Beyond National Averages For Immunizations In India: Income, Gender, and Regional Inequalities

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Executive Summary

This paper, motivated by discussions with the Indian health ministry, addresses overall performance and wealth and gender inequalities in immunization in India. The study calculates and analyzes, for each of the 17 largest states, urban and rural rates for full and no immunization, and differentials in these two immunization indicators across household wealth and gender of the child. The analysis uses data from the 1992-93 National Family Health Survey (NFHS), India.

India has poor immunization levels, slightly better in urban than rural areas. Less than one-third of rural children and a little over half of urban children were fully immunized, while thirty-eight percent of rural and seventeen percent of urban children had received no vaccines at all. Boys are more likely to be fully immunized and less likely to have received no immunization than are girls. Further, the wealthier the household, the higher is the percent of children immunized and the lower the percent with no vaccines.

There are large inter-state variations in levels and inequalities in full and no immunization. On average, states in the north perform worse than do southern states. Bihar, Assam, Uttar Pradesh and Rajasthan are particularly poor performers, while Tamil Nadu and Kerala perform notably well. The relationship across states between levels and wealth inequalities appears to follow a non-linear pattern. At one end of the spectrum, where system failure is high (as measured by high levels of no immunization and very low full immunization), wealth inequalities are low suggesting that all children are deprived, regardless of household wealth. Initial improvements (higher levels of full immunization) appear to be concentrated among wealthier households and inequalities are high. At the other end of the spectrum, once performance has reached a critically good level (high full and very low levels of no immunization), there is increasing access for and use by the poor and inequalities are, once again, low.

Gender differentials are spread through most states, and in most urban and rural areas, regardless of overall immunization levels or wealth inequalities. The gender discrimination is higher for no than for full immunization, suggesting that parents may not even start girl children out on the immunization schedule, leave alone completing the full complement of vaccines. For rural areas, Tamil Nadu is the only state with no female disadvantage in no immunization; five states' urban areas show no disadvantage for girls in no immunization.

While the data do not allow for an analysis of reasons for poor performance on various levels, possible problems in immunization related to demand (such as information), supply (such as insufficient supply of vaccines) and resources (such as higher "hidden" costs of waiting, transport etc. for immunization for the poor compared to the rich) suggest a focus for future research and policy. While the gender differentials reflect deep-seated societal factors rather than health system issues per se, still there are steps the health system can take to improve immunization among girl children in rural and urban areas.

I. Motivation

Recent studies show large wealth inequalities in access to health services; some countries also have evidence of female discrimination in health. One of these services is immunization. Given the public sector dominance as well as strong social externalities in immunization, wealth and gender inequities present important policy concerns.

Concerns about equity in health have led to initiatives to collect and analyze data on how health outcomes and services are distributed across social and economic groups. In particular such research has focused on inequities by household wealth or by gender (Kakwani et al., 1997; Kurz and Johnson-Welch, 1997; Carr et al., 1999;[1] Pande, 1999; Gwatkin, 2000; Wagstaff, 2000). Many studies have found evidence of worse access to health services and poorer health status among the poor compared to the rich. Studies in South Asia have also found evidence of gender inequities in a number of health indicators.

One such indicator is immunization. A recent research initiative that compiled country-specific tabulations of health, nutrition and population outcomes and services use by household wealth, gender, and urban-rural residence in 44 developing or transitional countries found significant wealth inequalities in immunization levels in many countries (Gwatkin et al., 2000).[2] While other health indicators are also unequally distributed, immunization presents some very particular policy concerns. First, immunization is one of the most cost-effective interventions to prevent a series of major illnesses, particularly in environments where children are undernourished and many die from preventable diseases (World Bank, 1993). In addition, immunization has been shown to have large social externalities, such as a documented "herd immunity" effect of measles vaccination. Given the broad social benefits of immunization, any inequities in access that leave out large sections of the most deprived populations are a cause for serious policy concern. The fact that, in most countries, immunization services are largely the domain of the public sector accentuates concerns regarding unequal access for those who need this service.

India shares these characteristics in its child health situation and its immunization program, including evidence of income and gender inequities in immunization across the country. Table 1 shows that, for every immunization indicator, children from the poorest 20 percent of the households have worse immunization rates than those from the wealthiest 20 percent. Other data from the same source (not shown here) presents evidence of gender differentials in full and no immunization as well.

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[1] The review by Carr et al. (1997) documents 14 different multi-country initiatives. Summaries can be found on http://www.worldbank.org/poverty/health/data/guide/guide.htm#projects

[2] The reports and data from this initiative can be downloaded from http://www.worldbank.org/poverty/health/data/index.htm

Table 1: Immunization rates by household wealth, India 1992-93

	Poorest 20%	Second poorest 20%	Middle 20%	Second richest 20%	Richest 20%
Measles	27.0	31.0	40.9	54.9	66.1
DPT 3	33.7	41.1	51.8	64.6	76.7
All vaccinations	20.2	25.1	34.1	46.9	59.8
No vaccinations	44.7	38.9	28.8	18.8	11.5

Source: Gwatkin et. al 2000.

Sharing these data with senior managers at the Ministry of Health and Child Welfare in India generated a debate and an interest among policy makers for additional information. The debate focused on conducting further analyses to find the reasons for the wide wealth and gender gaps in immunization. The request for additional analysis was driven by three perceived weaknesses in the tabulations presented above. First, policy makers argued that given the size and diversity of the country, such tabulations would be more useful if done separately for each major state. Second, policy makers felt that national-level household wealth quintiles did not take into account the differences in types of assets used and purchasing power of urban and rural areas. Finally, policymakers pointed out that the survey used – the National Family Health Survey (NFHS), 1992/3 – was dated. Since the NFHS was conducted again in 1998/9, there was interest in seeing if the equity picture has changed given the pro-poor initiatives by the government in the intervening years.

This paper addresses the first two concerns by calculating and analyzing immunization rates for the 17 major states in India for urban and rural populations. We present overall urban and rural state-level rates as well as inequalities in immunization by wealth and by gender of the child. [3] The main innovation of this work is the attempt to look beyond national averages with a special focus on poverty, gender, and residence (both urban-rural and by state). This disaggregated analysis can be used as a diagnostic tool to allow the government to localize unfavorable conditions. The analysis can also serve as a tool for planning programs and policies and to monitor and evaluate programs implemented, allowing policy makers to customize responses and re-align resources to address needs. In order to address the final concern above, the exercise will be repeated when the 1998/9 NFHS survey data are made public.

The next section provides a brief background on immunization in India and recent research on income and gender inequality. Data and methodological issues are summarized in Section III. The results are presented in Section IV followed by a discussion in Section V.

[3] There has been some debate in the research on how to define and measure "inequality". In addition to wealth or income, inequality can be defined in terms of gender, education, ethnic background, or other factors associated with social exclusion (Gwatkin, 2000). This paper focuses on two types of inequality: by wealth and by gender.

II. Background

A recent resurgence of interest in wealth inequalities in health has generated new information about inequalities in immunization. Studies from India show evidence of wide variations in immunization performance across states as well as some evidence of a female disadvantage in immunization. However, there is limited research on differentials in immunization in India by state, gender and poverty.

Immunization in the developing world

The Expanded Program on Immunization (EPI) was launched by the WHO and UNICEF in the late 1970s following the eradication of smallpox. As a result of EPI, the percent of children immunized globally increased from less than 5 percent in 1977 to 20-30 percent by 1983, and to about 80 percent coverage with polio, DPT and measles vaccines by 1990 (World Bank, 1993). The levels reached by 1990 appear to have been largely sustained at least through 1995-96, though with some regional variations. Across different regions of the developing world, the lowest recorded immunization rates are in sub-Saharan Africa (UNICEF, 1998; Boerma et al., 1990). In South Asia, by 1995-96, 93 percent of children had received BCG immunization, 83 percent were immunized by DPT and OPV (oral polio vaccine) and 77 percent were immunized against measles (UNICEF, 1995, 1998).

Thus immunization has been a focus of health care for several decades. Despite evidence of overall success in achieving high immunization rates in most parts of the developing world, the recent resurgence in examining inequities within countries or states in health services has pointed to gaps in access to immunization due to poverty, gender or other socio-economic characteristics.

Recent research on wealth and gender inequality in health

The international community's interest in wealth inequalities in health care in the developing world has varied in recent decades. Interest to decrease such inequalities was high in the 1970s and 1980s, diminished somewhat in the decade of the 1990s, and has re-surfaced as a crucial concern in development in the last few years (Gwatkin, 2000). This focus has been reflected in strategies and statements of major multilateral agencies including the WHO's 1999 *World Health Report*, and the World Bank's strategy for health, nutrition and population, and 2000 *World Development Report* which focuses on poverty (World Bank, 1997, 2000).

Studies have used a variety of methods to calculate wealth inequalities, using data on household income, consumption, expenditure or ownership of assets. Despite different methods, data sets and country settings, recent research in the developing world has consistently found that wealth inequalities exist in both mortality and non-mortality indicators of health, population and nutrition (Wagstaff, 2000; Gwatkin et al., 2000; Makinen et al., 2000; F. Castro-Leal et al, 2000). Immunization shows some of the larger poor-rich differentials: in almost half the countries examined in a recent series of analyses, children in the poorest twenty percent of households are at most 60% as likely

to be fully immunized as are children from the wealthiest twenty percent (Gwatkin et al. 2000).

Gender inequalities in health and society have also been a strong focus of development for decades. In the 1990s there was an increased level of international attention on gender issues, including gender equity and access to health services, as reflected in conferences such as the International Conference on Population and Development in Cairo in 1994 and the Beijing Women's Conference in 1995. Follow-on conferences and government plans of actions have preserved this momentum.

Gender differentials in child health form an important part of gender inequities in health and nutrition, and there is an extensive literature on gender differentials in child health and mortality in the developing world. Multiple studies have found that excess female child mortality exists in every part of the developing world, and is particularly severe in the Middle East-North Africa, East Asia, and South Asia (see, for example, Tabutin and Willems, 1995; Arnold, 1992, 1997; Hill and Upchurch, 1995). Gender inequality in aspects of health care such as immunization is less well-researched. A recent study of multiple countries did find some evidence of gender inequality in childhood immunization; the results also suggested that gender discrimination against girls in immunization may be associated with higher excess female child mortality (Hill and Upchurch, 1995).

Immunization in India: programs, levels, inequalities

There is evidence of inequalities in immunization in India, despite the fact that childhood immunization has been an important part of maternal and child health services since the 1940s. BCG immunization was started in 1948 and by 1951 was organized on a mass scale to cover all those below 25 years of age. The Indian government's Fourth Five-Year Development Plan (1969-74) included plans for DPT immunization of infants and pre-school children. EPI was adopted by the Indian government in 1977-78 and vaccines were provided free for all eligible children (Kanitkar, 1979). Measles vaccination was added to the Indian program in 1985 (Basu, 1985). In 1985-86, to provide a further impetus to immunization, the government started a special program called the Universal Immunization Program (UIP). The objectives of the UIP included covering at least 85 percent of all infants by 1990 against the six immunizable diseases; by 1989-90, all districts in the country were reportedly served by the UIP (IIPS, 1995; Sokhey et al., 1993).

Immunization coverage varies considerably across states, and between rural and urban areas. For India as a whole, among living children ages 12-23 months, by 1992-93 thirty five percent were fully vaccinated (had received BCG, all three doses of DPT/OPV and measles), another 35 percent had received some of the recommended vaccinations and a high 30 percent were not immunized at all. Rates of immunization were higher in urban than rural areas (IIPS, 1995). Drop-out rates remain troubling for multiple-dose vaccines. In the early 1980s, the dropout rate between the first and third dose of DPT/OPV was estimated at 30 percent (Basu, 1985). A 1993 report on the UIP by the Indian Ministry

of Health and Family Welfare estimated dropout rates of over 70 percent for DPT and oral polio vaccines in some areas (Anan, 1993). According to more recent data, in 1998-99 full immunization was steady at the 1992-93 level of about 35 percent, while the percent with no immunization had dropped considerably from 30 percent in 1992-93 to 17 percent in 1998-99 (IIPS, 2000; p204). This pattern suggests that while more children started out on the immunization schedule in 1998-99 than in previous years, drop-out rates remain a problem.

There is some evidence for gender differentials in immunization. Girls have been found to be significantly less likely to be fully immunized than boys, particularly in the northern states (Pande, 2000; Govindaswamy and Ramesh, 1996). Among children under the age of 5 years, in 1992-93 boys had higher immunization rates than girls in all states except Goa and Karnataka, though the extent of the differential varied by state (Kurz and Johnson-Welch, 1997). Small-scale studies in Rajasthan in the north show that, in addition to being less likely to get fully immunized, girls drop out at a faster rate than boys for the three-dose vaccinations of DPT and oral polio (Gupta et al., 1978) and are immunized at a later age than are boys (Sharma and Sharma, 1988).

Thus the existence of poor immunization levels and of some degree of gender inequality in immunization in India is indisputable. However, these studies, while noting the variation in immunization in India across states, urban-rural areas and gender of the child, do not examine the interaction of these differentials with poverty, particularly at the state level. This work seeks to fill that important research and policy gap.

