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A Closer Look at Child Mortality among Adivasis in India

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Abstract

The authors use data from the National Family Health Survey 2005 to present age-specific patterns of child mortality among India's tribal (Adivasi) population. The analysis shows three clear findings. First, a disproportionately high number of child deaths are concentrated among Adivasis, especially in the 1–5 age group and in those states and districts where there is a high concentration of Adivasis. Any effort to reduce child morality in the aggregate will have to focus more squarely on lowering mortality among the Adivasis. Second, the gap in mortality between Adivasi children and the rest really appears after the age of one. In fact, before the age of one, tribal children face more or less similar odds of dying as other children. However, these odds significantly reverse later. This calls for a shift in attention from infant mortality or in general under-five mortality to factors that cause a wedge between tribal children and the rest between the ages of one and five. Third, the analysis goes contrary to the conventional narrative of poverty being the primary factor driving differences between mortality outcomes. Instead, the authors find that breaking down child mortality by age leads to a much more refined picture. Tribal status is significant even after controlling for wealth.

This paper—a product of the Human Development Department, South Asia Region—is part of a larger effort in the department to undertake empirical analysis on the human development outcomes of the most excluded populations. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at mdas@worldbank.org.

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INTRODUCTION

Almost every monsoon the Indian media is rife with stories of child deaths in tribal[2] areas, with furious debates in Parliament and state legislative assemblies and outrage among civil society activists. This is the starkest manifestation of Adivasi deprivation in India – an average Indian child has a 25 percent lower likelihood of dying under the age of five compared to an Adivasi child. In rural areas, where the majority of Adivasi children live, they made up about 11 percent of all births but 23 percent of all deaths in the five years preceding the National Family Heath Survey 2005. While there has been progress in child survival over the years and greater awareness of the hazards, which often leads to these stories surfacing in the media at all, the fact remains that children in tribal areas are at much greater risk of dying than those in other areas.

The rich and longstanding demographic and medical literature on child mortality can broadly be classified into three groups – the first focuses on "routes to low mortality" and aggregate declines in mortality through cross-country studies (for instance, Caldwell 1986; Claeson et al, 2000); the second on the determinants of child mortality (for instance see Mosley and Chen 1984); and the third on inequalities in child mortality across countries, within countries and across households (for instance see Hill and Pebly 1989; Cesar et al, 2003). Differential fertility and mortality patterns within India by caste and tribal status have received greater attention over the last few decades (see Murthi et al, 1996; Dyson and Moore, 1993; Dreze and Gazdar, 1997; Maharatna, 1998; 2000). The preoccupation of such studies on child mortality has however been on correlates of mortality and the slow decline in child mortality in recent years. There is a good reason for this as India looks likely to falter on achieving this important Millennium Development Goal – a fear expressed in 2000 by Claeson et al.

The anthropological literature has also focused on access to health for India's Adivasis. Excess mortality of tribal children during monsoons in particular has been analyzed by activists more recently through a food security lens. The Right to Food movement and the recent Supreme Court judgments exhort governments to take more aggressive action to address malnutrition nationally but more so in tribal areas. The evidence from the grassroots highlights the peculiar problems in tribal areas because of which poverty is higher, and health and education outcomes are lower. There is for instance, wide acknowledgment that excess mortality in childhood for tribals is partly due to poverty and partly to poor access to services. Our own previous analysis of mortality using data from India's Reproductive and Child Health Surveys, 2005 (see World Bank, 2006) and a recent study on Orissa also shows that once poverty levels are controlled for, the effect of tribal (or indeed Dalit or Scheduled Caste (SC)) status goes away. By and large, therefore, much of the analytical work on Scheduled Tribes (STs) in India has confirmed what we already know about child mortality and its correlates. This paper is an attempt to drill deeper

[1] The authors are grateful to Julie McLaughlin and Rinku Murgai for comments.

[2] We use the terms Scheduled Tribes, tribes and the self-preferred term Adivasis interchangeably in this paper.

into that knowledge to come up with some disaggregated patterns that more fully describe and explain the high levels of mortality of tribal children.

The analysis undertaken for this paper is part of an ongoing program[3] that looks at social exclusion and the differential outcomes for excluded groups like Dalit and Adivasis along a range of development parameters. The characteristics of Scheduled Tribes and Scheduled Castes and manner in which exclusion manifests itself is discussed in greater detail in the reports from that program. In this paper we disaggregate tribal child mortality patterns to build on the robust understanding that tribals do worse than others.

Tribal groups have historically had more equal gender relations and women's status in tribal societies has been higher. This has manifested itself in later than average age at marriage, higher participation of women in the labor force and lower restrictions on the mobility of women (see Das and Desai, 2003). Until the late 20th century, child mortality and fertility rates for tribals were lower than those for non-tribals (Maharatna, 1998). Dreze and Gazdar (1997) and Maharatna (1998; 2000) however point to a disturbing trend in tribal societies – that gender equality and their lower fertility and mortality patterns seem to be gradually eroding, as they get more integrated into non-tribal society and as their traditionally sustainable livelihoods are encroached upon. Migration of tribals is also seen to be associated with wearing down their sustainable lifestyles (see for instance Maharatna on Santhal fertility, 2005). This is consistent with findings from other countries on the experience of indigenous populations. In their examination of health of Mexican immigrants in the USA, James (1993) and Vega and Amaro (1994) find a similar pattern of 'acculturation' resulting in behaviors or lifestyles that adversely impact health (e.g. decreased fiber consumption, decreased breast feeding, increased use of cigarettes and alcohol especially by young women).

Tribal groups however are very heterogeneous and there are large differences by state and even by districts within states, and certainly across tribes. The Government of India identifies 533 tribes with 62 of them located in the state of Orissa.[4] The national data do not allow for disaggregation by tribe, so some of these patterns may not hold true for individual tribes. There is an additional issue of heterogeneity. The most disadvantaged tribal groups are those where the Fifth Schedule of the Constitution applies. States in North-Eastern India, particularly those covered by the Sixth Schedule[5] have a large proportion of Scheduled Tribes but many also have much better human development indicators. Often the better indicators in these states raise average human development outcomes, so a state-wise disaggregation becomes really important.

The contribution of this paper lies in the fact that it disaggregates childhood mortality into neonatal, post-neonatal, infant and child mortality and analyzes the correlates of each. Most analyses have lumped child mortality[6] into "under-five" mortality or have analyzed only infant

[3] India Poverty Assessment Report and India Social Exclusion Report (forthcoming, 2010). We also draw heavily from the India chapter (Das, Hall, Kapoor and Nikitin, 2010) of a forthcoming volume on indigenous people (Hall and Patrinos, eds, 2010)

[4] http://www.tribal.nic.in/index1.html

[5] Assam, Meghalaya, Tripura and Mizoram

[6] Mortality indicators are in 'deaths per 1000 births'. Neonatal mortality (NN)- probability of dying in the first month of life; Post-neonatal mortality (PNN) - probability of dying after the first month of life, but before the first birthday;

mortality rates. While there is usually merit in undertaking such analyses, we show that for mortality rates of ST children, the disaggregation is even more instructive. We focus on the magnitude of age specific differences, the trends over time and the major explanatory factors invoked to explain these differences.

