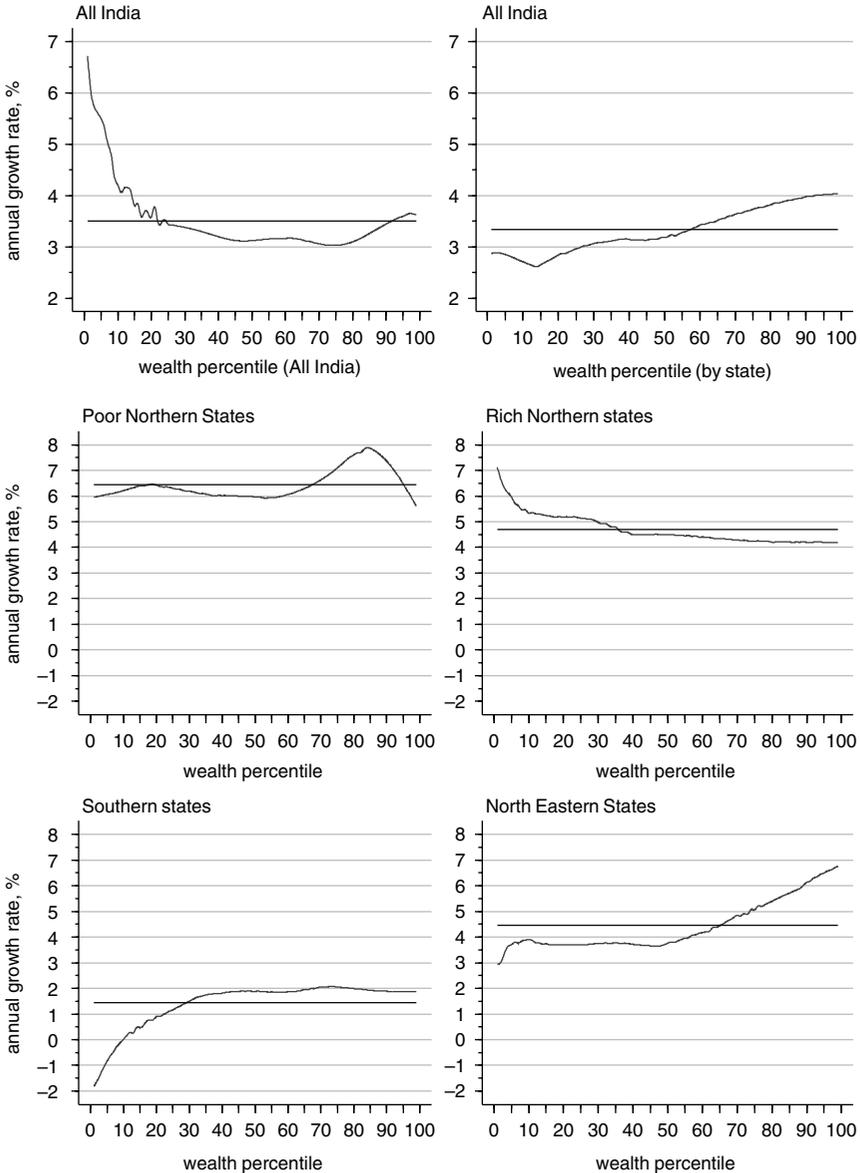
poorest villages showed almost 2 per cent *decline* in coverage while villages in the fortieth wealth percentile and above showed about 2 per cent growth. The Northeastern states showed a mildly regressive trend, with 2–3 per cent growth amongst the poorer villages and 4 per cent in the richest villages.

Probability of Programme Placement by Village Characteristics

The observed presence of the ICDS programme in a village could be interpreted as a result of two processes: programme placement and programme retention. The official policy of the Government of India is to place the ICDS programme in poorer administrative blocks and villages, with a preference for larger villages where an ICDS centre can serve a larger population. However, a number of factors could in practice modify the application of these placement criteria: for example, politicians may seek to corner benefits for their own electorate at the cost of more deserving candidates, and officials may seek to select villages which are easily accessible and have good infrastructure conditions to work in.

A village's chances of retaining the programme depend on its ability to create good conditions for its functioning. There are many ways in which the levels of local co-operation are critical to making it possible for the *anganwadi* worker (AWW) to function. A good space has to be made available for the centre. It also helps if the community is willing to help the *anganwadi* worker overcome difficulties encountered in her work, such as accessing water supplies, reaching the more difficult households, or rounding up children for immunization drives. AWWs operate under difficult conditions, far from their superiors, so communities which are better at offering such support are more likely to be able to retain the programme. The probability of retention is likely to be indicated by the presence of other development programmes in the village, which implies that there is a network of formal agents in place to provide occasional support to the AWW, and also that the village is able to retain development programmes in general. Community capacity for collective action is also indicated by the presence of co-operatives and women's associations.