III. Data and Methods

Source of data

The data used in this paper are from the 1992-93 NFHS, a large-scale household sample survey conducted in all the major states in India. The survey covered 89,777 ever-married women ages 13-49, of whom over 75% lived in rural areas (IIPS, 1995). Data collected includes information on several health, nutrition, population and health status and service use measures including immunization, as well as data on respondents' and their households' demographic, social and economic characteristics.

Defining and measuring household wealth

The NFHS did not collect data on household income or consumption. Consequently, we measure household wealth in terms of household assets and not by income or consumption levels. Asset information is obtained from the NFHS household questionnaire, which asks a number of questions concerning the household's ownership of consumer items ranging from a fan to a television and car; dwelling characteristics such as flooring material; type of drinking water source and toilet facilities used; and other characteristics that are related to household wealth status.

From this data on household asset ownership, we created an "asset index" that provides a single measure of household wealth. Other research has found this asset to be a robust and valid measure of household wealth in India (Filmer and Pritchett, 2001; Gwatkin et al., 2000). Each asset was assigned a weight or factor score generated through principal components analysis.[4] The resulting asset scores were standardized in relation to a standard normal distribution with a mean of zero and a standard deviation of one. For each household, the scores reflecting the distribution of assets for that household were summed. Households were ranked by score and divided into weighted quintiles, where the weights are a simple multiplicative of the relevant sampling weight (so that quintiles are representative) and the number of household members (to control for large variations in household size). All sample individuals were assigned the wealth quintile of the household in which they resided. Answering concerns about the applicability to all areas of a single national asset index, we calculated asset indices separately for each state, and within each state, separately for urban and rural areas.[5] The tables in Annex A show asset scores and quintile cut-offs for rural and urban India and confirm that many of the scores and the quintile cut-offs are indeed different for urban and rural areas.

Measuring inequality in immunization by household wealth and by gender

Immunization rates are calculated for each quintile to represent the patterns and differentials in immunization across household wealth groups. In addition, two summary inequality indices are presented. The first is a simple ratio between the rates for the poorest and richest wealth quintiles (the poor/rich ratio). This is a rather crude index since, among other things, it provides no information about the middle three quintiles. It does, however, provide a general order of magnitude of differences between the poorest and the richest 20 percent in their access to immunization for their children (Gwatkin et al., 2000).

The second summary measure, the concentration index, is similar to the Gini Coefficient frequently used in the study of income inequalities (Wagstaff et al., 1991; Kakwani et al., 1997). It measures the extent to which a particular health status variable is distributed unequally across all five asset quintiles – that is, the concentration of inequality. The value of the index ranges from –1 to +1. The closer is the index to zero for any one health indicator, the less concentrated is the wealth inequality for that indicator; conversely, the further away is the index from zero, the greater is the inequality. Thus, in the case of *full* immunization (where inequality is likely to take the form of higher rates in wealthier households than in poorer ones), a larger positive concentration index indicates greater inequality; in the case of *no* immunization (where inequality is likely to take the form of lower rates in wealthier households than in poorer ones), a larger negative index indicates greater inequality.

[4] Annex A presents more details on the conceptualization and measurement of the asset index.

[5] For the most part, assets are defined identically for rural and urban areas; in some cases, due to small sample sizes for certain categories of assets for either rural or urban areas, definitions may differ between rural and urban areas. Asset definitions, scores and household quintile cut-offs for state-specific urban and rural populations are available upon request.

Gender differentials are calculated as a ratio of rates for boys and rates for girls, multiplied by 100. Thus, a value of 100 implies no gender differential in immunization. Ratios for full immunization are calculated as: 100*(percent male full immunization/percent female full immunization). A value above 100 indicates that there is a female disadvantage -- in other words, a larger percent of boys than girls are fully immunized. Ratios for no immunization are calculated as: 100*(percent female no immunization/percent male no immunization). The ratio is inverted so that the interpretation is similar to that for full immunization: a value above 100 indicates that there is a female disadvantage. In other words, a larger percent of girls than boys have no immunizations.

Immunization rates

Immunization rates are calculated from information on immunization cards where these are available, and mother's report where there are no cards. This is the practice commonly followed by the Demographic and Health Surveys (DHS) which form the basis for the NFHS (Boerma and Bicego, 1993; Boerma et al., 1996). Other research has shown that mothers' reports of their children's immunization status are fairly accurate (Langsten and Hill, 1996).

We use two immunization indicators. A child is categorized as fully immunized if that child has received one dose of BCG, three doses each of DPT and OPV and one dose of measles vaccine by the time of the survey. A child is categorized as having no immunization if that child has received none of these vaccines by the time of the survey. From a policy perspective, the two immunization indicators reflect different aspects of the health system. The extent of no immunization indicates whether the system is working at all; thus high proportions of children with no immunizations may indicate a system failure. The extent of full immunization suggests the capacity of a working system to ensure compliance and follow-up; thus if few children have complete immunizations, the system may be reaching them but may not be efficient or appropriate enough to ensure that immunization protocols are completed. Each of these eventualities presents different policy emphases and decisions.

We present immunization results for children ages 12-60 months. The standard practice is to calculate immunization rates only for children ages 12-23 months; however, in the Indian context where children are often immunized at later ages, restricting the sample would exclude children who were immunized later and thus could bias our results. Indeed, our analysis of the NFHS data shows that, in both rural and urban areas, the average age for full immunization (mean and median) is roughly 32 months. DHS sampling weights are applied to all immunization rates so that the resulting numbers are

generalizable to the total population.[6] All-India figures are calculated using the all-India sample weights, while state-level figures use the weights for that particular state.[7]

IV. Results

Selected results are presented here for full and no immunization. These include discussion of levels and wealth and gender inequalities in urban and rural areas as a whole, and by state. Detailed tables are presented in Annexes A and B.

Levels and inequalities in rural and urban India

India has poor immunization levels, slightly better in urban than rural areas. Both urban and rural areas show strong evidence of worse immunization among poor than rich. There also exists a female disadvantage in immunization, in both urban and rural areas and across most household wealth quintiles.

Our results present a sobering picture of overall levels of immunization in rural and urban India, with performance worse overall in rural compared to urban areas. Less than one-third of rural children and only a little over half of all urban children were fully immunized by 1992/3. Moreover, thirty eight percent of rural and seventeen percent of urban children had received no vaccines by the time of the survey (Figure 1, black bars).

Combined with this poor overall immunization performance and urban-rural differential is a high degree of inequality in immunization use between children from poor and rich households. (Figure 2). The most striking inequity is among urban children with no immunization: 10 times as many of the poorest compared to the richest children go without any immunizations. Even among rural households, however, children from poorer households are less likely to be fully immunized and more likely to have no immunizations than are those from the richest households. For all quintiles, urban children fare better than rural children, in levels of both no and full immunization.

[6] DHS surveys often over-sample certain small sub-groups of interest – a particular ethnic group, for example – so as to get statistically meaningful sample sizes for analysis. The DHS sampling weights are used to compensate for such over-sampling so that final results are representative of the country's population as a whole and not just of the DHS sample.

[7] Results not shown where sample size is less than 25; results shown in italics for sample sizes of 25-50.

Figure 1: Totals: full and no immunization, urban and rural India 1992-93

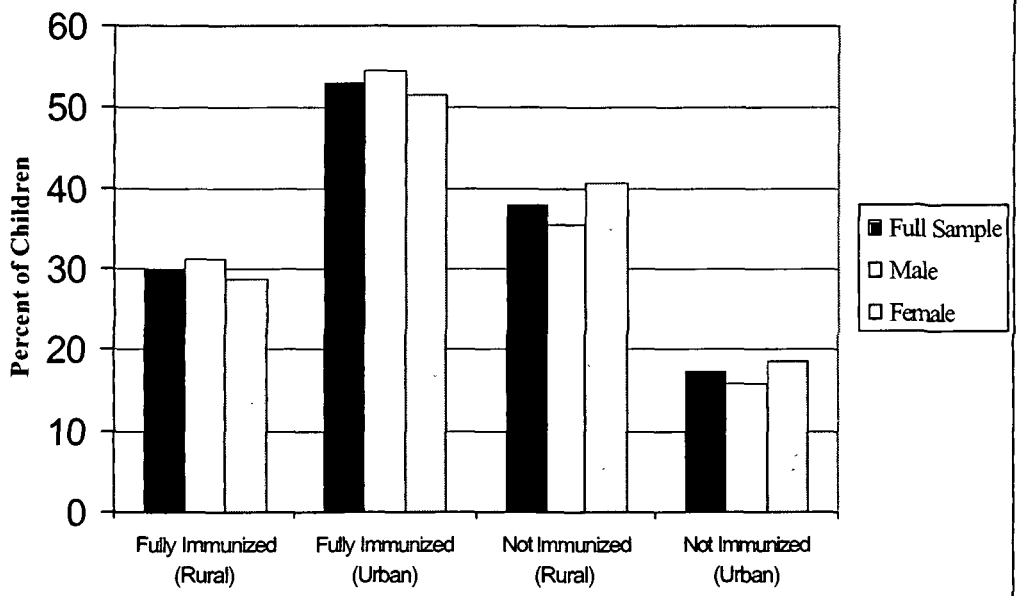
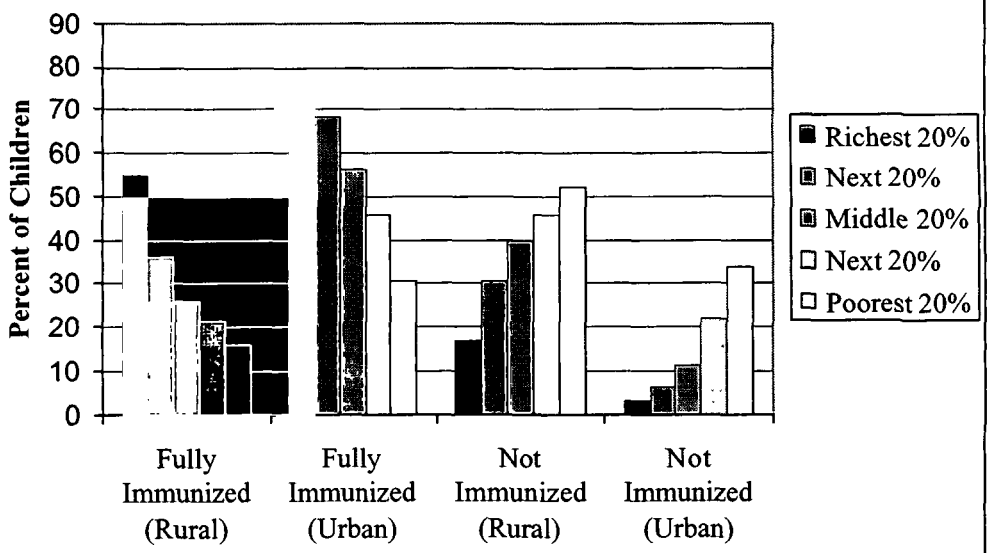


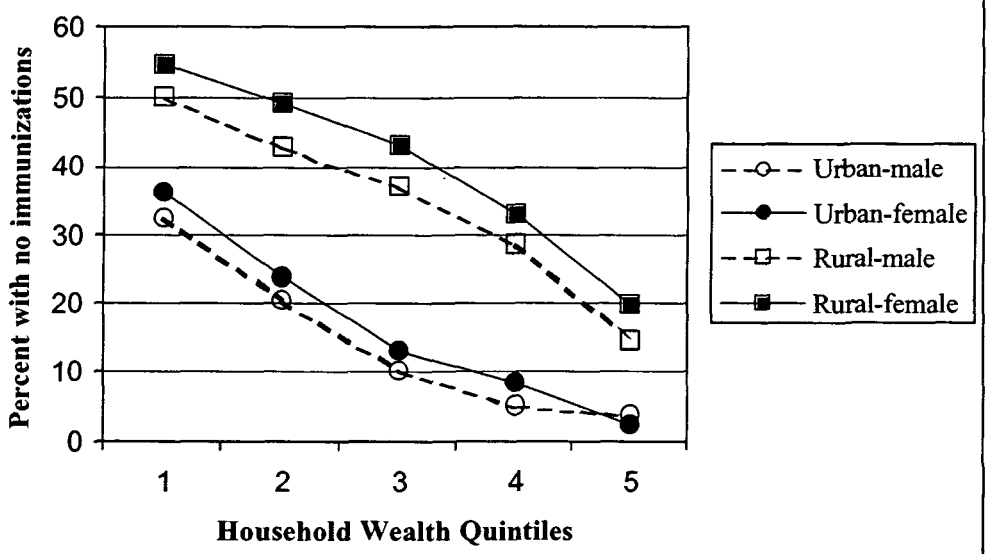
Figure 2: Full and no immunization by wealth quintile, urban and rural India 1992-93



There are noticeable gender differences, with more boys fully immunized and fewer boys totally un-immunized than girls, in both urban and rural areas. In particular, 5 percentage points more rural girls (40.7%) than boys (35.3%) are likely to be completely bypassed

by the system insofar as concerns immunization (Figure 1, white and gray bars). Boys fare better than girls at almost every level of household wealth, with the gender differentials larger in no immunization than in full immunization (Figure 3 shows the urban-rural patterns for no immunization). As with overall gender differentials and overall immunization levels, the male-female differences at each level of household wealth are greater in rural than urban areas. These data also show that the gender differential doesn't appear to differ by household wealth, confirming other research that gender bias in India goes beyond household economics (Das Gupta, 1987, Pande 2000).