Data and Methods: As pointed out earlier, this paper is part of ongoing work on poverty and social exclusion and we use some of the analysis undertaken previously from the National Sample Survey 61st Round (2004-05). But for the bulk of the analysis we rely on data from three rounds of the National Family and Health Survey (1992, 1998 and 2005). Outcomes of course vary by states and it is essential to keep that caveat in mind. Again, not in all states are STs the worst off. The Scheduled Castes fare worse in some of the Northern states. Also, aggregate data do not let us analyze outcomes below the state level. It is well known for instance that there is substantial diversity among Scheduled Tribes even within states. This heterogeneity is known more through anthropological and other qualitative studies. While extremely compelling, such studies have lacked statistical precision or have generated results that are limited to one tribe, village or state and which cannot be generalized.

We use a variety of statistical methods to take a closer look at patterns of child mortality for tribal and non-tribal children. Most of the results reported here are for rural areas, since that is where the majority of tribals reside and where the majority of child deaths take place. In addition, we show elsewhere that tribals who live in urban areas have a different socioeconomic profile than those in rural areas (see Das, Hall, Kapoor and Nikitin, 2010).

Our paper attempts to provide a comprehensive and nationally representative picture of age-specific child mortality differentials by tribal status. In addition we try and separate out the trends in mortality of children as well. Finally, we also report the correlates of mortality at different ages, after controlling for a range of maternal and household characteristics. While we build on the vast academic and activist literature on tribals, this is by no means a complete review or a comprehensive analysis of all issues involved.

1. CHILD MORTALITY DIFFERENTIALS

India's child health indicators have shown considerable improvement between 1992 and 2005, as indicated in the National Family and Health Surveys (NFHS). Infant mortality has declined from 78 to 57 deaths per 1000 live births and under-five mortality from 109 to 74 deaths per 1000 live births. However under-five mortality levels among tribal children remain startlingly high (at 96 deaths per 1000 live births). This section documents some patterns in tribal childhood mortality in comparison with other groups in India.

Scheduled Tribes make up 8 to 9 percent of the population, but account for about 14 percent of all under-five deaths, and 23 percent of deaths in the 1-4 age group in rural areas. Since the majority of deaths among tribal children are concentrated in the 1-4 age group (see Figure 1), in this age group, tribal deaths account for almost - a quarter of all deaths. For all

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Infant mortality ($1q_o$)- probability of dying before the first birthday; Child mortality ($4q_1$) - probability of dying between the first and fifth birthdays; and, under-5 mortality ($5q_o$)- probability of dying before the fifth birthday.

other social groups, the representation of deaths is proportionate to the representation of that group in the population. For example, Dalits account for about 22-24% of the population, and child deaths among them contribute to overall child mortality rates in roughly the same proportion.

Table 1: Child deaths over the five years prior to the survey by social group, **rural** areas only

Ethnicity	Percent of Child deaths (1-5 years)	Percent of Under 5 deaths
SC	28.1	24.6
ST	23.0	13.9
OBC	35.5	39.6
Other	13.4	21.9
Total	100	100
N obs	281	1,984

Source: NFHS 2005

Tribal children start on par with others but fall well behind by the time they are five. Studies in other parts of the world also disaggregate mortality outcomes by race or ethnicity. Heaton and Amoateng (2007) for instance document child mortality/survival rates for different ethnic groups in South Africa and find white children to have clearly the highest rates of survival. Gaps in mortality between black and white South African children tend to start from early ages and widen as the children grow older. The pattern of the mortality gap between Scheduled Tribes and non-Scheduled Tribes in India is curiously different, in that the former start on par with their non-tribal counterparts, but rapidly are disadvantaged by the time they are five years old. This divergence is all the more striking when compared with Scheduled Caste children who also face disadvantages. From the neonatal to the infant period, ST children in rural areas have lower chance of dying than SC children. But between the ages of 1-4, they start to lag behind registering much higher child mortality than SC children (see figure 1).

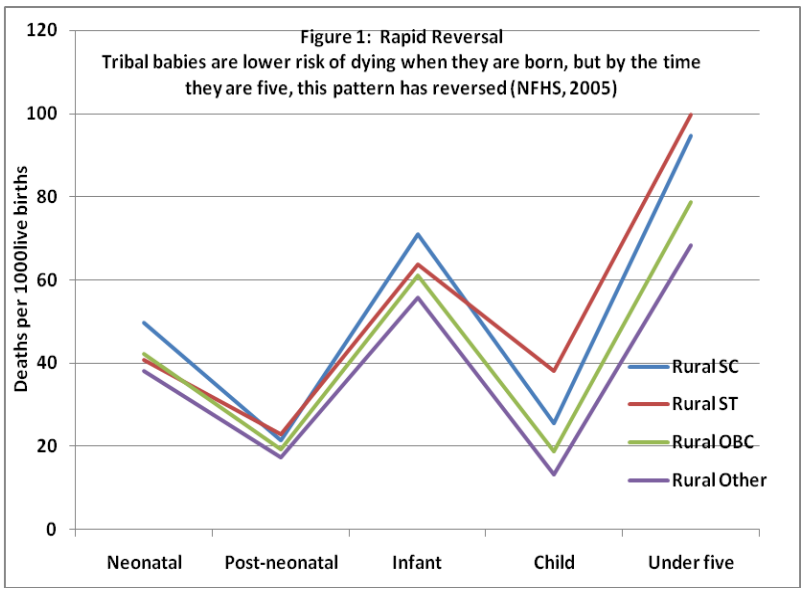


Table 2 shows the diverging hazard functions for STs and non-STs. During the first year, STs' and non-ST's probabilities of survival do not differ significantly i.e. there is no significant difference in their infant mortality rates (IMRs). But during the second year the gap between the Adivasi and non-Adivasi children's chances of dying widens and becomes statistically significant.

Table 2: ST-Non-ST gap in relative hazard rate

	Neonatal	Post-neonatal	Infant	Child	Under-5
Relative hazard rate					
Non-ST	1.01	0.98	0.99	0.92	0.98
ST	0.96	1.17	1.06	2.25	1.26
Test of significance of difference					
Wald chi2(1)	1.69	1.85	0.78	36.77	16.44
Pr>chi2	0.194	0.174	0.378	0.000	0.000

Source: Authors' calculations based on NFHS 2005-2006.

The initial parity in mortality outcomes between Adivasi children and others is perhaps related to the cultural and environmental practices, including birth spacing, feeding and weaning that the former follow (Maharatna 1998; 2000). These sustainable practices also seem to help when access to formal medical care for children and their mothers is difficult and/or costly. It is as the tribal child grows up and is weaned – particularly in the age 1-5 years – that she or he is substantially more at risk than children from other categories. This is also the age when perhaps formal medical care (e.g. proper and timely treatment of diarrhea and acute respiratory infections) is critical and reliance on traditional mechanisms alone does not work. And it is here that the chasm between the tribals and the rest begins to appear and widen.

