Disparities in the Treatment of Childhood Diarrhoea in India

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Abstract

Despite the severe impact of diarrhoea on children's health and mortality in India, recent surveys show that only half of all children suffering from diarrhoea receive treatment or medical advice, and more than two-thirds receive no Oral Rehydration Therapy (ORT). An understanding of the socio-demographic determinants for appropriate treatment of the disease will be critical for improving these figures. This analysis is based on the most recent National Family Health Survey (2007), which shows that children are more likely to receive ORT if they are treated in a public health facility, rather than in a private health facility. Households with mothers belonging to the youngest age group, lowest educational attainment, and poorest wealth index are the least likely groups to properly treat their children suffering from diarrhoea. A significant gender bias also exists as parents show a preferential treatment of male children and delay seeking treatment for their female children. The low usage of ORT can also be attributed to a combination of low health knowledge among the aforementioned groups, and low use of public health facilities.

Introduction

The high incidence of child mortality from diarrhoea in the early 1980s (4.6 million child deaths per year) led to the concerted efforts by the World Health Organization for reducing these deaths through its Control of Diarrhoeal Diseases program. Although the annual death toll by 2007 dropped to 1.5 million annually, some countries have made little progress (Victoria, Fontaine, and Monasch (2002)); India has one of the worst records and globally accounts for roughly half of all mortalities due to diarrhoea in children under the age of five. In addition to mortality, malnutrition is another major concern from persistent diarrhoea: it can lead to stunting and can make a child more susceptible to future bouts of enteric infections. Petri Jr, Miller, Binder, Levine, Dillingham, and Guerrant (2008) ascribe malnutrition as a co-morbid condition in 53% of diarrhoea cases.

Repeated bouts of the disease can increase shortfalls of growth leading to long-term stunting and reductions in cognitive function in children between 6 and 9 years of age (Guerrent, Carneiro-Filho, and Dillingham (2003)).

Management and treatment of diarrhoea is relatively inexpensive. A review of case studies across nations credits the implementation of Oral Rehydration Therapy (ORT) with a "dramatic" reduction in global deaths from diarrhoea (Victora, Bryce, Fontaine, & Monasch 2000). ORT combats dehydration, a side-effect of diarrhoea linked directly to mortality, through the application of Oral Rehydration Salts (ORS), increased fluid intake, and continued feeding. There is clear evidence that ORS packets if used can lead to a dramatic decrease in childhood morbidity and mortality (Petri Jr., Miller, Binder, Levine, Dillingham, and Guerrant, 2008).

Despite marked improvements in diarrhoea treatment in other parts of the world, management of childhood diarrhoea is poor in Indian households. Furthermore, India exhibits a *negative* trend in the prescription of oral rehydration therapy (Forsberg et al, 2007). According to the latest National Family Health Survey (NFHS III)[1], 55%-66% of mothers bring their children with diarrhoea into health facilities, but only 33% of families administer ORS as part of the treatment. Further, despite a widespread awareness of ORS its usage remains low; 60.7% of uneducated mothers, 75% of mothers with primary education, and 88.4% with minimum high school attainment have knowledge of ORS. However, only 18.1%, 24.3%, and 36%, of each respective group uses ORS to treat children. This pattern has persisted over time; the knowledge of ORS has increased actual usage still remains low indicating a gap between awareness of proper care and actual treatment practices (Rao et al. (1998).

Increasing the fluid intake of patients is not always common practice in India, where only 10% of mothers increased fluid intake of children with diarrhoea. Furthermore 30% of children brought to health facilities were improperly treated. This indicates a lack of knowledge regarding proper treatment in not only parents, but health care professionals (IIPS, 2005-06). The above observation raises questions about why the rate of treatment and in turn the rate of ORT is so low in India. Here we explore whether this is a result of lack of access to health facilities, the type of facility a family visits or other factors pertaining to family characteristics?

[1] Please see Table 1.