Figure 3: Gender and Wealth Inequalities in No Immunization, Urban and Rural India 1992/3



While other work has also recorded the overall poor performance of the Indian immunization system in the period under consideration (Pande, 1999; IIPS, 1995), the existence of income and gender inequalities presents additional policy concerns. A health service such as immunization is provided free of cost to everyone by the government. The fact that children from poorer households and female children are more disadvantaged than richer and male children suggests that immunization, as currently provided, may present other costs – such as travel, waiting time, and so on – that deter poorer parents or those with female children in seeking immunization. Even where it is available and not costly, however, information about immunization may not be adequately disseminated in more deprived areas such that poorer households may be less aware of the benefits of immunization or more hesitant to immunize their children because of side effects. However, all these patterns are likely to vary significantly by state, reflecting the very real variations in health system performance across Indian states.

Immunization levels by state

There are large inter-state and urban-rural variations in full and no immunization. The poorest performance – with no and full immunization – is in the northern states, particularly Bihar, UP, Rajasthan and Assam. The southern states are among the good performers on both immunization indicators. In every state, urban children fare better than rural children.

Full immunization ranges from a very low 10 percent of eligible rural children and 23 percent of urban children in Bihar, to 60 percent rural and 75 percent urban children in Tamil Nadu. The range is even higher for no immunization: while a majority of rural (62.6 percent) and 42 percent of urban Bihari children are completely un-immunized, only 6 percent of rural and less than 2 percent of urban children in Tamil Nadu are missed entirely by the immunization system (Table 2). The overall poor performance of the immunization program in India is reflected in the state-level distributions. Only 6 of the 17 largest states have 50 percent or more rural children fully vaccinated, while almost half the states (8 of 17) have a quarter or more rural children with no immunizations at all. The situation is better in urban areas: 9 states have at least half of all eligible urban children immunized, and only 3 states have a quarter or more urban children totally un-immunized.

Despite the variation, there is a relatively consistent regional grouping of poorly performing and better performing states on all immunization indicators measured here (Table 2). In general, the states with the worst immunization levels (full and none, urban and rural) tend to be clustered in the north and north-east, with Bihar, Uttar Pradesh (UP), Rajasthan and Assam being the worst performing states on most counts. At the other end of the spectrum, none of the southern states are among the poor performers and all but one perform above-average. Particularly noteworthy are the immunization levels in Tamil Nadu, Kerala and Maharashtra. Some northern states are also among the good performers: Punjab, Haryana and Himachal Pradesh in the north all show evidence of a relatively well-functioning immunization system, with a small percent not immunized and a majority of children fully immunized.

Regardless of overall state performance levels, for all states urban children are more likely to be fully immunized and less likely to have no vaccines than are rural children in the same state (Table 2). Large urban-rural gaps are evident in good performers such as Himachal Pradesh (almost 82 percent of urban children fully immunized compared to 60 percent of rural children) as well as among poor performers such as Rajasthan (almost one-third more urban than rural children fully immunized by the time of the survey). On the whole, however, states with worse levels tend to have larger urban-rural differentials than states with better immunization levels, particularly in the case of no immunization. These differences in urban-rural rates highlight, once again, the importance of going beyond averages and analyzing rural and urban data separately.

Table 2: State levels of full and no immunization, rural and urban India 1992-93

	State	Fully Immunized		Not Immunized	
		Rural	Urban	Rural	Urban
Better Performing States	Tamil Nadu	60.0	75.5	6.1	1.7
	Himachal Pradesh	60.0	81.8	13.1	3.3
	Maharashtra	59.0	62.9	13.2	9.0
	Kerala	54.8	65.9	13.6	5.5
	Punjab	65.0	80.1	16.7	7.8
	Jammu	61.3	80.2	22.7	3.7
	Karnataka	49.4	59.9	23.3	16.9
	Haryana	49.4	67.6	23.6	12.7
	Gujarat	45.9	57.5	24.0	20.9
	Andhra	39.9	49.2	25.5	15.4
Poorly Performing States	WBengal	23.8	34.2	32.7	30.6
	Orissa	27.7	44.1	35.0	23.7
	Madhya Pradesh	24.8	46.0	40.2	23.7
	Assam	15.0	30.7	49.2	21.6
	Uttar Pradesh	15.9	30.5	50.3	21.1
	Rajasthan	13.8	41.8	59.3	29.5
	Bihar	10.0	23.0	62.6	42.1

Wealth inequalities in immunization by state

There is wide inter-state variation in wealth inequalities in immunization. In certain cases, states with similar overall levels of no or full immunization have distinctly different patterns of poor-rich distributions for immunization. These results once again highlight the importance of going beyond national averages to gauge immunization performance across Indian states.

In addition to inter-state differences in the overall levels of full and no immunization, there also exists a wide variation in inequalities in immunization levels (full and none). For full immunization, for example, inequality ranges from minimal in urban and rural areas of Tamil Nadu, to high rural and urban wealth inequalities in many northern states, particularly Assam and Bihar. All the southern states have lower inequality compared to the northern states (Table 3).

These differentials are particularly striking when comparing immunization levels for the poorest and richest children, compared to the average. One example is rural full immunization in Jammu and Punjab. Both states have relatively equivalent levels of full immunization (Figure 4, gray bars), but while rich children fare similarly in both states, poor children are much less likely to be fully immunized in Jammu than in Punjab. In other words, while averages would suggest that rural areas in Punjab and Jammu perform similarly well on full immunization, data on inequalities shows that rural Jammu has worse poor-rich differentials than does rural Punjab.

Table 3: Concentration index (full immunization), rural and urban India 1992-93

	State	Concentration Index	
		Rural	Urban
Better Performing States	Tamil Nadu	0.082	0.056
	Kerala	0.086	0.092
	Andhra Pradesh	0.111	0.087
	Maharashtra	0.129	0.113
	Haryana	0.131	0.150
	Karnataka	0.135	0.190
	West Bengal	0.141	0.371
	Punjab	0.145	0.099
	Gujarat	0.157	0.197
	Himachal Pradesh	0.160	0.058
Poorly Performing States	Rajasthan	0.174	0.274
	Madhya Pradesh	0.191	0.202
	Jammu	0.200	0.107
	Orissa	0.200	0.181
	Uttar Pradesh	0.232	0.239
	Bihar	0.322	0.349
	Assam	0.336	0.250

Differentials between the poorest and richest children are even more stark in the case of rural no immunization. Himachal Pradesh, Maharashtra and Kerala all have equivalently low levels of rural children not immunized (Figure 5, gray bars -- note that in this case a longer bar means higher proportion not immunized and thus worse immunization status than a shorter bar).. However, children from the poorest rural households in Kerala are much less likely to be totally bypassed in immunization than are the corresponding poorest children in Himachal Pradesh or Maharashtra. Moreover, the gap or differential among the poorest and richest children is considerably lower in Kerala than is the case in the other two states. In another example, Jammu stands out as having a much worse poor-rich ratio – a higher percent of poorest children and much fewer of the richest children un-immunized – for its average no immunization level, compared to other states with a similar overall average in no immunization (Karnataka, Haryana, Gujarat, Andhra Pradesh).

Figure 4: Rural poor-rich ratios and state averages, full immunization: Indian states 1992-93

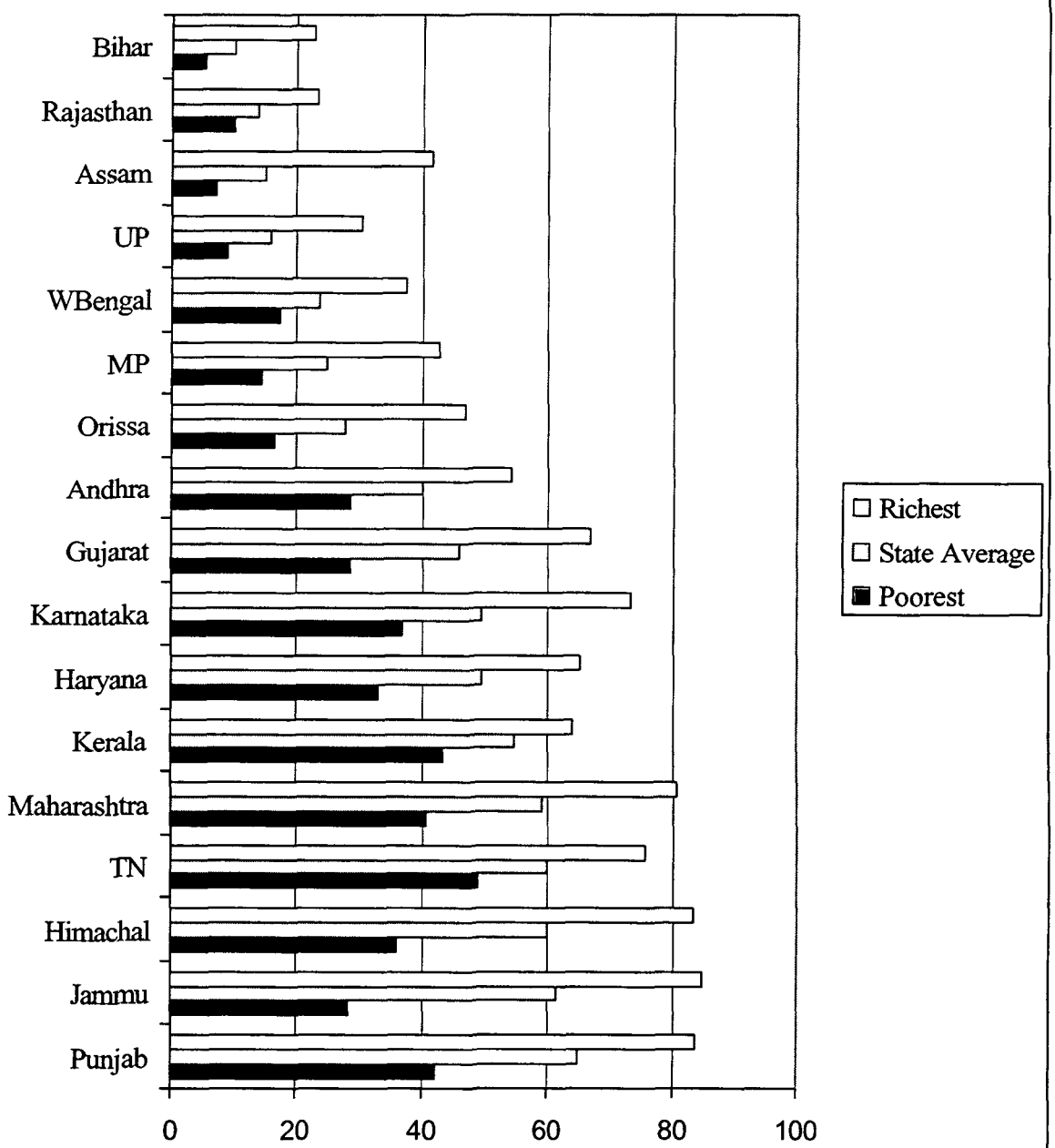
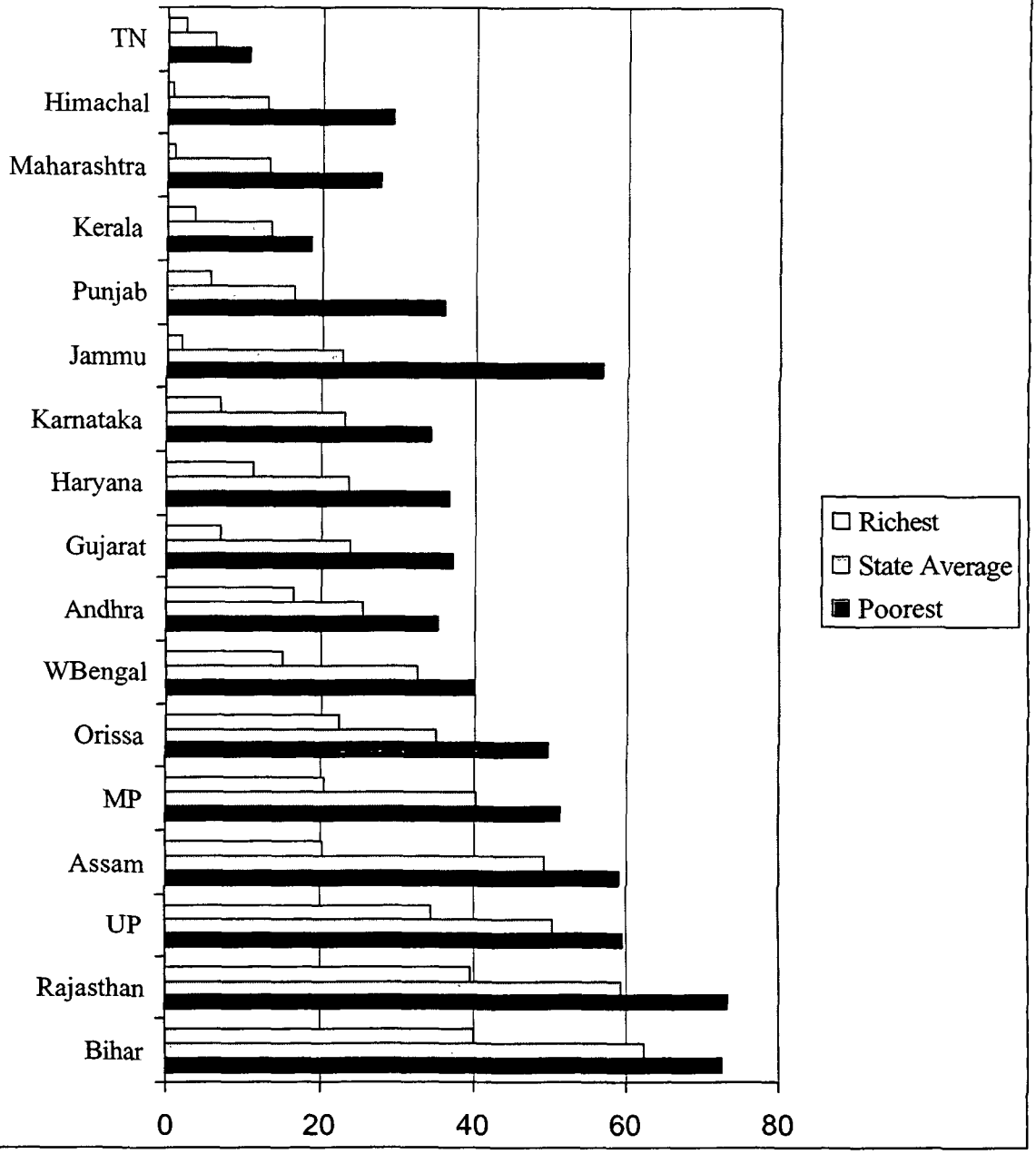