Not all regions and tribes have the same patterns of diverging mortality rates between tribal and non-tribal children with increasing age. Some studies report a higher infant mortality rate for tribal groups, while others show a distinct advantage over the non-tribal population in the same location (Maharatna 2005). For instance, a survey in Panchmahals district of Gujarat, the results of which were published in 1992 (Gujral et al, 1992) showed inordinately high rates of infant mortality for tribals, with the tribal/non-tribal differential declining with increasing age. While in the aggregate sex ratios of tribal children are better than those for non-tribals, this study found the reverse to be true for Panchmahals.

If you control for poverty, does the "tribal effect" on mortality go away? The answer is no! Our multivariate results – presented in Annex 1 – are in keeping with the trends described earlier. We find that even in the presence of controls, the disparity between ST and non-STs in terms of mortality rates is robust at older ages (1-4 and under five). During the neonatal, post-neonatal, and infant periods, ST and non-ST children have more or less similar odds of dying. *Yet between the age of one and four and overall under age five, mortality trends among the tribal and non-tribal children diverge: ST children face much higher (more than two times higher) odds of dying than general caste children.*

This finding is striking for a variety of reasons. As pointed out earlier, most analysis lumps all under five mortality together and finds that poverty status explains most of the differential in mortality for SCs and STs (in comparison with other social groups). A World Bank study in

Orissa for instance, finds that while child and infant mortality rates (IMRs) are higher among the Scheduled Tribes, these are largely a function of poverty (lower levels of income and assets), low levels of education, and poor access/utilization of health services (World Bank 2007). This is confirmed more recently by Sharma et al (2009) whose analysis of the NFHS data for Orissa shows significant disparity in neo-natal, infant and under-five mortality rates in the state by tribal status, wealth and education groups. The authors find that the lowest and the second lowest wealth quintiles (based on an asset index) experience the highest under-5 mortality (119 and 97 deaths respectively, compared to 66 and 28 deaths among children of families belonging to the top two quintiles). In other words, children from the poorest households are four times as likely to die before their fifth birthday compared to children in the richest quintile. Finally, our own multivariate analysis using the RCH II data also found that the effect of tribal (and Dalit) status disappeared once we controlled for wealth quintile (World Bank, 2006).

In sum, the conventional narrative is that higher mortality of tribal children is explained by their poverty status. Our analysis finds that *even after controlling for wealth*, tribal children have a higher likelihood of dying than their non-tribal peers between ages one to five. This comes through because we disaggregate under-five mortality into its age-specific constituent parts. This finding has significant policy relevance because it means that more than socio-economic status, the problem of high child mortality is explained by its concentration in tribal groups. Addressing poverty alone therefore may not help. Unless interventions reach these groups, India may not be able to meet its goal of reducing child mortality by two-thirds by 2015.

While there has been improvement for all children over the last decade or more, yet child mortality rates for tribals in rural areas have nearly stagnated. In Table 3 we look at changes in childhood mortality rates for different birth cohorts (by caste/tribe status). We compare mortality rates of children born in 2001-2005 (0-4 year-olds at the time of fielding NFHS-3 survey) with those of children born in 1991-1995 (the 10-14 years age cohort at the time of fielding NFHS-3). The table reveals several interesting stylized facts.

First, it suggests that neonatal, post-neonatal, and infant mortality rates declined for children from all groups. In fact Scheduled Tribes – especially in urban areas – experienced the most dramatic reductions (in the 30 to 60 percent range) with respect to these mortality measures. Similarly, neonatal, post-neonatal, and infant mortality levels among Scheduled Castes dropped considerably (reduction rates ranging from 11 to 21 percent). Driven by improvements in children's survival to first birthday, under-five mortality rates also declined for all groups.

However, for STs and SCs (particularly STs in rural areas and SCs in urban areas) change in child mortality has not kept pace with improvements on the other four mortality indicators. In fact, child mortality *increased* among the Scheduled Caste children in urban areas: an SC child in a city or a town had a higher probability of dying between her first and fifth birthdays than she did in 1991-95. Notably, in rural areas, child mortality among Scheduled Castes declined by over one-third.

While there was no increase in child mortality among Scheduled Tribes in general, there was a stagnation in child mortality rates among ST children in rural areas. While significant declines (44 percent) were recorded in child mortality rates for tribal children in urban areas, this needs to

be qualified with the absolute number that live in cities and towns since a majority of the tribal population is concentrated in remote rural villages. Stagnation in child mortality among the urban SCs and rural STs despite the state's focused attempts to reduce it, bears grim news. Unlike the child's first year, mortality among 1 to 4 year-olds in these groups has not responded to policy interventions, perhaps due to a wider range of socio-economic factors impacting survival at this stage. Few studies document the need to differentiate between age-specific childhood mortality and those that do are limited in their scope to only a few specific tribes (for instance see Kapoor and Kshatriya 2000)[7]. This re-emphasizes the need to shift attention from infant mortality to child mortality as an indicator of tribal deprivation and tailor policy responses accordingly.

Table 3. Early childhood mortality rates by residence and ethnicity for different cohorts, 2005
Number of deaths per 1000 live births

	Birth cohort*: 0 to 4			Birth cohort: 10 to 14			Change (t2/t1-1), %		
	Overall	Rural	Urban	Overall	Rural	Urban	Overall	Rural	Urban
Neonatal mortality									
Scheduled castes	42.9	46.4	31.1	55.4	62.2	35.0	-23	-25	-11
Scheduled tribes	41.9	43.3	28.3	66.5	68.3	45.8	-37	-37	-38
Other backward class	38.4	42.1	26.8	53.9	60.0	36.1	-29	-30	-26
Other	35.2	38.9	28.2	40.5	45.9	30.8	-13	-15	-8
Post-neonatal mortality									
Scheduled castes	20.8	22.7	14.3	26.2	29.0	18.0	-21	-22	-21
Scheduled tribes	21.8	22.7	13.3	33.3	33.1	34.5	-35	-31	-61
Other backward class	17.2	17.6	15.5	24.9	26.4	20.8	-31	-33	-25
Other	15.2	18.5	9.0	20.5	24.6	13.5	-26	-25	-33
Infant mortality									
Scheduled castes	63.7	69.1	45.4	81.6	91.2	53.0	-22	-24	-14
Scheduled tribes	63.7	66.0	41.6	99.8	101.4	80.3	-36	-35	-48
Other backward class	55.6	59.7	42.3	78.8	86.4	56.9	-29	-31	-26
Other	50.4	57.4	37.2	61.0	70.5	44.3	-17	-19	-16
Child mortality									
Scheduled castes	23.6	24.5	20.6	33.4	37.9	19.9	-29	-35	4
Scheduled tribes	37.9	40.2	16.4	39.4	40.3	29.5	-4	0	-44
Other backward class	15.2	18.1	6.5	23.6	26.9	14.2	-36	-33	-54
Other	9.3	10.9	6.2	18.2	22.1	11.2	-49	-51	-45
Under-five mortality									
Scheduled castes	87.3	93.6	66.0	115.0	129.1	72.9	-24	-27	-9
Scheduled tribes	101.6	106.2	58.0	139.2	141.7	109.8	-27	-25	-47
Other backward class	70.8	77.8	48.8	102.4	113.3	71.1	-31	-31	-31
Other	59.7	68.3	43.4	79.2	92.6	55.5	-25	-26	-22

Notes: * Birth cohort expressed in years preceding the survey; *Source*: NFHS-3

Most states with larger tribal populations also have higher child mortality rates. While child mortality among STs is high (over 37 deaths per 1000 births for the cohort of children born in 2001-05), the numbers differ considerably across states. Table 4 examines the geographic distribution of mortality rates among STs in India. Considering only states where STs account for 9 or more percent of the state's population (at or above their share in the national population), we find that there is significant state-level variation in STs' childhood mortality (from 8 deaths

[7] Kapoor and Kshatriya (2000) compute selection potential based on differential fertility and mortality rates for six tribal groups in India: Sahariya, Mina and Bhil of Rajasthan; and Munda, Santal and Lodha of West Bengal. They find that childhood mortality constitutes the bulk of postnatal mortality for all these tribal groups.