We model the probability that a village is selected into the ICDS programme as a function of various village characteristics, using the standard probit framework. The dependent variable is a binary indicator of whether there is an ICDS centre in a village. The explanatory variables include the village's demographic characteristics, wealth, distance from towns and transport connections, infrastructure, and the presence of other development programmes and community associations.

The results of this estimation (not shown) confirm the results from the descriptive analysis, that programme placement is regressive between states. However, they show more clearly than the descriptive results that placement

is progressive *within* a given state: villages with a lower average household wealth index were significantly more likely to have the programme.

Within a given state, villages with larger populations and villages with electricity are significantly more likely to have the programme. Villages that have development programmes such as employment generation programmes and 'fair price shops' (selling foodgrains and a few other basic food items at controlled prices), and women's associations (*Mahila Mandals*) have a higher probability of being selected into the ICDS programme. Such characteristics as the village's distance to the district centres, accessibility, and the average level of women's education are not significantly related to the probability of placement in either year.

Our results support the view that programme placement follows the official policy of giving preference to villages in poorer administrative blocks, with larger population size. If politicians are modifying the application of these guidelines to meet electoral pressures, this is not to an extent that is perceptible in the data. There also seems little evidence that programme placement is geared towards officials' convenience, as the village's connection to transport networks or proximity to the district centre does not increase its likelihood of being selected. A village's likelihood of being selected is greater if it has other development programmes and community associations in place, perhaps partly because this indicates the village's ability to attract as well as to retain development programmes.

EVALUATION OF OUTCOMES: IMPACT OF THE ICDS PROGRAMME

We turn now to evaluating whether children living in villages with the ICDS programme have significantly different anthropometric outcomes than those living in villages without the programme. The unconditional distribution of child anthropometric measurements in both the 1992 and 1998 surveys is very similar among children living in villages served by the programme and those living in villages without the programme. This suggests little evidence of programme impact on child nutrition outcomes.

To investigate this more rigorously, we modelled the impact of the ICDS programme on child nutritional status, comparing anthropometric outcomes for the children in the beneficiary villages with those of children from a comparison group of villages. We used the Propensity Score Method, which removes the selection bias due to differences between villages with and without projects (Rubin, 1973), to the extent that selection of a village into the programme is based purely on observable characteristics. Each child in the villages with the ICDS programme (the treatment group in evaluation literature terminology) was paired with one in the villages without the programme (the control group), with similar observed characteristics of the child (age, birth order and gender); of the mother (age, education, caste, religion); household wealth; and of the village (population, and

development indicators[21]). We then tested for significant differences in nutritional outcomes between the children in the treatment group and their matched counterparts in the control group.[22]

The results indicate little overall effect of the ICDS programme on nutritional outcomes (Table 3). We found that the only significant effect of the programme was a positive effect on boys' stunting in the data from the 1992 survey, but not in 1998. For girls, the effect was not significant. We disaggregated the results to see whether there are significant effects at regional levels, but found none except a significant *negative* impact in the poor Northern states, and in the Northeastern states. There, children living in an ICDS village had a higher probability of being underweight in the 1998 survey.

Other studies also found little evidence of programme impact on child nutritional status. A national study (NIPCCD, 1992) found the prevalence of underweight children to be somewhat lower where the programme was in place, but given the sample sizes of the control and treatment groups these differences are not statistically significant. Using the 1992 NFHS data, Deolalikar (2004) found that the presence of an ICDS centre is associated with a 5 per cent reduction in the probability of being underweight for boys, but not for girls. Our results from the same survey are in line with this (Table 3). Using data from a sub-group of states, Bredenkamp and Akin (2004) found that the presence of a centre has no significant effect.

Our results on programme impact are not conclusive, because of the absence of panel data on children (or villages) participating in the programme. Our method is an improvement on previous studies, because we tried to control for various observed factors that could bias the estimates of the effects of the ICDS programmes. However, with cross-sectional data some unobservable household or village characteristics correlated with the programme placement and outcome could introduce bias into the estimates of project impact.[23] If, for example, the programme were placed in a village

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21. The village development indicators include electrification, drainage, road connection, primary health centre, women's association, controlled-price shops, and development programmes such as the IRDP, EGS and NREP for income generation.