Figure 5: Rural poor-rich ratios and state average, no immunization: Indian states 1992-3



Relationship between immunization levels and inequalities across states

The data show a relationship between levels and inequalities, in no and full immunization and in both urban and rural areas. On average, states with higher proportions fully immunized have less wealth inequality. States with a majority of children un-immunized, however, also have less wealth inequality, suggesting that system failure is so strong in these states that children are un-immunized regardless of wealth.

Despite the variations noted in the previous section, there is some evidence of a positive association between levels and inequalities in full immunization in rural and urban areas (Figures 6 and 7, respectively), such that states with a good record in full immunization levels also have a good record in terms of wealth inequality for the percent fully immunized. In other words, high levels go hand in hand with low inequality. Thus, it appears that where the health system works to ensure follow-up in immunization, it also is able to provide access to the poor as well as the rich. States clustered in the bottom-right quadrant of these figures (6 and 7) can be regarded as the best performers on both levels and inequalities: Punjab, Himachal Pradesh, and Tamil Nadu for urban and rural areas, and Maharashtra for rural areas only.

This relationship is not exact, and some states perform better or worse than expected. Specifically, states that fall *below* the trend line perform *better* than the average state, while those above the trend line perform worse. As with previous results, all the four southern states (Karnataka, Andhra Pradesh, Kerala and Tamil Nadu) perform better than average in rural areas and three out of four are among the better-performing states for urban areas. While northern states are distributed below and above the trend line, Bihar is the worst performing state for both rural and urban areas.

The association between levels and inequalities in no immunization is, by contrast, a negative one (Figures 8 and 9 for rural and urban areas, respectively), such that states that have a majority of children un-immunized (and are thus poor performers in terms of levels) also have low levels of wealth inequalities in no immunization. Key examples are states like Bihar and UP, where large proportions of rural and urban children have no vaccines, suggesting a large system failure. However, these states also have some of the lowest household wealth differentials in rural and urban immunization in the country. This "equality", nonetheless, cannot be regarded as an achievement. This pattern most likely does not reflect equal access to the system for all children regardless of income, but rather that there is such overarching system failure that even the wealthiest children are not immunized at all.

Similarly, good performers on levels of no immunization are also the ones with high wealth differentials. Thus, in states such as Maharashtra, Himachal Pradesh, Jammu and Punjab, though the system may be working overall and only a minority receives no vaccines, it is still not working for those who need it most – the poorest.

Figure 6: Levels and Inequalities in Full Immunization, rural Indian states 1992-3

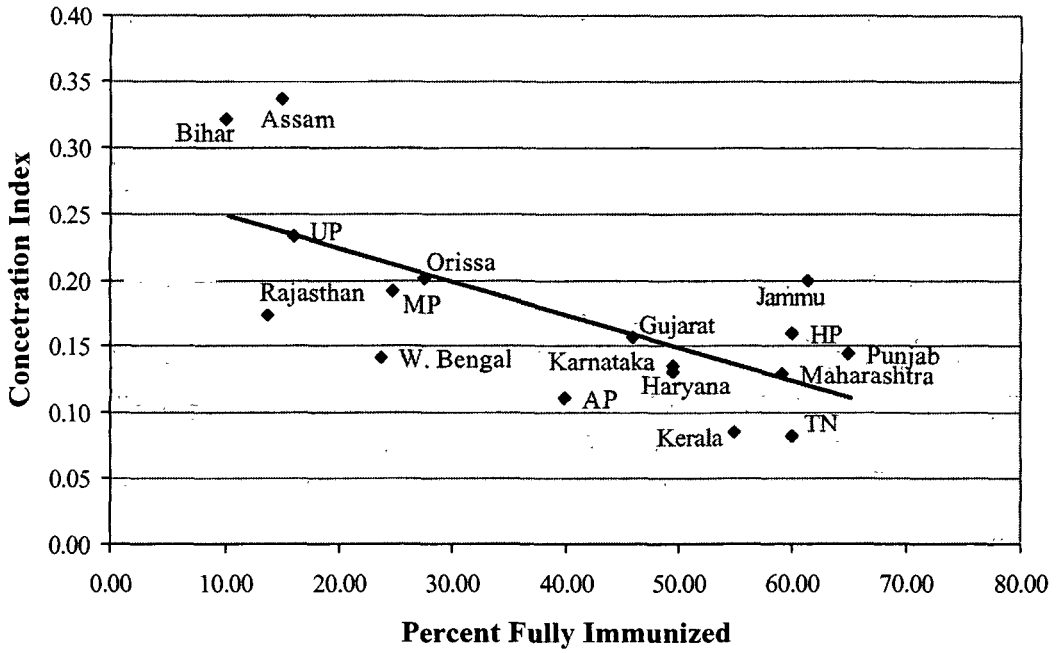


Figure 7: Levels and Inequalities in Full Immunization, Urban Indian States 1992-3

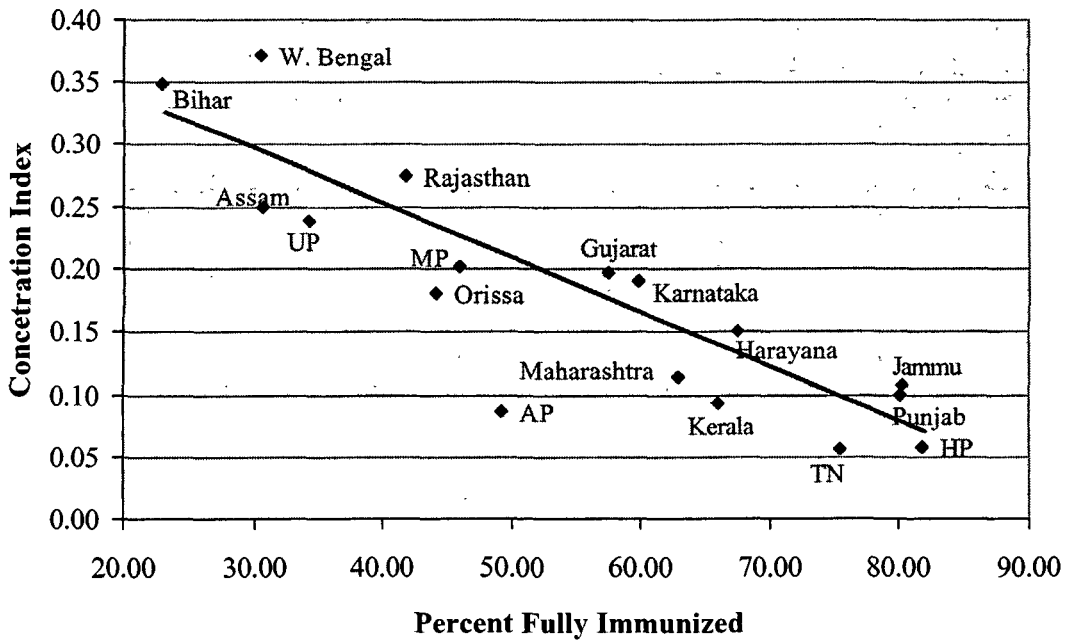


Figure 8: Levels and Inequalities in No Immunization, rural Indian states 1992-3

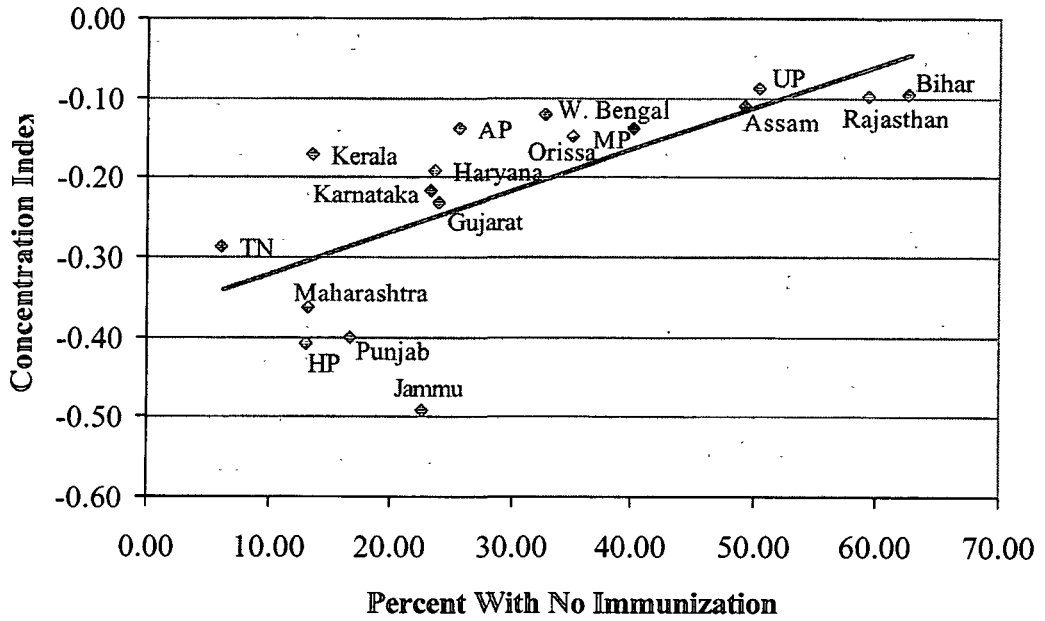
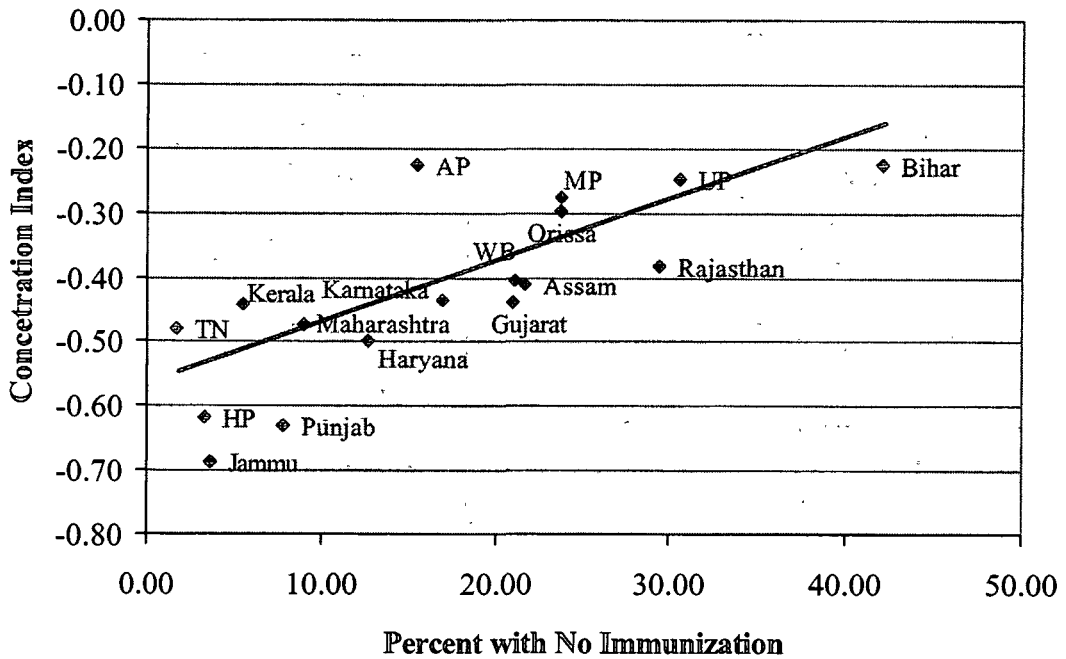


Figure 9: Levels and Inequalities in No Immunization, Urban Indian States 1992-3



In the case of no immunization (Figures 8 and 9), states that fall *above* the trend line perform *better* than the average state, while those below the trend line perform worse. Mirroring the results for full immunization, the southern states tend to perform better than average, with Andhra Pradesh, Kerala and Tamil Nadu being "exceptional" states on all counts. Northern states are distributed between better than average and worse than average, with Bihar being, once again, the worst performing state in both rural and urban areas.