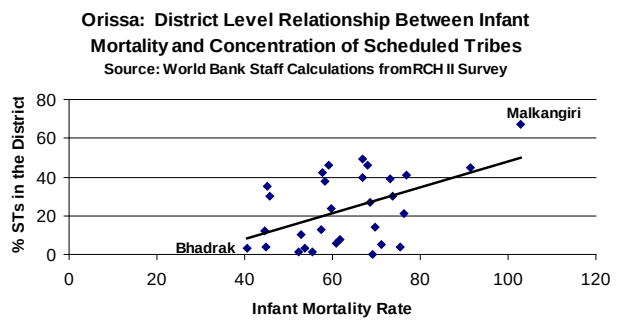
per 1000 in Sikkim to 43 in Jharkhand)[8]. Four states –Jharkhand, Madhya Pradesh, Rajasthan and Orissa – register child mortality greater than 39 per 1000 live births. However, these are also states that are inhabited by a large number of STs[9].

Table 4. Child mortality rates among Scheduled Tribes by state, 2005

	Neonatal	Post-neonatal	Infant	**Childhood**	Under-five
Rajasthan	24	19.3	43.3	**40**	83.3
Sikkim	11.7	25.3	37	7.7	44.7
Arunachal Pradesh	32.4	23.9	56.3	26	82.3
Nagaland	12.7	18.8	31.5	17.3	48.8
Manipur	33.6	22	55.6	9.3	64.9
Mizoram	15.6	16.7	32.3	23.8	56.1
Tripura	23.8	40.1	63.9	11.6	75.5
Meghalaya	24.9	21.5	46.4	14.6	61
Assam	35.6	13	48.6	34.5	83.1
Jharkhand	52.1	25.3	77.4	**43**	120.4
Orissa	52.2	28	80.2	**39.2**	119.4
Chhattisgarh	44	22.8	66.8	30.8	97.6
Madhya Pradesh	50.2	25.2	75.4	**41.6**	117
Gujarat	29.5	38.8	68.3	28.5	96.8
Maharashtra	47	8.8	55.8	30.7	86.5

Notes: Only states with 9 percent ST population; calculations based on NFHS-3 for the cohort 0-4 years old

Figure 2



These high levels of child mortality in states with larger tribal populations also bear out at the district level. Analyzing the health status of different social groups in Orissa, the World Bank (2006) for instance found that infant mortality is directly proportional to the proportion of Scheduled Tribes in the district (Figure 2).

2. WHAT EXPLAINS THESE PATTERNS?[10]

[8] While the authors have made every attempt to match the mortality numbers in Table 4 with published numbers, it has not always been possible because DHS implemented a proprietary code to compute their mortality rates. For their calculations, the authors of this paper relied on the ltable command in Stata, using matching interval int(0,1,3,6,12,24,36,48,60), as suggested by the DHS methodology guide (Rutstein and Rojas, 2006). This approach is also recommended in O'Donnel et al (2008). Beyond deriving matching statistics, relying on DHS's methodology does not offer any additional benefits since there are a number of other reliable techniques for calculating mortality rates. In fact, moving beyond descriptive analysis of mortality requires shifting away from DHS's methodology altogether in favour of survival estimation based on the Kaplan-Meier method used in stcox regressions in Stata.

[9] The states of Jharkhand, Madhya Pradesh, Rajasthan, Orissa and Maharashtra together account for 58 percent of the ST population in India.

[10] The sections on access to helath for Adivasis draws heavily from Das et al (2010)

Demographic literature in India and elsewhere is quite consistent on the correlates of child mortality[11]. At the individual level, the health of the child (or risk to death) is influenced to a great extent by factors related to the mother: her education, her situation prior to and post the pregnancy, the care received before, during and after the pregnancy, location of birth, birth order, and the care received by the child during the first few years of his or her life. The education of the mother for instance is known to have a strong, positive impact on children's health as well as the mothers' ability to access and use health care services such as ante-natal care (Caldwell 1986; Caldwell and Macdonald 1982; Levine et al 1991; Sastry 1997; Measham et al 1999; Madise et al 1999; Ramalingaswami et al. 1997; Gragnolati et al 2006; Nair 2007; Virmani 2007; Gaiha et al 2009). Not only are educated women likely to earn more, thereby improving living conditions for the child at home, they are also likely to assert more control over household resources and spend for their children (Caldwell 1993). Educated mothers and those with access to media are also more likely to take their children to health centers when ill and regulate their own reproductive behavior (Castro Martin and Juarez, 1995; Cleland and Van Ginneken, 1988).

However, given that the mother lives within the domain of a household, the situation of the household and the norms and practices followed within are also likely to have an effect on the mother's and the child's health. Among the more obvious factors is the household's socioeconomic status which influences its ability to provide better health care for its children and other amenities which affect health (e.g. food with adequate nutrients, proper clothing, clean tap water, clean sanitary conditions) (Aber et al 1997, Defo 1997, Barrett and Browne 1996).

Besides the household, overall contextual influences (availability of and access to local infrastructure and services) play an important role as well. Table 5 summarizes from the literature several possible correlates by level of analysis and level of potential interventions. We then look at some of these indicators and how they relate to the health of tribal children to arrive at an understanding of the patterns described above.

[11] See, for example, Pandey, Cheo, Luther, Sahu and Chand (1998), Rozenzweig and Schultz (1982), Murthi, Guio and Dreze (1996), Hughes, Lvovsky and Dunleavy (2001), Jalan and Ravallion (2003), Mishra and Retherford (1997), and Wagstaff and Claeson (2004).