22. To measure the difference in nutritional outcomes between the children from the villages with and without the programme, we use the standard estimator of the average treatment on the treated defined as: $E(z_1 - z_0|s = 1)$, where z_1 is a particular health outcome (z-scores) for the child in the treatment and z_0 is a z-score for a child in the control group, and s is the binary indicator equal to 1 if the child resides in the village with the programme and 0 otherwise. We can also define the average effect conditional on some set of child's characteristics $\mathbf{x}$ as: $E(z_1 - z_0|s = 1, \mathbf{x})$. Matching estimators require that conditionals on a vector of observed characteristics, $\mathbf{x}$ (z_1 and z_0), are independent of s. Children for whom a match could not be found were dropped from the analysis in order to avoid the primary cause of a bias in a matching estimator (Heckman et al., 1997, 1998).

23. This problem is thought to be severe for the programmes in poor areas if the deficient state of children's health in the initial period not only attracts the programme, but also reduces future growth (Jalan and Ravallion, 2003).

Table 3. The Estimated Effect of the ICDS Programme on z-scores of Children using the Child-level Data, With and Without Propensity Score Matching, 1992 and 1998[a]

z-score	Unmatched				Matched			
	treated	controls	difference	std. err.	treated	controls	difference	std. err.
India: all children								
haz								
1992	−1.844	−2.149	0.305***	0.026	−1.877	−1.933	0.056	0.055
1998	−1.787	−1.981	0.194***	0.027	−1.807	−1.832	0.024	0.056
waz								
1992	−1.894	−2.089	0.195***	0.017	−1.917	−1.873	−0.044	0.038
1998	−1.771	−1.881	0.110***	0.021	−1.789	−1.788	0.001	0.047
India: Boys								
haz								
1992	−1.808	−2.203	0.396***	0.036	−1.823	−1.974	0.151**	0.076
1998	−1.762	−1.992	0.230***	0.037	−1.777	−1.872	0.095	0.073
waz								
1992	−1.867	−2.122	0.255***	0.023	−1.885	−1.897	0.012	0.054
1998	−1.754	−1.864	0.111***	0.029	−1.767	−1.804	0.037	0.071
India: Girls								
haz								
1992	−1.881	−2.092	0.211***	0.038	−1.925	−1.935	0.010	0.081
1998	−1.816	−1.970	0.154***	0.039	−1.859	−1.803	−0.056	0.095
waz								
1992	−1.921	−2.053	0.131***	0.025	−1.948	−1.948	0.000	0.055
1998	−1.790	−1.898	0.108***	0.032	−1.827	−1.702	−0.125	0.092
North (poor): Uttar Pradesh, Bihar, Rajasthan, Madhya Pradesh, Orissa								
haz								
1992	−2.054	−2.267	0.213***	0.043	−2.140	−2.069	−0.071	0.097
1998	−2.086	−2.135	0.049	0.038	−2.091	−1.962	−0.130	0.090
waz								
1992	−2.045	−2.172	0.127***	0.029	−2.083	−2.038	−0.045	0.058

<div align="center">

Table 3. (Continued)

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z-score	Unmatched				Matched			
	treated	controls	difference	std. err.	treated	controls	difference	std. err.
1998	−2.053	−2.066	0.014	*0.030*	−2.066	−1.891	−0.175***	*0.041*
North (rich): Punjab, Haryana, Maharashtra, Gujarat								
haz								
1992	−1.888	−1.907	0.019	*0.054*	−1.860	−1.879	0.019	*0.093*
1998	−1.890	−1.750	−0.140	*0.094*	−1.859	−1.997	0.138	*0.131*
waz								
1992	−1.879	−1.999	0.120***	*0.041*	−1.859	−1.855	−0.006	*0.108*
1998	−1.730	−1.681	−0.049	*0.079*	−1.730	−1.823	0.093	*0.176*
South: Andhra Pradesh, Karnataka, Kerala, Tamil Nadu								
haz								
1992	−1.618	−2.122	0.504***	*0.082*	−2.095	−2.222	0.127	*0.132*
1998	−1.437	−1.571	0.133*	*0.079*	−1.488	−1.730	0.242	*0.152*
waz								
1992	−1.852	−2.074	0.222***	*0.043*	−2.103	−2.078	−0.025	*0.174*
1998	−1.636	−1.686	0.050***	*0.064*	−1.677	−1.939	0.262	*0.160*
1998	−0.921	−0.919	−0.002	*0.090*	−0.890	−1.192	0.302	*0.241*
Northeast: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura								
haz								
1992	−1.795	−1.916	0.121	*0.074*	−1.738	−2.002	0.264	*0.191*
1998	−1.425	−1.860	0.436***	*0.087*	−1.399	−1.289	−0.110	*0.344*
waz								
1992	−1.636	−1.712	0.075	*0.056*	−1.611	−1.559	−0.052	*0.147*
1998	−1.365	−1.300	0.065	*0.067*	−1.373	−0.995	−0.378*	*0.213*