On the whole these results suggest that the relationship between levels and inequalities may, in fact, follow an inverse-U pattern. Specifically, at both ends of the spectrum, the "worst" end where there is total system failure and thus high levels of no immunization and the "best" end where the system works very well and there are high levels of full immunization, we see low levels of inequalities. In the middle are the states with moderate performance where there is some – but not very high – immunization and there are high levels of inequalities. In other words, when there is abysmal system failure (high no immunization), inequalities are low because all are deprived. Initial improvements (some degree of full immunization) appear to be largely concentrated among those with greater access – the wealthy – and thus inequalities are high. Once performance has reached a critically good level (low no immunization and high full immunization) there appears to be increasing access for and use by the poor and thus, once again, inequalities are low. At which point of the spectrum a state is located, therefore, has important implications for how best to improve immunization performance.

Gender-specific immunization levels by state and urban-rural residence

A female disadvantage in immunization is present in most states, including some in the south. Girls are more disadvantaged than boys in no immunization than in full immunization, suggesting strong neglect of girl children's immunization needs in a majority of urban and rural areas across states.

In most states, in urban and rural areas, girls are disadvantaged compared to boys for both full and no immunizations. [8] At the same time, consistent with the picture for overall immunization levels, there are large inter-state and urban-rural variations in gender differentials such that girls fare worse in rural areas and in the north compared to urban areas or southern states.

Gender differentials are particularly strong in no immunization (Table 4). However, state ranking into good and bad performers in terms of gender inequalities in no immunization does not always parallel ranking in terms of immunization levels or wealth inequalities. Thus, Punjab has the worst gender differentials in no immunization in the country (Table 4), while it has low overall proportions un-immunized (Table 2) and moderate levels of wealth inequalities (Table 3). Madhya Pradesh and Rajasthan have some of the lowest gender differentials in no immunization, but high overall proportions un-immunized and high levels of wealth inequalities. Urban Maharashtra, Tamil Nadu and Kerala are perhaps the only states that perform well on all three indicators – low gender inequalities,

[8] Due to small sample sizes, patterns in gender differential between household wealth quintiles by state will not be discussed here.

very few children not immunized, and minimal wealth inequalities, in urban and rural areas.

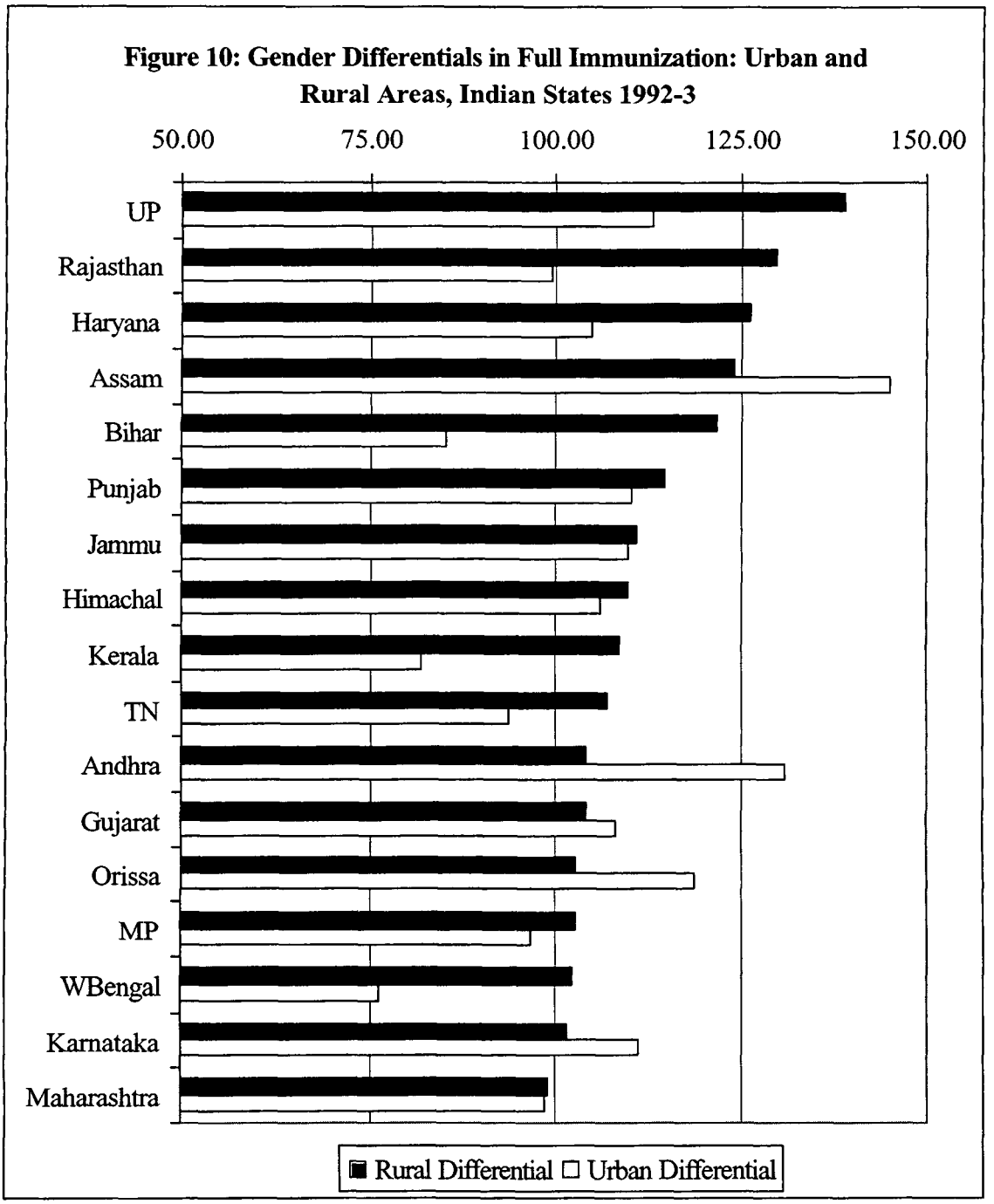
Data on gender differentials in full immunization show that ten of the seventeen largest states have some degree of discrimination against girl children (differential larger than 100) in both urban and rural areas (Figure 10). In the majority of states (all but five) the female disadvantage is larger in rural than in urban areas. Thus, for example, in Rajasthan, boys are 30 percent more likely to be fully immunized in rural areas than are girls; however, there is no recorded gender differential in urban areas. Gender differentials are strong in the northern states such as UP, Rajasthan and Haryana, particularly in rural areas. Girls in the southern states fare better, but other than in Maharashtra, every state shows some female disadvantage in full immunization, either in rural or urban areas or both.

Table 4: State gender differentials for no immunization, rural and urban India 1992-93

	States	Gender Differentials	
		Rural	Urban
Poorly Performing States	Punjab	192.3	522.1
	Haryana	169.5	126.8
	Jammu	132.9	157.1
	Himachal	126.3	273.9
	Bihar	118.4	94.2
	Orissa	118.3	149.5
	WBengal	117.3	111.7
	Maharashtra	117.1	71.7
	Andhra	116.6	128.0
	UP	116.4	107.5
	Karnataka	113.4	115.9
	Assam	113.3	131.0
Better Performing States	Kerala	112.4	84.5
	Gujarat	112.4	95.3
	Rajasthan	112.1	119.7
	MP	107.5	127.2
	TN	95.7	36.7

That the extent of female discrimination is stronger for no immunization (Table 4) than for full immunization, suggests that in most states households do not even start girl children on the schedule of vaccines, leave aside completing all vaccinations for girls. The highest differentials are in Punjab and Haryana in the north. The extraordinarily high differential for urban Punjab reflects that there are hardly any un-immmunized boys (2.8 percent) compared to girls (14 percent). Almost twice as many rural girls than boys receive no vaccines at all in rural Punjab; the differential is only slightly smaller in Haryana. Interestingly, Punjab and Haryana also have relatively high household wealth inequalities in no immunization, particularly in urban areas, though they have among the lowest overall levels of no immunization in the country. Thus, while the system may be

functioning well on average in these two states, poor children and female children are still deprived of any immunization. Once again, all states but one (Tamil Nadu) show some female disadvantage in no immunization in rural, urban or both areas.



V. Discussion

The data presented in this paper provide evidence that India's immunization program has not been successful in reaching large numbers of children. More than half of all children age 12-60 months were not fully immunized by 1992-93 and a significant proportion – over a third in rural areas – had received no vaccinations at all.[9]

Our results also show, however, that there is large variability across states in immunization performance in levels of immunization, as well as in wealth inequalities, urban-rural differentials and gender differentials (Table 5). For the discussion that follows, we examine states' performance relative to each other and divided into three groups: worst performers (horizontal black bars in table 5), medium performers (gray bars) and best performers (white bars). These criteria are derived using a weighted ranking of states depending on their performance on each indicator.

Table 5: States performance by various immunization indicators, India 1992-93

Rank	State	Levels	Inequality by Wealth	Gender Differentials	Rural/Urban Differentials
1	Bihar	Worst	Worst		
2	Assam				
3	Rajasthan				Worst
4	UP				
5	Orissa				
6	MP				
7	WBengal				
8	Haryana				
9	Jammu				
10	Andhra				
11	Gujarat				
12	Himachal				
13	Punjab			Worst	
14	Karnataka				
15	Kerala				
16	Maharashtra				Best
17	TN	Best	Best	Best	

Levels, wealth inequalities, and urban-rural differentials

The analysis presented earlier showed that northern states are relatively worse performers than are southern states, in terms of levels and wealth inequalities. The picture presented

[9] While more recent data from the NFHS 1998/99 show that the percent with no immunizations has decreased enormously to 14 percent all-India, still only 42 percent of all children age 12-23 had been fully immunized by the time of the survey (IIPS, 2000; p.209).

here (table 5) also clearly shows that, on average, there is a concordance between those states that do badly (or well) on levels, those that are bad (or good) performers on wealth inequality, and those that are bad (or good) performers on urban-rural differentials. Thus, Bihar, Assam, Rajasthan, UP and MP are among the worst performers on all three indicators, while Kerala and Tamil Nadu are the best performers on all counts. This correlation between levels, household wealth, and urban-rural residence suggests that, where immunization levels are weak, the situation is particularly bad for poor children in rural areas. While the data in this analysis did not permit us to analyze reasons for this particular failure among the rural poor, other work suggests multiple possible causes.

One set of possible reasons can be termed a "demand" failure, particularly as regards information, such that the rural poor may not demand or may not use available immunization services. First, the poor may not fully know about the benefits of immunization, possibly because government information campaigns on immunization do not reach them. Second, families may not be adequately informed about where and when immunizations are conducted, and such information failure may be particularly acute in poorer or more remote rural areas than in wealthier, urban areas. On-going research with data from the World Bank funded Reproductive and Child (RCH) surveys suggests that such is the case among households with un-immunized children, most of which tend to be poor, rural families. Phase I of the RCH survey found that 30 percent of households with un-immunized children were not aware of the need for immunization and 32.6 percent were not aware of the time and place immunization services were going to be available in the village.

Weak immunization performance in poor, rural areas may also be indicative of system failure in reaching under-privileged populations. First, such failure is related to the inability to effectively provide such populations with the information they need to make full use of such immunization services as do exist. Additionally, however, immunization services themselves may be inadequate or ineffective in such areas. Supply problems include ineffectiveness of the auxiliary nurse-midwife (ANM) in arriving on time or regularly to administer vaccinations, a break in the cold chain for the vaccines, inadequate supplies, and so on. The almost exclusive focus of the government, until recently, on female sterilization as the main measure of success for the health and family welfare program and for employee evaluation has almost certainly contributed to the lack of attention paid to the effectiveness of the immunization program in many parts of the country. Improved management of the immunization program – for example, more regular planning and monitoring of immunization sessions, instituting a management information system to monitor the use of services by the poor, and some type of in-built system of independent evaluation – are possible steps to try and overcome some of these systemic issues.

Finally, resource allocation issues are likely to be important in the uneven distribution of immunization across states, urban-rural areas and household wealth. Within states that have particularly unequal distributions, fewer resources for the immunization program may go to poorer areas and rural areas than go to wealthier or urban areas. Further, even though families do not have to pay for vaccines provided by the government, the way the

program is run may result in a number of other costs that are not taken into account by the system but that act as a disincentive for poorer households to immunize their children. These costs include travel costs to the immunization site, waiting costs, and the opportunity cost of several hours or a day spent away from work. The rural poor are almost certainly less likely to be able to afford such costs than are wealthier households in urban areas. Urban, wealthy households are also more likely to have alternative, private sources to immunize their children if the public system is not providing adequate services. Recent data shows, in fact, that almost a quarter of urban children receive vaccines through the private medical sector compared to 8 percent of rural children; similarly, close to 30 percent of children from wealthy households are immunized in the private sector compared to 5 percent of the poorest children (IIPS, 2000; p. 212).