Table 5: Conceptual Framework – Correlates of Child Mortality[12]

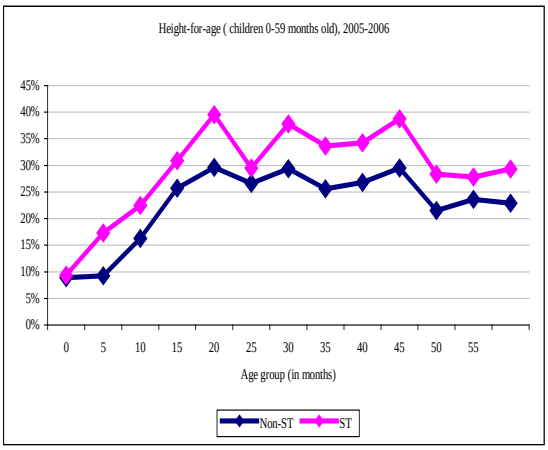
Domain of Variables	Factors to consider
A. Individual	Parents' education (particularly mother's education); mother's age at first pregnancy; birth order; birth spacing or birth interval; mother's nutrition and health status (measured through indicators like the body mass index); use of pre-natal, ante-natal and post-natal services (whether received tetanus injections/iron supplements during pregnancy); care during the first few years of life (immunization, breast feeding, incidence of disease, prevention and treatment of illness); location of last birth and whether attended by doctor/trained mid-wife
B. Women's agency	Knowledge and use of modern contraceptives and feeding and childcare practices; women's access to media (through radio, television or newspaper readership); ability to go to health facilities alone
C. Household	Household resources (assets, income, savings, availability of food); type of housing; availability of clean drinking water; sanitation; intra-household distribution of resources (especially food) by gender and age; household behaviors (migration, attitudes to pregnancy, child bearing and norms about seeking "modern" health care etc)
D. Community	Access to infrastructure (roads, water, sanitation, electricity); transport (public/private); financial services; education and training; community institutions; gender and socio-cultural norms; community attitudes to pregnancy, child bearing and seeking "modern" health care
E. Service Provision	Availability of and access to health facilities; staffing; quality of service; availability of medicines/drugs, blood, etc; (formal and informal) cost of using service; availability of and access to large public assistance programs (e.g. ICDS)
F. Voice and participation	Access to information, participation in local governance (gram sabhas), ability to seek redress to grievances against service providers.

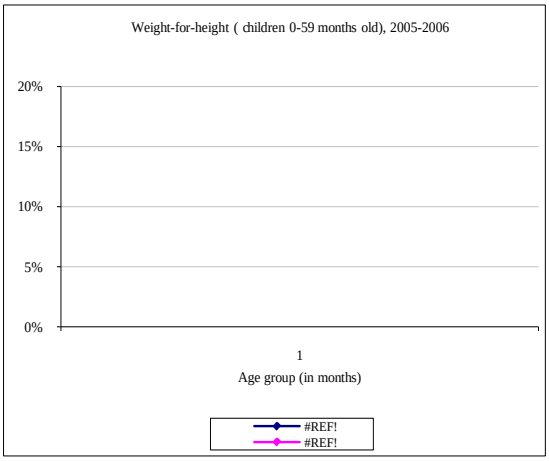
Tribal children are at much greater risk of malnutrition. Malnutrition in India is widespread, with 48 percent of Indian children showing signs of long-term malnutrition (i.e. stunting, a deficit in height-for-age), 24 percent of severe stunting and 42 percent of being under-weight[13]. Even worse than the population averages are outcomes for tribal children, among whom 53 percent are stunted, 29 percent are severely stunted and 55 percent are under-weight. The gap between the Adivasi children and those from other groups appears within the first 10 months of birth and persists – with some variation throughout early childhood. The rise in severe wasting among ST children during the first 10 months of life is particularly alarming (Figure 3).

[12] Adapted from World Bank (2006) *Achieving the MDGs in India's Poor States: Reducing Child Mortality in Orissa and* from extant demographic literature on child mortality.

[13] Malnutrition is usually measured along three dimensions: stunting (deficit in height-for-age), wasting (deficit in weight-for-height), and under-weight (deficit in weight-for-age). Stunting reflects long-term effects of malnutrition; while wasting measures the current nutritional status of the subject, i.e. his/her food intake immediately prior to the survey. The 'under-weight' indicator is a combination of the former two and captures both long-term and short-term effects of deficient food intake. A child is considered to be malnourished with respect to each of these measures, if his/her indicator falls below -2 standard deviations from the median (defined for 2006 WHO international reference population). Falling below -3 standard deviations signals severe malnutrition.

Figure 3: More Scheduled Tribe children are severely stunted and wasted within the first 10 months of their birth





Source: Das et al, 2010 based on NFHS

One argument for entrenched malnutrition among the ranks of the tribals could simply be poverty. However, while an important cause of both malnutrition and higher incidence of deaths among tribal children, poverty is clearly not the only cause. Malnutrition in India is not just a problem of the poor: even among children of well-off households (i.e. wealthier in terms of assets, more educated), 22 percent are stunted (Tarozzi 2007).

At the same time, malnutrition is much higher in states with larger tribal populations. Even within states, much of the underweight children are concentrated in relatively small number of districts. A mere 10 percent of villages and districts account for 27-28 percent of all underweight children in the country, and a quarter of districts and villages account for more than half of all underweight children (World Bank 2004). Most of these are remote, tribal districts and/or villages.

Child deaths on account of malnutrition and hunger have led to frequent public outcry. Public interest law suits have been filed on behalf of families that lost their children[14], and state governments have been repeatedly directed by the courts to take remedial action. Governments have undoubtedly become more vigilant on this issue than they were before, but solutions are still ad hoc and in crisis-mode. For instance, during an emergency large numbers of medical personnel are deployed to the vulnerable areas, but normally absenteeism of doctors is endemic in rural and especially tribal areas. Additionally, poor registration of births and deaths has meant frequent haggling over the real numbers of deaths/children affected.

> Defining a "hunger-related death" is not easy. Those who are severely malnourished tend to contract disease quite easily. When they succumb, the cause can always be attributed to the specific disease - rather than the hunger that brought about the collapse of the victim's resistance.

[14] See for instance, Sheela Barse v/s State of Maharashtra 1993

P. Sainath, The Hindu, March 18, 2001

Are tribal children more likely to get sick as they get older and so more of them die? All-India data indicate that tribal babies are *not more likely to get sick* from diarrhea or respiratory disease, but are much *less likely to get treated* than other children. Figure 4 shows that disparities remained in treatment of illness for tribal children 3 years of age and below, compared to other children, although the incidence of disease varied only slightly. The gap was more acute in the treatment of acute respiratory infections (ARIs). Over 41 percent of ST children received no treatment for fever or cough as opposed to only 27 percent SC, 28 percent OBC and 25 percent of children from other castes. In the case of treatment of diarrhoea, both OBC and ST children were less likely to receive any treatment, but here again incidence of diarrhoea is roughly the same across social groups. Clearly, therefore the major story in the health and mortality of tribal children is not so much that they get sick more often, but that they get treatment less often.

Figure 4. Tribal children are less likely to fall sick from fever/cough, but are also much less likely to be treated if they are sick

Source: NFHS-3

Vaccine preventable diseases and other (mainly water borne and vector borne) diseases are an important proximate cause of mortality for all children. There has been an overall improvement in immunization coverage in India, but this section documents the fact that while improvements have been larger in magnitude for tribals, absolute proportions are still low and gaps between tribal and non-tribal children remain high, especially in rural areas.

We measure immunization coverage using two indicators - *breadth* of coverage (percentage receiving any basic vaccination) and *intensity* or *quality* of coverage (percentage receiving all basic vaccinations). Our analysis using the NFHS data suggests that both indicators registered substantial improvement between 1992 and 2005, especially among Scheduled Tribes, thus narrowing the differential between tribal and non-tribal populations (Table 6). At the all-India level, of the 12-23 months olds born to ever married women in the age group 15-49 years, the proportion that received any of the basic vaccines expanded from 71 to 95 percent (a 34 percent increase). The corresponding increase for Scheduled Tribe children was 53 percent - from 58 to

89 percent. The intensity of coverage expanded more slowly - 22 percent for all India and 30 percent for Scheduled Tribes[15]. The improvement was slower in rural areas where most of the tribal groups are concentrated. This expanded coverage of immunization is perhaps responsible for the fact that tribal children are at similar risk as other babies of getting sick from certain causes.