Previous work has found a number of socio-economic variables to be important determinants of appropriate treatment for management of childhood diarrhoea. Ali, Atkinson and Underwood 2000, focus on mother's use of ORS and her knowledge, in a rural district in northeast of Bangladesh and find that mother's lack of knowledge, difficulty of administration and misperception about the severity of diarrhoea and minimum age of administration are common reasons for not using ORS. This highlights the failing of the communication on part of the public health system. Larson, Saha, Islam et.al. (2006) use a nationally representative survey and find strong gender disparities in the use of ORT. They also find differences in the use of ORT across wealth level and rural/urban regions.

While there are no recent studies that analyse the question of childhood diarrhoea at the national level for India, some studies discuss treatment of childhood diarrhoea for smaller samples. Bentley (1988) stresses the knowledge of ORS (function of ORS as a rehydration treatment and not an anti-diarrheal medicine) as an important determinant of its use, from his study of 4 villages in the rural region of North India. Sur (2004) reports religious differences in the treatment seeking behaviour; Gender, Mother's wealth status and Education were not found to be important determinant of treatment seeking behaviour or treatment choices in urban slums of Kolkata in India. The current study presents a nationally representative account of current childhood diarrhoea management practices in India, and further analyzes the important factors associated with inappropriate and under treatment of childhood diarrhoea.

The current study presents a nationally representative account of current childhood diarrhoea management practices in India, and further analyzes the important factors associated with inappropriate and under treatment of childhood diarrhoea. This study adds to the literature by analysing the importance of various socio-economic factors at different stages of decision-making that can result in proper treatment of a child suffering from diarrhoea. This paper analyses the determinants of treatment of childhood diarrhoea at three different stages: whether or not a child receives treatment at all, the duration of lag between onset of diarrhoea and when treatment is received, and the types of treatment used. This study analyzes the importance of variables that were previously found to be significant in children's health care, as well as other variables that have not been considered in the past, some of which are specific to the Indian situation. These include: household

structure – whether the child resides in a nuclear family or in a joint family (this would imply the influence of an older generation that might be culturally steadfast); number of siblings under the age of three years (parents have less time for each child); the Mother's Autonomy index (mother needs husband's permission to access health facility); and gender of the child. All of these variables were found to be significant determinants in the appropriate treatment of a child suffering from diarrhoea.

Data

India's 2005-2006 National Family Health Survey III is used for this study. The survey reports treatments of children with diarrhoea in the two weeks preceding the survey. Of 37,735 children under 3 years of age, 3,918 suffered from diarrhoea within the 2 weeks preceding the survey. While only 10.5% of these cases received an increase in fluids, 68.7% were fed appropriately. Our sample showed that 68.9% of parents sought treatment for their children but only 32.7% were given ORS. Of the sample, 25.4% of parents sought treatment on the same day their child exhibited symptoms of diarrhoea, 32.5% waited one day, 28.5% waited two days, while the remaining 13.6% waited 3 to 10 days.

The following variables were considered as potential determinants of appropriate treatment of diarrhoea. *Mother's age,* which was classified into four categories: less than 20 years (used as the reference group), 20 to 29 years of age, 30 to 39 years of age, and older than 40 years. If a woman was *pregnant,* and already using maternal health care facilities, she might have easier access to information on how to treat a sick child, so a binary variable was used to mark a mother's pregnant state, at the time of the survey. *Mother's education* was categorized by the highest level attained: no education (the reference group), less than primary, primary, middle school, completed high school and above. To address a woman's *autonomy,* a binary variable was used, which was equal to 1 if she was allowed to visit a health care facility on her own, and equal to 0, otherwise. Two other binary variables pertain to the mothers' work situation, as these can affect the time she has available to care for a sick child. If a mother *currently works* (or has worked in the last 12 months), the variable takes the value 1, and if a mother has been working *away from home,* the variable takes the value of 1. Another indicator of exposure to information is *frequency of media,* which refers to how often a mother, in total, reads newspapers, listens to

the radio, and watches television. The range of values is from: not at all, less than once a week, at least once a week, and almost every day.