Gender differentials

While levels, wealth inequalities and urban-rural differentials appear related such that bad (or good) performers on one of these indicators are likely to perform similarly on the other two, such is not the case for gender differentials (table 5). In fact, gender differentials appear to be spread through the country such that even states that perform relatively well on other indicators may have medium or high gender differentials. The only exceptions are Kerala and Tamil Nadu, where low gender differentials coincide with good performance on all other indicators. Inexplicably, Rajasthan, which has high excess female child mortality and poor social indicators for women, as well as poor performance on other immunization indicators, also has low gender differentials.

This very different pattern for gender differentials suggests that the reasons for worse immunization among girls than boys may lie not as much in the immunization or public health system per se but, rather, may reflect a pervasive social situation that goes beyond the public health system. In other words, discrimination against girl children in terms of immunization in almost all the states is indicative of the persistence of son preference in much of India, as well as high excess female child mortality in most states across the country. This said, there are still policy actions that the health system can take to alleviate some degree of the gender discrimination in immunization.

One example of what the health system can tackle relates to the un-measured costs of immunization mentioned earlier. If households have to incur costs in immunizing their children, then they are likely to be less willing to immunize less preferred – mainly female – children. Thus, identifying and lessening "hidden" costs of immunization, particularly in rural areas, could help improve girls' immunization levels. More generally, any planned changes or improvements in the system can target girl children specifically, such as improving information about vaccination, and immunization campaigns. In addition, ANMs and other health officials involved in immunization could receive gender training, such as is being conducted for PHCs in Himachal Pradesh by UNFPA, so that they are made aware of the gender gaps in immunization and in Indian society as a whole and maintain a special focus on the girl child in program development and implementation.

Next steps

This paper pinpoints where problems exist in immunization in India, and what types of problems are most prevalent in which states – poor levels, high wealth inequalities, urban-rural differentials, or gender differentials. We also suggest several possible systemic, demand-based and social reasons for these problems. The next step on the policy and research agenda is to identify more specifically which of these and other possible reasons is key in explaining the weaknesses of immunization performance in India, where "performance" is measured in all the different ways analyzed here. At the same time, identifying what reasons account for good performance on various indicators of immunization could also go a long way in understanding how to improve immunization where it is lagging. Once key reasons for good and bad performance are identified, the government and other interested parties need to identify policy and programmatic changes that would take into account problematic issues, as well as take advantage of strengths in the program in certain states.

On the face of it, the challenges are daunting. Nonetheless, several states appear to have successfully faced many of these challenges and have high levels of immunization, small wealth inequalities, and minimal or no gender differentials in immunization. Tamil Nadu and Kerala are two key examples that can be learnt from. The crucial factor in this as in all public health matters is, however, political will. The Ministry of Health and Family Welfare is in the process of restructuring India's public health policy to focus broadly on maternal and child health, including immunization. Recent pulse polio campaigns have recorded enormous success in reaching formerly un-reached children. The new National Family Health Survey shows that immunization levels have improved for the country as a whole between 1992-93 and 1998-99. Thus the environment is a positive one and the policy mandate exists, more so now than it has at any recent point in the past. It is now in the hands of government officials to use that mandate to improve immunization for all Indian children, regardless of their residence, household wealth, or gender.

Annex A
Asset Factor Scores and Household Wealth Quintiles

The three tables in this annex presents information about the assets used in the calculation of the asset index in rural and urban areas, and the quintile cut-off points for both rural and urban areas, respectively. In Tables A1 and A2, the first column on the left-hand side provides a brief description of each asset. Though most assets are repeated in urban and rural analyses, some assets are not used in both samples due to small sample sizes for certain categories. The following two sets of columns present descriptive statistics for the assets, namely the unweighted proportion of all sample households that owns each asset (and the standard deviation for that proportion); and the percentage of the sample population in each wealth quintile of the population (and total) that owns each asset.

The column labeled "Asset factor scores" presents the raw factor scores for each asset generated by principal components analysis, as explained in the text. Asset scores generated by this analysis were then standardized relative to a standard normal distribution with a mean of zero and standard deviation of one, as follows:

Household standardized asset score =

$$\left(\frac{\text{value of asset variable} - \text{unweighted mean of asset variable}}{\text{unweighted standard deviation of asset variable}}\right) \times \text{"raw" asset factor score}$$

The last two columns on the right-hand side of Tables A1 and A2 present the calculated standardized household asset scores. These are presented for each asset, based on the following procedure. For dichotomous variables (i.e., variables that take a value of 1 if the household owns the asset and 0 if the household does not own the asset), there are two household scores for each asset -- one for households that own the asset and one for households that do not own the asset. For assets that are not dichotomous, such as the number of persons per sleeping room, the asset score is calculated according to the formula presented at the bottom of annex tables A1 and A2.

Standardized household scores were added up for each household. Households were ranked by score and divided into weighted quintiles, where the weights are a simple multiplicative of the relevant sampling weight (so that quintiles are representative) and the number of household members (to control for large variations in household size). All sample individuals were assigned the wealth quintile of the household in which they resided. The cut-off points that defined the quintiles for rural and urban areas are presented in Table A3.

Table A 1: Assets and Factor Scores, Rural India 1992/3

				Household score if:	
Asset variable	Unweighted		Asset factor scores	Has asset	Does not have asset
	Mean	Std. Deviation			
Kuchha house	0.605	0.489	-0.3497	-0.2826	0.4326
Semipucca house	0.284	0.451	0.0000	0.0000	0.0000
Pucca house	0.112	0.315	0.1426	0.4021	-0.0505
Number of members/sleeping room	3.066	1.926	-0.1192	**	**
Separate room as kitchen	0.499	0.500	0.1610	0.1613	-0.1606
Land	0.644	0.479	0.0383	0.0285	-0.0515
Irrigated land	0.255	0.436	0.0887	0.1516	-0.0518
Animals	0.672	0.470	-0.0017	-0.0012	0.0025
A bullock	0.292	0.455	-0.0142	-0.0222	0.0092
A cow	0.350	0.477	0.0152	0.0208	-0.0112
A buffalo	0.279	0.448	0.0624	0.1003	-0.0388
A goat	0.173	0.378	-0.0532	-0.1164	0.0243
Sheep	0.019	0.136	-0.0052	-0.0373	0.0007
A camel	0.005	0.068	-0.0001	-0.0018	0.0000
Other animals	0.029	0.167	-0.0083	-0.0482	0.0014
A sewing machine	0.113	0.316	0.2016	0.5662	-0.0718
A clock	0.430	0.495	0.2399	0.2761	-0.2083
A sofa	0.037	0.189	0.2057	1.0504	-0.0403
A fan	0.187	0.390	0.3071	0.6409	-0.1472
A radio	0.316	0.465	0.2153	0.3170	-0.1462
A refrigerator	0.017	0.129	0.1815	1.3850	-0.0238
A television	0.089	0.285	0.2740	0.8761	-0.0857
A video recorder or player	0.010	0.097	0.0766	0.7821	-0.0075
A bicycle	0.396	0.489	0.1218	0.1503	-0.0987
A motorcycle	0.038	0.192	0.1906	0.9564	-0.0380
A car	0.003	0.058	0.0838	1.4443	-0.0049
Piped drinking water in residence	0.071	0.256	0.2146	0.7789	-0.0591
Public tap for drinking water	0.123	0.328	0.0887	0.2372	-0.0332
Drinking water pump in residence	0.150	0.357	0.1454	0.3460	-0.0611
Public pump for drinking water	0.266	0.442	0.0000	0.0000	0.0000
Well in residence	0.082	0.274	0.1193	0.4005	-0.0356
Public well	0.239	0.427	0.0135	0.0242	-0.0076
Spring for drinking water	0.009	0.096	0.0246	0.2528	-0.0024
River for drinking water	0.025	0.156	0.0083	0.0518	-0.0013
Pond or lake for drinking water	0.015	0.123	0.0143	0.1139	-0.0018
Dam for drinking water	0.001	0.036	0.0041	0.1153	-0.0001
Rainwater for drinking	0.000	0.013	0.0081	0.6227	-0.0001
Tanker water for drinking	0.001	0.034	0.0122	0.3576	-0.0004
Other sources of drinking water	0.018	0.132	0.0289	0.2144	-0.0039

Table A1, contd.

				Household score if:	
			Asset factor	Has asset	Does not
Asset variable	Unweighted		scores		have asset
	Mean	Std. Deviation			
Own flush toilet	0.061	0.240	0.4051	1.5846	-0.1036
Shared flush toilet	0.005	0.072	0.0932	1.2807	-0.0068
Public flush toilet	0.003	0.053	0.0540	1.0205	-0.0029
Own pit latrine	0.050	0.218	0.2473	1.0750	-0.0569
Shared pit latrine	0.006	0.077	0.0767	0.9872	-0.0060
Public pit latrine	0.004	0.060	0.0557	0.9299	-0.0033
Bush or no toilet facility	0.870	0.336	0.0000	0.0000	0.0000
Other toilet facility	0.000	0.020	0.0188	0.9238	-0.0004
Electricity as main source of lighting	0.387	0.487	0.5437	0.6840	-0.4323
Kerosene as main source of lighting	0.608	0.488	0.0000	0.0000	0.0000
Gas as main source of lighting	0.001	0.029	0.0164	0.5556	-0.0005
Oil as main source of lighting	0.002	0.041	0.0150	0.3621	-0.0006
Other source of lighting	0.002	0.047	0.0217	0.4566	-0.0010
Wood as main fuel source	0.775	0.418	0.0000	0.0000	0.0000
Dung as main fuel source	0.123	0.329	0.0402	0.1073	-0.0151
Coke as main fuel source	0.021	0.143	0.0434	0.2967	-0.0063
Coal as main fuel source	0.002	0.046	0.0143	0.3069	-0.0007
Kerosene as main fuel source	0.019	0.135	0.1132	0.8220	-0.0156
Electricity as main fuel source	0.001	0.037	0.0365	0.9893	-0.0013
Gas as main fuel source	0.019	0.138	0.2103	1.4950	-0.0296
Biogas as main fuel source	0.005	0.072	0.0701	0.9644	-0.0051
Other source of fuel	0.034	0.181	-0.0186	-0.0991	0.0035
** Household scores for numbers of people per sleeping room is calculated as follows:					
{#people per room - unweighted mean)/unweighted std. Deviation}*asset factor score					

Table A 2: Assets and Factor Scores, Urban India 1992/3

				Household score if:	
			Asset factor	Has asset	Does not
Asset variable	Unweighted		scores		have asset
	Mean	Std. Deviation			
Kuchha house	0.173	0.378	-0.3731	-0.8170	0.1704
Semipucca house	0.262	0.440	-0.3057	-0.5125	0.1824
Pucca house	0.565	0.496	0.0000	0.0000	0.0000
Number of members/sleeping room	2.789	1.984	-0.1359	**	**
Separate room as kitchen	0.629	0.483	0.1845	0.1418	-0.2402
Land	0.197	0.398	-0.0331	-0.0669	0.0164
Irrigated land	0.197	0.398	0.0000	0.0000	0.0000
Animals	0.143	0.350	-0.0836	-0.2043	0.0342
A bullock	0.030	0.171	-0.0450	-0.2559	0.0079
A cow	0.068	0.251	-0.0408	-0.1515	0.0110
A buffalo	0.043	0.203	-0.0401	-0.1887	0.0085
A goat	0.044	0.204	-0.0691	-0.3238	0.0147
Other animals	0.010	0.101	-0.0230	-0.2247	0.0024
A sewing machine	0.355	0.479	0.1853	0.2498	-0.1375
A clock	0.788	0.409	0.2130	0.1106	-0.4100
A sofa	0.239	0.427	0.2145	0.3823	-0.1203
A fan	0.685	0.464	0.2660	0.1802	-0.3925
A radio	0.595	0.491	0.1890	0.1559	-0.2291
A refrigerator	0.200	0.400	0.2166	0.4327	-0.1084
A television	0.517	0.500	0.2621	0.2531	-0.2713
A video recorder or player	0.067	0.251	0.1275	0.4743	-0.0343
A bicycle	0.475	0.499	0.1055	0.1108	-0.1005
A motorcycle	0.192	0.394	0.1902	0.3899	-0.0928
A car	0.032	0.177	0.0969	0.5293	-0.0178
Piped drinking water in residence	0.481	0.500	0.0000	0.0000	0.0000
Public tap for drinking water	0.216	0.411	-0.3051	-0.5821	0.1600
Drinking water pump in residence	0.095	0.294	-0.1364	-0.4199	0.0443
Public pump for drinking water	0.086	0.280	-0.1984	-0.6482	0.0607
Well in residence	0.046	0.210	-0.0898	-0.4071	0.0198
Public well	0.045	0.208	-0.1623	-0.7457	0.0353
Spring for drinking water	0.001	0.030	-0.0205	-0.6737	0.0006
River for drinking water	0.005	0.073	-0.0697	-0.9458	0.0051
Pond or lake for drinking water	0.003	0.056	-0.0467	-0.8327	0.0026
Rainwater for drinking	0.000	0.013	-0.0067	-0.4940	0.0001
Tanker water for drinking	0.010	0.099	-0.0519	-0.5181	0.0052
Other sources of drinking water	0.011	0.104	-0.0734	-0.7002	0.0077
Own flush toilet	0.453	0.498	0.0000	0.0000	0.0000
Shared flush toilet	0.089	0.284	-0.1493	-0.4784	0.0466
Public flush toilet	0.060	0.237	-0.1574	-0.6254	0.0396
Own pit latrine	0.100	0.300	-0.1602	-0.4816	0.0533
Shared pit latrine	0.033	0.177	-0.1060	-0.5782	0.0194
Public pit latrine	0.024	0.153	-0.1065	-0.6806	0.0167
Bush, other or no toilet facility	0.243	0.429	-0.4263	-0.7522	0.2416

Table A2: contd.