Table 6. While breadth of immunization coverage (% children receiving *any* basic vaccination) improved for ST children, intensity of coverage (% children receiving *all* basic vaccinations) expanded more slowly

	Urban			Rural			Overall		
	ST	Other	Total	ST	Other	Total	ST	Other	Total
All basic** vaccinations, % (Intensity)									
1992-93	36	51	51	24	32	31	25	37	35
1998-99	43	57	57	22	39	37	25	43	41
2005-06	52	58	58	30	40	39	32	45	44
Change 1993-2006, %	*45*	*13*	*13*	*27*	*25*	*25*	*30*	*22*	*23*
Any of the basic** vaccinations, % (Breadth)									
1992-93	79	84	84	56	67	66	58	71	70
1998-99	85	95	95	75	86	85	76	88	87
2005-06	94	97	97	89	95	94	89	95	95
Change 1993-2006, %	*19*	*15*	*15*	*57*	*41*	*43*	*53*	*34*	*35*

Source: NFHS

* Children 12 to 23 months old born to ever married women, 15 to 49 years old.

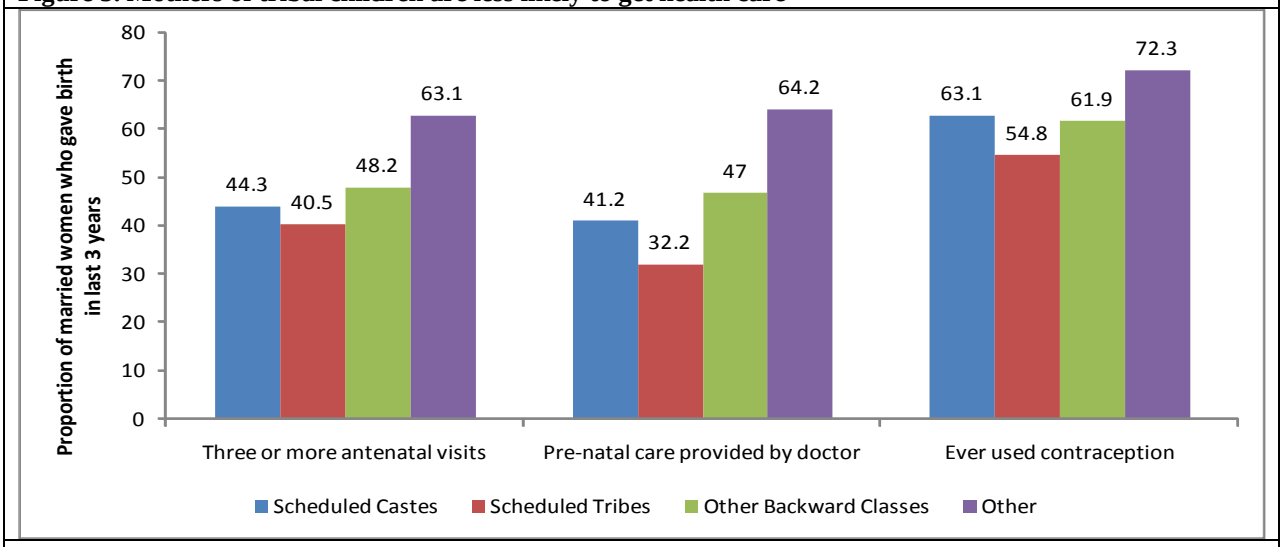
** Basic vaccinations include three rounds of Polio 1-3 and DPT 1-3, BCG, Measles.

Mothers of tribal children are much less likely to get health care and perhaps this affects the care of their children. While improvements for tribal women occurred at a faster pace than those for other women, the low base from which the former started has driven their faster progress. Moreover, gaps between tribal and other women on a range of indicators related to access to maternal health care continue to be wide (figure5). For instance, the proportion of tribal women going for ante-natal visits or using contraception remained lower than the population average or the average for women belonging to other social groups. Overall, almost 60 percent of all women and 80 percent of tribal women give birth at home.

The comparisons with SC and OBC women are particularly instructive. Fifty-five percent of tribal women in the 2005 NFHS reported having ever used contraception compared to 63 percent of SCs and 62 percent of OBCs and the all-India figure of 65 percent (see figure 5). In comparison to SCs and OBCs, a relatively smaller proportion of ST women reported three or more ante-natal visits (40 percent compared to 44 percent for SC women and 48 percent for women from the OBC group). Women belonging to Scheduled Tribes also remained less likely to receive pre-natal care from doctors. Only one-third received such care in 2005 as compared to the population average of 49 percent. Worse, the proportion of ST women to have received such care actually declined marginally from 1998 levels (from 35 percent to 32 percent).

[15] This is not surprising given that improvements in intensity of coverage are considerably more difficult to bring about, insofar as they are more costly and require a more coordinated immunization policy.

Figure 5. Mothers of tribal children are less likely to get health care



Source: NFHS-3

Medical practitioners and others often cite the reasons for poor outcomes for women as being "lack of demand" or "ignorance". Nagda (2004) for instance attributes poor health outcomes to the reluctance of tribal women to accept modern treatment. Using his research from Rajasthan he elaborates how about 86 percent of tribal deliveries in the state are performed at home and over three-fourths are conducted by untrained *dais* or other personnel largely because acceptance of antenatal care is "not necessary or customary" in tribal societies. Rather, the decision about the nature of treatment is taken at the community level (mostly by traditional healers known as *Bhopas*) based on traditional health care systems and a deep understanding and observation of nature.

However, low demand for health or nutrition services is often disguised as demand for public employment, food security and access to roads. And what is the extent to which quality of health services, attitude of medical providers and issues of trust influence demand? There is a deep rooted cultural chasm and mistrust between the largely non-tribal health providers and the tribal residents, with several reports of the former treating the tribal patients with little dignity, if any (Bharat et al 2003, Pallavi 2004). These stereotypes of tribal peoples are not peculiar to India. Colloredo-Mansfeld (1998) for instance documents the "pernicious images of disease, irrationality, and "dirty Indians" used by White-mestizos to characterize Ecuador's indigenous population and to explain the latter's poverty (Colloredo-Mansfeld, 1998: 186).

Access to health facilities is much poorer for tribals and their children seem to succumb to this lacuna. One of the key issues in tribal areas is poor physical access of tribal communities to health facilities. In most states in India, Scheduled Tribes are physically isolated, concentrated in certain regions and districts and in hilly and forested areas that make communication and access to services difficult even in normal circumstances. Poor coverage of all weather roads makes transportation in emergencies virtually impossible, even if health centers were attended by medical personnel. A longitudinal study in the tribal dominated Bolangir district in Orissa found for instance that villagers took a young child to the hospital only when his or her condition was critical given difficulty with transport (poor road condition) and the expenditure associated with

hiring a vehicle. They also identified "giving birth" as a risk because mothers could not reach health centers due to inadequate road access, particularly during the rainy season (Van Dillen 2006).