Notes:
[a]Children aged 0–4 in the 1992 survey, and 0–3 in the 1998 survey. Data for Sikkim were not available for 1992.
***Significant at 1% level; **significant at 5% level; *significant at 10% level; standard errors are estimated using bootstrapping based on 200 iterations (one-to-one matching).
Sources: NFHS 1 and 2 (IIPS, 1995; IIPS and ORC Macro, 2000).

because a food shortage was anticipated there, the evaluation procedure would underestimate the effectiveness in the programme. Given the available data, we can only say that there is nothing to indicate that the programme has had an impact.

DISCUSSION

Overall, levels of child malnutrition have fallen slowly in India during the 1990s, although this was a decade of fairly rapid growth in all sectors of the economy. The main gains in nutrition status have been amongst the upper socio-economic groups: among the children of educated mothers, wealthier households, and the upper castes. Girls have gained less than boys, and their nutrition status has actually worsened amongst the lower socio-economic groups.

The high incidence of underweight amongst the children of the highest socio-economic groups (with adequate per capita nutritional intake) indicates that exposure to disease is a major cause of poor child growth, and that the latter cannot be attributed solely to poverty. The living conditions of the lower socio-economic groups make them even more exposed to disease than better-off groups: this suggests that it might be more cost-effective for the ICDS programme to focus more efforts on improving environmental hygiene and child feeding practices, in order to improve child nutritional outcomes. The programme currently places heavy emphasis on supplementary feeding, which has been found to be ineffective in many large-scale programmes.

Programme placement is clearly regressive across states. The states with the greatest need for the programme — the poor Northern states with high levels of child malnutrition and nearly half of India's population — have the lowest programme coverage, and by far the lowest budgetary allocations from the central government. To make things worse, two of these states (Bihar and Uttar Pradesh) do not even spend the full funds allocated for this, highlighting issues of poor governance. Most other states do spend their allocations.

Programme placement within a state is more progressive. Placement appears to follow the government guidelines of selecting villages from poorer administrative blocks, with a larger population to serve. Villages which already have other development programmes or community associations in place are also more likely to have the ICDS programme. Infrastructure such as electricity raises the probability of placement, but not distance to district headquarters or access to transport. The application of official guidelines seems to be a stronger determinant of outcomes than considerations of cultivating particular electorates or personal convenience.

During the 1990s, when the programme expanded very rapidly, the *growth* of programme coverage was progressive across states: it was more

rapid in states with the lowest levels of coverage in 1992. However, its distribution within a state became somewhat less progressive during this period. It may be that the rapid programme expansion diluted care in selection of villages: this is consistent with monitoring reports which indicate that the rapid expansion led to dilution of programme quality on various fronts.

The rich Northern states are consistently the most progressive region of India in their programme placement, underscoring the fact that the states which least need the programme not only get the most funding, but also use the funding the most effectively. There are clearly many issues at play — including states' ability to provide matching funds, political clout, and governance ability — in determining which states are able to attract funds and use them effectively. This needs to be studied carefully in further research.

There is little evidence of ICDS programme impact on overall child nutrition status. However, these results need to be interpreted with caution. As we indicated above, using cross-sectional data can lead to various kinds of biases in estimations of the effectiveness of the programme. A conclusive evaluation of programme impact will have to wait until panel data are available. Nevertheless, many studies have highlighted problems with the implementation of the ICDS programme, which would limit its impact and are consistent with our result.

In sum, we find limited evidence that the ICDS programme is meeting its goals of reducing child malnutrition in India. Some modifications are needed towards this end. Firstly, programme coverage and fund allocation need to be shifted towards states with the highest prevalence of child malnutrition. Secondly, efforts have to be made to ensure that funds are fully utilized in the few states where this is not the case. Thirdly, the impact of the programme on recipients can be enhanced by changing some aspects of programme design and implementation. With such changes, the substantial resources allocated to the ICDS can be used more effectively for raising future generations of healthy children.

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