				Household score if:	
			Asset factor	Has asset	Does not
Asset variable	Unweighted		scores		have asset
	Mean	Std. Deviation			
Electricity as main source of lighting	0.827	0.378	0.0000	0.0000	0.0000
Kerosene as main source of lighting	0.170	0.376	-0.4681	-1.0333	0.2121
Other source of lighting	0.002	0.047	-0.0486	-1.0257	0.0023
Wood as main fuel source	0.298	0.458	-0.4423	-0.6783	0.2884
Dung as main fuel source	0.031	0.172	-0.1428	-0.8043	0.0254
Coke as main fuel source	0.079	0.270	-0.1819	-0.6203	0.0533
Coal as main fuel source	0.008	0.090	-0.0572	-0.6332	0.0052
Kerosene as main fuel source	0.227	0.419	-0.2518	-0.4650	0.1364
Electricity as main fuel source	0.010	0.099	-0.0348	-0.3483	0.0035
Gas as main fuel source	0.335	0.472	0.0000	0.0000	0.0000
Biogas as main fuel source	0.007	0.085	-0.0198	-0.2311	0.0017
Other source of fuel	0.005	0.072	-0.0646	-0.8963	0.0047
** Household scores for numbers of people per sleeping room is calculated as follows:					
{#people per room - unweighted mean)/unweighted std. Deviation}*asset factor score					

Table A 3: Household Wealth Quintiles, Rural India 1992/3

RURAL					
Wealth		Asset Index Score			
Quintile	Sample size	Mean	Std. Deviation	Lowest	Highest
Poorest	10608	-2.172	0.224	-2.9889	-1.8198
Second	10587	-1.427	0.227	-1.8197	-1.0354
Middle	10673	-0.570	0.284	-1.0353	-0.0447
Fourth	12477	0.777	0.528	-0.0445	1.7919
Richest	14537	4.357	2.325	1.7924	14.2108

Table A 4: Household Wealth Quintiles, Urban India 1992/3

URBAN					
Wealth		Asset Index Score			
Quintile	Sample size	Mean	Std. Deviation	Lowest	Highest
Poorest	5925	-3.860	0.943	-6.5645	-2.3475
Second	5694	-1.299	0.583	-2.3573	-0.3210
Middle	5587	0.517	0.476	-0.3208	1.3487
Fourth	5669	2.202	0.504	1.3492	3.0856
Richest	5583	4.039	0.618	3.0859	5.5327

Annex B
Levels and Inequalities in Full and No Immunization: Rural and Urban Indian States 1992/3

Table B 1: Full Immunization, Rural India

State	Wealth Quintiles					State Level	Concentra-tion Index	Poor/Rich Ratio
	Poorest	Second	Middle	Fourth	Richest			
Andhra	28.57	37.50	39.29	43.41	54.14	**39.92**	0.11	0.53
Assam	6.91	9.05	13.36	20.34	41.59	**14.99**	0.34	0.17
Bihar	5.18	4.80	7.27	12.32	22.71	**9.99**	0.32	0.23
Gujarat	28.57	39.09	48.33	54.19	66.90	**45.86**	0.16	0.43
Haryana	32.91	41.77	51.33	57.86	65.10	**49.40**	0.13	0.51
Himachal	35.91	48.70	61.83	74.19	83.44	**59.98**	0.16	0.43
Jammu	28.35	38.02	64.66	80.67	84.71	**61.34**	0.20	0.33
Karnataka	36.84	42.25	45.89	54.74	73.36	**49.38**	0.14	0.50
Kerala	43.36	50.23	53.80	66.67	64.02	**54.78**	0.09	0.68
Maharashtra	40.62	53.11	54.92	67.62	80.60	**59.02**	0.13	0.50
MP	14.22	21.77	24.35	26.84	42.55	**24.79**	0.19	0.33
Orissa	16.39	20.72	26.92	30.43	46.89	**27.67**	0.20	0.35
Punjab	42.00	57.14	66.67	87.97	83.69	**64.96**	0.14	0.50
Rajasthan	9.90	10.06	12.21	13.53	23.33	**13.77**	0.17	0.42
TN	48.94	57.23	56.95	67.12	75.61	**59.97**	0.08	0.65
UP	8.68	11.83	14.72	15.74	30.28	**15.92**	0.23	0.29
W. Bengal	17.23	20.84	21.83	26.60	37.49	**23.78**	0.14	0.46
All-India	**16.14**	**21.29**	**26.06**	**36.07**	**55.01**	**30.00**	**0.24**	**0.29**

Table B 2: Full Immunization, Urban India

State	Wealth Quintiles					State Level	Concentra-tion Index	Poor/Rich Ratio
	Poorest	Second	Middle	Fourth	Richest			
Andhra	40.00	47.14	51.61	56.82	61.22	**49.23**	0.09	0.65
Assam	15.92	24.04	45.57	29.11	67.92	**30.72**	0.25	0.23
Bihar	5.66	17.49	29.68	39.38	46.11	**22.99**	0.35	0.12
Gujarat	33.33	41.76	69.86	77.61	84.29	**57.52**	0.20	0.40
Haryana	37.78	68.09	66.67	87.93	90.91	**67.62**	0.15	0.42
Himachal	58.46	88.89	88.52	88.71	86.27	**81.79**	0.06	0.68
Jammu	56.79	76.27	91.67	91.67	98.00	**80.20**	0.11	0.58
Karnataka	26.89	50.70	71.54	71.59	87.13	**59.86**	0.19	0.31
Kerala	51.47	50.72	73.42	72.15	79.71	**65.93**	0.09	0.65
Maharashtra	47.54	56.63	67.48	73.11	85.56	**62.85**	0.11	0.56
MP	25.41	35.42	54.93	62.98	68.89	**46.00**	0.20	0.37
Orissa	30.56	32.61	44.90	60.32	75.56	**44.09**	0.18	0.40
Punjab	53.45	74.00	95.65	89.47	93.33	**80.08**	0.10	0.57
Rajasthan	16.13	25.88	46.51	66.20	67.74	**41.81**	0.27	0.24
TN	64.77	67.39	80.68	87.01	80.28	**75.48**	0.06	0.81
UP	19.14	22.69	31.68	42.05	63.45	**34.24**	0.24	0.30
W. Bengal	6.41	20.65	50.00	37.05	66.29	**30.46**	0.37	0.10
All-India	**30.79**	**46.04**	**56.36**	**68.24**	**77.98**	**53.16**	**0.18**	**0.39**

Table B 3: No Immunization, Rural India

State	Wealth Quintiles					State Level	Concentra-tion Index	Poor/Rich Ratio
	Poorest	Second	Middle	Fourth	Richest			
Andhra	35.24	28.80	23.47	21.46	16.56	**25.53**	-0.14	2.13
Assam	59.27	52.59	52.53	43.50	20.35	**49.21**	-0.11	2.91
Bihar	72.67	73.72	62.33	59.68	40.10	**62.56**	-0.10	1.81
Gujarat	37.24	29.44	21.67	18.71	7.04	**24.02**	-0.23	5.29
Haryana	36.71	24.68	24.67	19.29	11.41	**23.58**	-0.19	3.22
Himachal	29.28	16.23	9.14	7.74	0.66	**13.06**	-0.41	44.36
Jammu	56.69	40.50	15.04	8.00	1.91	**22.67**	-0.49	29.68
Karnataka	34.21	26.36	27.05	17.24	7.01	**23.29**	-0.22	4.88
Kerala	18.58	15.49	13.04	14.52	3.66	**13.57**	-0.17	5.08
Maharashtra	27.68	13.88	13.47	8.57	1.00	**13.21**	-0.36	27.68
MP	51.25	45.76	43.14	33.70	20.52	**40.19**	-0.14	2.50
Orissa	49.59	39.84	30.29	30.00	22.49	**35.03**	-0.15	2.20
Punjab	36.00	20.00	8.67	3.76	5.67	**16.65**	-0.40	6.35
Rajasthan	73.44	64.20	59.22	59.68	39.44	**59.33**	-0.10	1.86
TN	10.64	8.18	3.97	3.42	2.44	**6.13**	-0.29	4.36
UP	59.64	55.96	50.00	49.39	34.45	**50.30**	-0.09	1.73
W. Bengal	40.04	36.44	35.39	30.30	15.26	**32.74**	-0.12	2.62
All-India	**52.29**	**45.71**	**39.95**	**30.53**	**17.09**	**37.95**	**-0.18**	**3.06**

Table B 4: No Immunization, Urban India

State	Wealth Quintiles					State Level	Concentra-tion Index	Poor/Rich Ratio
	Poorest	Second	Middle	Fourth	Richest			
Andhra	25.00	14.29	9.68	11.36	8.16	**15.38**	-0.23	3.06
Assam	42.04	24.04	6.33	7.59	0.00	**21.61**	-0.41	
Bihar	61.92	47.09	41.61	20.85	10.79	**42.10**	-0.23	5.74
Gujarat	41.44	31.87	10.96	4.48	0.00	**20.87**	-0.44	
Haryana	34.44	10.64	6.41	5.17	0.00	**12.69**	-0.50	
Himachal	10.77	3.17	1.64	0.00	0.00	**3.31**	-0.62	
Jammu	12.35	1.69	0.00	0.00	0.00	**3.69**	-0.69	
Karnataka	38.66	23.94	7.32	6.82	1.98	**16.93**	-0.43	19.53
Kerala	10.29	14.49	0.00	3.80	0.00	**5.49**	-0.44	
Maharashtra	19.13	12.65	3.25	0.84	0.00	**8.96**	-0.47	
MP	39.61	27.97	17.69	17.63	4.69	**23.67**	-0.28	8.45
Orissa	41.67	25.00	20.41	9.52	4.44	**23.65**	-0.30	9.39
Punjab	25.86	8.00	0.00	1.75	0.00	**7.81**	-0.63	
Rajasthan	53.76	45.88	25.58	7.04	1.61	**29.47**	-0.38	33.39
TN	3.41	3.26	1.14	0.00	0.00	**1.68**	-0.48	
UP	49.53	37.85	31.79	15.45	12.00	**30.61**	-0.25	4.13
W. Bengal	42.94	18.35	7.91	8.36	3.91	**21.06**	-0.40	10.98
All-India	**33.94**	**22.10**	**11.36**	**6.54**	**3.15**	**17.26**	**-0.37**	**10.77**

Table B 5: Full Immunization, Rural India Male Children

State	Wealth Quintiles					State Level	Concentra-tion Index	Poor/Rich Ratio
	Poorest	Second	Middle	Fourth	Richest			
Andhra	25.86	37.50	42.45	48.00	54.32	**40.73**	0.13	0.48
Assam	8.33	8.62	15.52	25.88	44.00	**16.63**	0.33	0.19
Bihar	6.75	6.70	8.02	12.01	24.40	**10.97**	0.27	0.28
Gujarat	23.86	40.82	52.17	56.34	65.79	**46.82**	0.17	0.36
Haryana	39.02	42.35	57.14	65.06	70.24	**54.70**	0.13	0.56
Himachal	32.18	50.00	68.42	76.14	84.71	**62.65**	0.17	0.38
Jammu	32.76	44.29	70.15	77.78	84.88	**64.36**	0.17	0.39
Karnataka	37.95	44.44	40.82	50.39	79.31	**49.76**	0.14	0.48
Kerala	41.59	50.86	62.89	70.83	64.79	**57.00**	0.10	0.64
Maharashtra	39.47	52.88	52.08	67.92	80.53	**58.72**	0.14	0.49
MP	13.84	24.18	28.55	21.78	43.10	**25.13**	0.18	0.32
Orissa	13.01	22.06	25.83	34.82	48.15	**28.05**	0.23	0.27
Punjab	45.83	62.89	72.09	88.06	88.57	**69.23**	0.13	0.52
Rajasthan	9.85	8.89	14.29	18.62	25.38	**15.44**	0.21	0.39
TN	51.81	57.14	63.41	63.51	79.31	**62.13**	0.07	0.65
UP	10.67	15.19	17.89	17.21	32.76	**18.36**	0.20	0.33
W. Bengal	19.71	19.01	22.24	29.36	33.92	**24.06**	0.12	0.58
All-India	**16.59**	**22.39**	**27.20**	**36.79**	**57.99**	**31.22**	**0.24**	**0.29**