While distance to health facilities in tribal pockets is an issue, a larger problem is of absenteeism of service providers. High absenteeism in turn is attributed to postings in tribal areas being perceived, generally, as 'punishment postings' that are assigned to the non-performers. Some frontline workers resign even before attending their first training; yet others continue to draw salary despite not visiting the Anganwadi or primary health center (PHC) for years altogether.

Migration of tribals during the lean season to cities and towns makes the task of health surveillance for antenatal care or immunization or growth monitoring of children even more difficult. For a family that is displaced often, getting their child immunized is no longer a priority. Finally, while administrators realize the value of recruiting local residents as field level medical personnel, it is often impossible to find even secondary educated tribal women who can fill the positions of nurses or female health workers. As a result the positions either remain vacant or are filled by non-tribal, non-resident providers.

Poor health outcomes for tribals and their children need to be read against a context of their increasing alienation from traditional livelihoods, land and socio-cultural practices. Mortality outcomes for tribal children in India cannot be analyzed in a contextual vacuum. Instead, they need to be looked at in the light of larger changes experienced by Scheduled Tribes as a people, more so in the past two or three decades. Changes in livelihood patterns and in socio-cultural practices as tribals enter the mainstream – all have an effect on tribal health indicators.

The relationship of tribals to land is beyond that of subsistence cultivation and extends to the use of forest products and their dependence on natural resources for a livelihood. This is evident given that about 60 percent of India's forest cover lies in the 187 tribal districts covered by the Fifth and Sixth Schedules of the Constitution (Forest Survey of India Report, 2003). Estimates from Orissa indicate that one half to over one-fifth of annual income of tribal households comes from Non-Timber Forest Products (NTFPs). Many NTFPs (e.g. kendu leaves) are of high value and are prone to commercial exploitation. Their sale is usually governed by a complex set of rules and regulations and tribal rights activists allege that the state and middlemen work towards keeping the tribals' share of the profits low. While there have been efforts to devolve the procurement and marketing of NTFPs to *gram sabhas*[16], the lack of capacity of *gram sabhas* in these areas has meant that middlemen may have benefited more than tribal people.

In addition to their tenuous hold over NTFPs, the Scheduled Tribes in India have also been gradually losing access to their traditional lands – a process that is referred to as alienation. The largest form of alienation from traditional land has taken place due to state acquisition of land for development. The 10th 5-Year Plan notes that between 1951 and 1990, 21.3 million people were displaced, of which 40 percent, or 8.5 million, were tribal people (Burra, 2008). Activists argue that such alienation and destruction of traditional livelihoods is the single largest factor

[16] Orissa for instance has devolved the procurement and marketing of 69 NTFPs; the Gram Sabha is a village assembly of which each resident of the village is a member

explaining poor health outcomes including high mortality and morbidity of children among tribals.

Large scale public assistance programs aim at tribal welfare, but they are limited in their reach. While there are several policies in place to secure the rights of tribals to their land, natural resources and livelihoods and improve their health and nutrition outcomes; gaps still remain. Take the case of India's primary policy response to addressing child malnutrition and related morbidity –the Integrated Child Development Services (ICDS) program[17]. The scheme has expanded rapidly over the past 30 years, so much so that more than 80 percent of households in Schedule V states like Orissa have an ICDS centre in the village (World Bank 2007). Yet several centers remain non-functional with poor attendance of personnel. A World Bank review of the ICDS/Supplementary Nutrition program in Orissa found a 30 percent absenteeism rate among Anganwadi workers (World Bank 2007).

Yet another criticism of the ICDS program is its inadequate reach among vulnerable groups, particularly poor tribal households. Other limitations include the scheme's focus on the 3-6 year age group with insufficient attention to the nutritional outcomes and health of children in the critical cohort of 0-3 – a time when the gap between mortality rates of tribal and non-tribal children starts rising. Anganwadis face operational challenges (few workers, limited equipment) and end up trying to provide nutrition services to all children under six at the risk of losing focus on children under three—the window of opportunity for addressing child malnutrition (Gragnolati et al 2006). Finally, design features of the program set by the central government also limit states' ability to implement it. In a recent field visit to Orissa, one of the authors was told how ICDS centers in the state were unable to procure pulses for the nutrient mix since they could not raise procurement prices otherwise set by the central government. These issues of targeting and program performance have been in the policy debate for several years, but monitoring, gaps in targeting and political interference remain significant roadblocks.

In spite of the inequitable distribution and the many political and institutional challenges, there are examples of successes to address the issue of child health in tribal areas in a cohesive manner. The answer lies to a large part in local action and local accountability. For instance, when local level officers have been held accountable for child mortality, as a preventive step (most often when a neighboring district has had a crisis, or a district officer has taken personal interest) then the entire district machinery has been galvanized into action.

The best known interventions have been non-governmental and while extremely important, they are often so small and resource intensive, that scaling up becomes the real challenge, and when attempted, it fails, making the problem seem more intractable than it is. SEARCH in the remote tribal areas of Gadchiroli (Maharashtra) is an international success story in maternal and neonatal health. The program trains ordinary villagers to be midwives and take care of infants in the absence of doctors. Estimates suggest that the intervention has resulted in a decline in the infant

[17] Initiated in 1975, the ICDS aims to improve the nutritional and health status of vulnerable groups including pre-school children, pregnant women and nursing mothers. Specifically, its goals are to reduce the incidence of mortality, morbidity, malnutrition and school drop-out. The scheme provides a package of services including supplementary nutrition, pre-school education, immunization, health check-up, referral services and nutrition and health education.

mortality rate in Gadchiroli from 121 per 1000 live births in 1998 to only 30 by the year 2000 (Goswami 2003). It is true that the per unit cost of SEARCH is high, but this is to be expected when the intensity of interventions and the remoteness are taken into account. Interventions made by local governments (district officers and *Zilla Parishads*) on the other hand, are large enough in scale that they can be replicated, but the impact of these still need to be documented, evaluated and built upon.

CONCLUSION

This paper attempts to disaggregate childhood mortality by age and by social group membership and analyzes the correlates for each. Our analysis leads to three results that are of policy relevance.

First, we point out that a disproportionately high number of child deaths are concentrated among Adivasis especially in the 1-5 age group and in those states and districts where there is a high concentration of Adivasis. Since the gap between tribal and non-tribal children's mortality outcomes is so high, the slow pace of improvement in India's child mortality MDG is driven to a large extent by tribal mortality. Any effort to reduce child morality in the aggregate will now have to focus more squarely on lowering mortality among the Adivasis.

Second, the gap in mortality between tribal children and the rest really appears after the age of one. In fact before the age of one, tribal children face more or less similar odds of dying as other children. However, these odds significantly reverse later. This calls for a shift in attention from infant mortality or in general under-five mortality to factors that cause a wedge between tribal children and the rest between the ages of one and five.

Third, our analysis goes contrary to the conventional narrative of poverty being the primary factor driving differences between mortality outcomes. Instead we find that upon breaking down child mortality by age, we come to a much more refined picture. Tribal status then is significant even after controlling for wealth.