A family's structure and social status can determine how many resources the parents allocate towards a sick child, which may be measured by *number of siblings* under three years of age, or a joint family structure. To examine gender bias, a binary variable is used that equals 1 if a child is *male*; and the child's *birth order* is categorized as between 2^{nd} to 4^{th}, 5^{th} to 8^{th}, or 9^{th} to 16^{th}, with the first born used as the reference group. The *wealth* index is broken into: poorest (the reference group), poorer, middle, richer, and richest, which, according to the literature, has been shown to affect decisions regarding treatment of sick children. Whether parents *live jointly* with the father's extended family in the same household might also affect decisions regarding health care, as grandparents may exert influence on a child's health care. This binary variable equals 1 if the family is non-nuclear in structure (joint family). To examine differences between rural and urban families, a binary variable is used where *rural* takes the value 1. Categorical variables for *caste* and *religion* are also included. The former takes "other" as the reference group and includes schedule caste, schedule tribe, and other backward classes. *Religion* uses Hindu as the reference group and includes Muslim, Christian, and Sikh.

Methodology and Results

Seeking Treatment

Logistic regression was used to examine the determinants of whether or not parents seek advice or medical treatment. A binary dependent variable takes the value of 1 if a child with diarrhoea was brought in to receive medical care. The additional variable, *distance to the health facility*, reflects the added cost in effort and time, and the possible transportation that parents must use with increasing distances. This ordinal variable is expected to have a negative effect on treatment, as a family has either no problem, not a big problem, or too big a problem in traveling to the health facility. The results are presented as odds-ratios in Table 2.

The odds that a child will receive treatment is 1.44 times higher if the mother has at least high school education, compared to the odds for a child with an illiterate mother. Although mother's autonomy (defined by

her ability to visit a health facility without permission) and her work status, are significant in the first model, these variables are non-significant when caste and religion are included in the regression. Distance to the health facility is significant in both models, as increase in distance reduces the likelihood that the child will receive treatment. Wealth is the most important determinant for seeking treatment for a sick child. Compared to "other" castes or tribes, the odds of seeking treatment for a sick child are higher in families belonging to a schedule caste and backward class, by factors of 1.43 times and 1.22 times, respectively. Muslim families with an odds ratio of 1.32, are more likely than Hindus to seek treatment, while Christians are less likely (OR 0.31).

Delays in Seeking Treatment (if treatment is sought)

Duration is measured as number of days waiting after the onset of diarrhoea and before seeking treatment. Since diarrhoea is a countable variable, the Poisson event count model is used to examine the determinants of the 'duration' that parents wait before seeking advice or treatment. The results are presented in Table 3.

The results are similar across the two models, that is, including caste and religion in the regression does not change most of the significant results. Table 3 indicates that, compared to mothers under age 20, those in the older age group wait fewer days. Mothers who work away from home wait 1.09 [exp(.09)] the number of days waited by mothers who work from home. The importance of autonomy and gender bias is also evident in the results. Mothers who are free to visit health facilities on their own, and parents of boys, wait fewer days (both variables are significant at the 1% level). Parents of boys wait .90 the number of days waited by parents with girls. With every additional sibling under the age of three years, the time waited to bring in a sick child increases. Compared to the poorest class, children belonging to the middle, richer, or richest groups receive treatment quicker. The number of days waited by families in the middle income group is about 0.78 [exp(-.29)] the number of days waited by families in the poorest income group. Thus, if the poorest families wait an average of seven days, then the middle income families tend to wait an average of five days (.78*7). Families living in rural areas also tend to delay seeking treatment, compared to families living in urban areas. Children belonging

to schedule caste and other backward classes tend to seek treatment earlier than the other children. Compared to the Hindu families, Sikh families tend to wait fewer days.

Oral Rehydration Treatment (ORT)

Once treatment is sought for a child suffering from diarrhoea, the child may not necessarily receive proper treatment. One of the important factors is the type of health facility. Figure 1 shows the disparities in ORS prescriptions across different types of health facilities from the survey. Public health facilities across the board (government dispensary, government hospitals, etc.) are more likely to prescribe ORS than are private facilities (Figure 1). Families seeking advice from traditional healers were the least likely group to treat the child with ORS.