Table B 6: Full Immunization, Rural India Female Children

State	Wealth Quintiles					State Level	Concentra-tion Index	Poor/Rich Ratio
	Poorest	Second	Middle	Fourth	Richest			
Andhra	31.91	37.50	35.56	39.05	53.95	**39.05**	0.09	0.59
Assam	5.59	9.48	10.89	15.22	39.68	**13.40**	0.35	0.14
Bihar	3.51	2.87	6.46	12.61	21.14	**9.01**	0.39	0.17
Gujarat	32.41	37.37	44.32	52.38	68.18	**44.94**	0.14	0.48
Haryana	26.32	41.10	46.25	47.37	58.46	**43.30**	0.13	0.45
Himachal	39.36	47.44	54.95	71.64	81.82	**57.07**	0.15	0.48
Jammu	24.64	29.41	59.09	84.06	84.51	**57.98**	0.24	0.29
Karnataka	35.51	40.15	50.46	60.19	66.33	**48.97**	0.13	0.54
Kerala	45.13	49.48	43.68	62.22	63.44	**52.50**	0.07	0.71
Maharashtra	41.82	53.33	57.73	67.31	80.68	**59.33**	0.12	0.52
MP	14.66	19.12	20.80	31.77	41.91	**24.44**	0.21	0.35
Orissa	19.83	19.13	28.41	26.27	45.54	**27.26**	0.17	0.44
Punjab	38.46	50.00	59.38	87.88	78.87	**60.31**	0.16	0.49
Rajasthan	9.94	11.39	9.71	8.47	20.86	**11.89**	0.12	0.48
TN	46.67	57.30	49.28	70.83	72.31	**58.00**	0.09	0.65
UP	6.33	7.76	11.54	14.24	27.46	**13.21**	0.29	0.23
W. Bengal	14.88	22.94	21.33	23.53	41.06	**23.49**	0.17	0.36
All-India	**15.66**	**20.09**	**24.96**	**35.30**	**51.82**	**28.70**	**0.24**	**0.30**

Table B 7: Full Immunization, Urban India Male Children

State	Wealth Quintiles					State Level	Concentra-tion Index	Poor/Rich Ratio
	Poorest	Second	Middle	Fourth	Richest			
Andhra	45.28	57.14	58.82	56.52	72.00	**55.83**	0.08	0.63
Assam	21.74	25.00	53.66	32.50	67.65	**36.25**	0.21	0.32
Bihar	8.93	16.12	20.23	38.33	41.83	**21.13**	0.31	0.21
Gujarat	35.38	46.51	70.00	78.38	85.00	**59.56**	0.18	0.42
Haryana	40.82	71.70	67.50	85.71	94.12	**69.12**	0.14	0.43
Himachal	57.58	96.97	83.33	94.87	85.71	**84.05**	0.05	0.67
Jammu	60.00	82.86	92.86	92.11	96.43	**83.43**	0.08	0.62
Karnataka	32.73	55.56	70.69	68.89	89.47	**63.07**	0.16	0.37
Kerala	45.24	45.71	69.05	65.62	73.53	**59.46**	0.10	0.62
Maharashtra	42.70	58.24	67.14	71.70	93.02	**62.43**	0.13	0.46
MP	15.92	36.68	55.88	70.01	69.11	**45.29**	0.26	0.23
Orissa	35.59	29.17	44.23	74.19	87.50	**47.66**	0.20	0.41
Punjab	62.50	80.00	96.15	87.50	96.00	**83.45**	0.07	0.65
Rajasthan	15.69	20.93	50.98	65.12	66.67	**41.74**	0.28	0.24
TN	56.52	70.00	80.00	87.18	73.53	**72.86**	0.06	0.77
UP	18.36	25.80	34.66	47.06	62.48	**36.23**	0.23	0.29
W. Bengal	7.62	8.00	52.37	37.24	48.79	**26.38**	0.35	0.16
All-India	**31.07**	**47.22**	**58.89**	**69.90**	**79.20**	**54.61**	**0.18**	**0.39**

Table B 8: Full Immunization, Urban India Female Children

State	Wealth Quintiles					State Level	Concentr a-tion Index	Poor/Rich Ratio
	Poorest	Second	Middle	Fourth	Richest			
Andhra	34.04	40.48	42.86	57.14	50.00	**42.59**	0.09	0.68
Assam	11.36	22.92	36.84	25.64	68.42	**25.00**	0.29	0.17
Bihar	1.89	18.91	35.53	40.54	50.28	**24.80**	0.38	0.04
Gujarat	30.43	37.50	69.70	76.67	83.33	**55.08**	0.21	0.37
Haryana	34.15	63.41	65.79	90.00	87.50	**65.93**	0.16	0.39
Himachal	59.38	80.00	93.55	78.26	86.96	**79.14**	0.06	0.68
Jammu	53.66	66.67	90.00	90.91	100.00	**75.97**	0.13	0.54
Karnataka	21.88	45.71	72.31	74.42	84.09	**56.64**	0.22	0.26
Kerala	61.54	55.88	78.38	76.60	85.71	**72.63**	0.07	0.72
Maharashtra	52.13	54.67	67.92	74.24	78.72	**63.28**	0.09	0.66
MP	35.57	33.92	54.11	54.55	68.61	**46.78**	0.14	0.52
Orissa	24.49	36.36	45.65	46.88	61.90	**40.10**	0.16	0.40
Punjab	42.31	65.00	95.00	92.00	90.00	**75.68**	0.14	0.47
Rajasthan	16.67	30.95	40.00	67.86	68.75	**41.90**	0.27	0.24
TN	73.81	65.38	81.25	86.84	86.49	**77.88**	0.05	0.85
UP	19.88	18.64	28.67	35.72	64.46	**32.03**	0.25	0.31
W. Bengal	5.31	37.65	47.22	36.82	76.59	**34.57**	0.38	0.07
All-India	**30.49**	**44.85**	**53.62**	**66.36**	**76.61**	**51.59**	**0.17**	**0.40**

Table B 9: No Immunization, Rural India Male Children

State	Wealth Quintiles					State Level	Concentra-tion Index	Poor/Rich Ratio
	Poorest	Second	Middle	Fourth	Richest			
Andhra	35.34	25.00	24.53	19.00	9.88	**23.63**	-0.19	3.58
Assam	55.30	48.28	46.55	43.53	20.00	**46.09**	-0.10	2.77
Bihar	70.87	65.86	54.75	52.59	36.46	**57.30**	-0.11	1.94
Gujarat	39.77	29.59	16.30	15.49	7.89	**22.59**	-0.28	5.04
Haryana	28.05	18.82	18.57	15.66	8.33	**17.82**	-0.19	3.37
Himachal	26.44	22.37	4.21	5.68	1.18	**11.60**	-0.46	22.41
Jammu	50.00	38.57	8.96	8.64	2.33	**19.61**	-0.49	21.46
Karnataka	31.93	24.60	26.53	17.05	6.03	**21.89**	-0.22	5.30
Kerala	15.93	13.79	14.43	12.50	4.23	**12.78**	-0.13	3.77
Maharashtra	26.32	12.50	12.50	8.49	0.88	**12.20**	-0.37	29.91
MP	53.33	43.55	36.82	32.91	19.36	**38.77**	-0.16	2.75
Orissa	49.59	37.50	28.33	26.79	15.74	**32.22**	-0.19	3.15
Punjab	30.21	9.28	4.65	4.48	4.29	**11.54**	-0.43	7.04
Rajasthan	72.91	66.11	56.19	52.13	33.50	**56.13**	-0.13	2.18
TN	10.84	8.57	3.66	4.05	3.45	**6.27**	-0.25	3.14
UP	53.54	51.61	47.36	46.81	32.06	**46.67**	-0.08	1.67
W. Bengal	38.57	34.86	28.31	28.64	14.86	**30.23**	-0.13	2.60
All-India	**50.00**	**42.59**	**37.08**	**28.28**	**14.48**	**35.34**	**-0.19**	**3.45**

Table B 10: No Immunization, Rural India Female Children

State	Wealth Quintiles					State Level	Concentra-tion Index	Poor/Rich Ratio
	Poorest	Second	Middle	Fourth	Richest			
Andhra	35.11	32.29	22.22	23.81	23.68	**27.55**	-0.09	1.48
Assam	62.94	56.90	59.41	43.48	20.63	**52.23**	-0.12	3.05
Bihar	74.58	81.67	70.46	66.22	43.50	**67.84**	-0.09	1.71
Gujarat	35.19	29.29	27.27	21.43	6.06	**25.39**	-0.19	5.81
Haryana	46.05	31.51	30.00	24.56	15.38	**30.20**	-0.18	2.99
Himachal	31.91	10.26	14.29	10.45	0.00	**14.65**	-0.36	
Jammu	62.32	43.14	21.21	7.25	1.41	**26.07**	-0.49	44.20
Karnataka	36.96	28.03	27.52	17.48	8.16	**24.83**	-0.21	4.53
Kerala	21.24	17.53	11.49	16.67	3.23	**14.37**	-0.21	6.58
Maharashtra	29.09	15.24	14.43	8.65	1.14	**14.29**	-0.35	25.52
MP	48.84	48.20	48.47	34.47	21.86	**41.68**	-0.12	2.23
Orissa	49.59	42.61	32.95	33.05	29.70	**38.12**	-0.11	1.67
Punjab	41.35	33.33	14.06	3.03	7.04	**22.19**	-0.37	5.87
Rajasthan	74.03	62.03	62.86	67.20	46.63	**62.93**	-0.06	1.59
TN	10.48	7.87	4.35	2.78	1.54	**6.00**	-0.32	6.81
UP	66.86	61.24	52.63	52.03	37.17	**54.34**	-0.10	1.80
W. Bengal	41.43	38.24	44.29	32.14	15.66	**35.46**	-0.11	2.65
All-India	**54.76**	**49.14**	**42.74**	**32.92**	**19.88**	**40.71**	**-0.16**	**2.75**

Table B 11: No Immunization, Urban India Male Children

State	Wealth Quintiles					State Level	Concentra-tion Index	Poor/Rich Ratio
	Poorest	Second	Middle	Fourth	Richest			
Andhra	20.75	14.29	8.82	4.35	12.00	**13.50**	-0.20	1.73
Assam	40.58	23.21	2.44	7.50	0.00	**18.75**	-0.46	
Bihar	64.69	46.94	40.71	19.96	14.54	**43.36**	-0.23	4.45
Gujarat	44.62	30.23	12.50	2.70	0.00	**21.33**	-0.47	
Haryana	32.65	3.77	7.50	7.14	0.00	**11.27**	-0.48	
Himachal	6.06	3.03	0.00	0.00	0.00	**1.84**	-0.66	
Jammu	12.50	0.00	0.00	0.00	0.00	**2.96**	-0.76	
Karnataka	36.36	22.22	6.90	11.11	0.00	**15.68**	-0.43	
Kerala	14.29	11.43	0.00	3.12	0.00	**5.95**	-0.51	
Maharashtra	25.84	12.09	2.86	0.00	0.00	**10.40**	-0.53	
MP	36.63	30.18	15.37	4.73	3.86	**20.96**	-0.35	9.49
Orissa	35.59	22.92	13.46	6.45	0.00	**19.16**	-0.36	
Punjab	9.38	3.33	0.00	0.00	0.00	**2.76**	-0.67	
Rajasthan	50.98	44.19	17.65	9.30	3.33	**27.06**	-0.38	15.31
TN	4.35	5.00	2.50	0.00	0.00	**2.51**	-0.43	
UP	45.82	38.42	26.37	15.59	16.86	**29.56**	-0.22	2.72
W. Bengal	37.06	20.00	7.33	10.21	8.13	**19.90**	-0.33	4.56
All-India	**32.11**	**20.54**	**9.92**	**5.03**	**3.80**	**15.93**	**-0.38**	**8.45**

Table B 12: No Immunization, Urban India Female Children

State	Wealth Quintiles					State Level	Concentra-tion Index	Poor/Rich Ratio
	Poorest	Second	Middle	Fourth	Richest			
Andhra	29.79	14.29	10.71	19.05	4.17	**17.28**	-0.25	7.14
Assam	43.18	25.00	10.53	7.69	0.00	**24.57**	-0.36	
Bihar	58.74	47.25	42.16	21.83	7.14	**40.86**	-0.22	8.23
Gujarat	36.96	33.33	9.09	6.67	0.00	**20.32**	-0.40	
Haryana	36.59	19.51	5.26	3.33	0.00	**14.29**	-0.52	
Himachal	15.62	3.33	3.23	0.00	0.00	**5.04**	-0.58	
Jammu	12.20	4.17	0.00	0.00	0.00	**4.65**	-0.60	
Karnataka	40.62	25.71	7.69	2.33	4.55	**18.18**	-0.44	8.93
Kerala	3.85	17.65	0.00	4.26	0.00	**5.03**	-0.36	
Maharashtra	12.77	13.33	3.77	1.52	0.00	**7.46**	-0.40	
MP	42.80	25.33	19.71	33.10	5.72	**26.66**	-0.21	7.48
Orissa	48.98	27.27	28.26	12.50	9.52	**28.65**	-0.26	5.14
Punjab	46.15	15.00	0.00	4.00	0.00	**14.41**	-0.61	
Rajasthan	57.14	47.62	37.14	3.57	0.00	**32.40**	-0.38	
TN	2.38	1.92	0.00	0.00	0.00	**0.92**	-0.59	
UP	53.10	37.11	37.30	15.27	6.90	**31.77**	-0.28	7.70
W. Bengal	48.29	16.14	8.58	6.14	1.42	**22.22**	-0.47	34.01
All-India	**35.94**	**23.67**	**12.91**	**8.25**	**2.42**	**18.69**	**-0.36**	**14.85**

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