While heterogeneity is of essence, and what is true for one state or tribe is not true for another, our analysis indicates a significant gap between ST and non ST children and their mothers across the board. Notwithstanding gains in immunization, child treatment and maternal health outcomes, in absolute levels the Scheduled Tribes fare the worst when compared to other categories. Tribal children though as (or less) prone to falling ill than others are significantly less likely to receive treatment. Most tribal women remain deprived of health facilities in their local clusters. They still have to cover significant distances to access formal health care services. Where present, tribal households hesitate to use such facilities due to the significant costs and callous treatment of service providers.

Large public assistance programs such as the ICDS can play a useful role. However, changes are needed in the program to bridge the gap between policy intentions and actual performance. Tribal children, especially in the age-group of 0-3 need to be reached urgently and funds need to be redirected to states with higher prevalence of malnutrition. Targeting gaps too need to be addressed. Involving communities in the implementation and monitoring of ICDS can be a useful

way of bringing in additional resources into the anganwadi centers, improving quality of service delivery and increasing accountability in the system (Gragnolati et al 2006).

Proximate and local factors aside, at its root child mortality among tribals is explained by a gradual process of alienation that finds tribal households deprived of their lands, their livelihoods and their traditional sources of nutrition and medicine.

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Annex 1: Multivariate analysis of early childhood mortality

We fit a logit model of early childhood mortality (D) in rural areas among children born to ever-married women age 15 to 49 during the 5 years prior to survey:

$$D_i = \alpha + \beta (C_i) + \beta (P_i) + \beta (H_i) + \beta (G_i) + \beta (K_i) + \varepsilon$$

The *dependent variable* (D) is defined as a binary indicator (D=0 if child is alive and D=1 if the child is dead). Consistent with the standard definitions of childhood mortality measures, we consider the probability of children dying during the first month after birth (neonatal mortality), between the second and the 11-th month after birth (post-neonatal mortality), during the first 12 months (infant mortality), between the 12-th and 59-th months (child mortality) and prior to reaching the age of 5 (under-five mortality).

Child's characteristics include child's sex (0=female, 1=male), birth order (reference category is last birth), location of birth (reference category is birth in a hospital). *Parents' characteristics* (P) comprise mother's and her partner's education level (reference category no formal education); mother's age at the time of birth, with the age group 19-24 years old as the reference category; and access to mass media, which takes the value of 1 if the mother watches TV, listens to the radio, or reads a newspaper at least once a week and the value of 0 otherwise. *Household characteristics* (H) include quintiles of the standardized asset index, which measures household welfare level; area of land owned by the household (in hectares) as well as a quadratic term; access to medical facilities, which takes the value of 1 if the household reports that distance makes it difficult for its members to obtain medical care; access to an improved water source dummy; and the lack of sanitary toilet facilities dummy, which takes the value of 1 if no access and 0 if there is. A set of dummies for the *geographic location* (G) in one of six regions have been included, with the northern region being the reference category. Caste and religious classifications (K) have been combined into a single variable, for which the reference category is Hindu (upper caste) non-Adivasi, and non-Dalit children.

The table below reports odds ratios (OR), which indicate the change in the odds of a child dying during a given period after birth, which corresponds to a one unit increase in an independent variable. OR<1 indicate a decrease in mortality, while OR>1 indicate an increase in mortality. For instance, we find that – after controlling for all other factors, including household's welfare level – Adivasi children have 2.4 times higher odds of dying between ages 2 and 5 than their non-ST non-SC peers. In fact, we find that the variables which fare well as predictors of other mortality measures, fail to account for child mortality as well. Apart from the ST status, only mother's post-primary education significantly lowers child mortality.

Correlates of early childhood mortality in RURAL areas, logit regressions, NFHS: 2005-06. Odds ratios

	Neonatal	Post-neonatal	Infant	Child	Under-five
Dependent variable: 1= child died					
Caste/religion					
1= SC	1.051	0.869	0.987	1.743*	1.042
1= ST	0.948	0.738	0.877	**2.359*** **	1.013
1= OBC	1.034	0.710*	0.921	1.102	0.925
1=Muslim	0.938	0.785	0.885	1.546	0.932
1=Christian	1.337	0.731	1.117	0.793	1.073
1=Other religions	1.076	1.082	1.08	2.648**	1.195
Sex of child: 1=male	1.066	0.774**	0.966	0.538***	0.891**
Mother's age at birth					
25-34 years old	0.702***	0.832	0.738***	0.913	0.761***
35+ years old	0.759	0.672	0.730*	0.685	0.712**
Birth order					
Penultimate child	0.659***	0.808	0.694***	1.006	0.718***
3-rd to 5-th child	0.667***	0.818	0.706***	1.299	0.763***
6-th plus child	0.991	0.997	0.985	1.491	1.042
Location of last birth: home	0.548***	1.174	0.675***	0.829	0.681***
Birth with doctor or midwife	0.753**	0.84	0.779**	0.784	0.772**
Mother's education level					
Primary	0.917	0.700**	0.847*	0.714	0.826**
Secondary	0.656***	0.596***	0.633***	0.517**	0.622***
Post-secondary	0.258***	0.71	0.349***		0.337***
Partner's education level					
Primary	1.220*	1.045	1.161*	1.084	1.143*
Secondary	1.075	0.751**	0.962	0.846	0.938
Post-secondary	0.967	0.509*	0.809	0.518	0.775
Access to media: TV/radio/newspaper at least once a week	1.016	1.233*	1.08	0.74	1.029
Welfare quintiles					
Lower-middle rural quintile	0.933	1.400**	1.065	0.992	1.047
Middle rural quintile	0.944	1.316*	1.052	1.052	1.047
Upper-middle rural quintile	0.839	1.064	0.908	0.678	0.876
Richest rural quintile	0.702**	1.038	0.791	0.553	0.772*
Area of agricultural land owned, ha.	1.003	1.041	1.003	1.038	1.001
Area of agricultural land owned, ha.^2	1	0.998	1	0.996	1
Distance to medical facility prevents obtaining proper health care	1.114	1.350***	1.184***	1.092	1.173***
HH has access to improved water source	0.911	0.976	0.928	0.938	0.932
Toilet type: none/field/bush	1.092	1.092	1.093	1.203	1.107
Geographic location					
Central region	1.255**	1.430**	1.306***	1.314	1.319***
Eastern region	1.025	1.054	1.023	0.683	0.967
Northeastern region	1.036	1.29	1.1	1.334	1.123
Western region	0.964	1.073	0.992	0.633	0.939
Southern region	0.829	0.942	0.855	0.561	0.821*
Constant	0.104***	0.022***	0.129***	0.017***	0.154***

Number of observations	31688	30283	31688	23382	31688
Pseudo-R-squared	0.021	0.027	0.02	0.069	0.024

Notes: The universe includes children born during 5 years prior to the survey to ever married women 15 and older; Reference categories: Ethnicity (Hindu forward castes); education (below primary/illiterate); birth order (most recent birth); mother's age (15-24 years); welfare (poorest quintile); region (Northern).
Source: Authors' calculations based on NFHS: 2005-06