In the next set of models, the relationship between type of facility parents visited and the appropriate treatment a child received is further explored. Appropriate treatment is comprised of continuing feeding, fluid intake, and offer of ORS. The treatment of a child suffering from diarrhoea was examined using logistic regression with the results presented as odds-ratios (Table 3). Feeding is a binary dependent variable, with the value of 1 if children were fed the same amount of food or somewhat less. Because sick children might not want to consume the same amount of food during episodes of diarrhoea, a smaller amount is still considered as an acceptable measure of appropriate feeding. Fluid intake is a binary variable with the value of 1 if more fluids were given to the child, and ORS is a binary variable with the value of 1 if oral rehydration salts were given to the child. The binary variable *public* takes the value of 1 if any of the following facilities were visited: government or municipal hospital, government dispensary, unc/uhp/ufwc, government mobile clinic, asha, chc/rural hospital/phc, sub-centre, camp, anganwadi/icds centre, or other public facilities.

By examining the appropriate treatment practices in Table 3, the three aspects of appropriate treatment do not seem to be explained by similar covariates. Mother's age is an important determinant only for adequate feeding practices, and compared to mothers under the age of 20 years, those between 20 and 29 have an odds ratio of 1.41, those between 30 and 39 have an odds ratio of 1.62, and mothers above the age of 40 have the most striking difference with an odds ratio of 3.02. Children of pregnant women were more likely than children of

non-pregnant women to receive appropriate food and ORS packages during episodes of diarrhoea. Mother's education also seems to be a strong predictor of use of ORS and for an increase in fluid being offered to the child, though it is not a significant predictor of appropriate feeding behavior. The odds that a child will receive ORS increases by a factor greater than two if the mother has at least a high school education.

Children of mothers who do not need permission to visit a health facility are more likely to get adequate food, compared to children with mothers who do not have this freedom of movement. The odds of a child receiving appropriate food in cases where the mother has autonomy is 1.23 greater than the odds when mothers do not have the same autonomy. The number of siblings of a sick child is negatively associated with appropriate feeding, which illustrates the time constraints mothers face in caring for other children. The number of siblings also has a negative effect on intake of adequate fluid (OR 0.69).

A child is more likely to receive proper treatment in a public health facility, rather than in a private health facility. Parents who visit public health facilities are 1.52 times more likely to increase their child's fluids than those who visit private facilities. Moreover, children brought to public health facilities are 3.13 times more likely to receive ORS than are those brought to private facilities. Christians are 1.53 more times likely than Hindus to increase their child's fluids, while Sikhs are less likely to do so (OR 0.34), though the trend of the former is significant only at the 10% level, while the trend for the latter group is significant at 5%. Income seems to play an important role in the administration of ORS (even after controlling for education). The richer and richest quintiles are more likely to give ORS to their children, with odds ratios of 1.47 and 2.05, respectively.

Discussion

Our results establish that maternal factors, wealth, caste, and religion are significant predictors of whether or not a child receives medical attention and appropriate treatment, and are predictors of the delay between onset of diarrhoea and the seeking of medical care. As mothers are usually the primary caregivers of children, they represent an important determinant of the children receiving proper treatment. Our results support the idea that education is a proxy for health knowledge (Desai & Alwa, 1998). Compared to uneducated mothers,

those with middle school education were more likely to increase fluids and give ORS to their children. Furthermore, of the maternal-related variables, mothers with at least a high school education were the only statistically significant predictor of children receiving any treatment. These findings highlight the importance of teaching less-educated mothers about proper treatment methods.

Also, we find children with working mothers are less likely to receive adequate fluid, compared to children of unemployed mothers. If a mother is working, she may not have the time to increase the frequency of fluids given to a sick child, especially if the child is young. Furthermore, childcare may fall to someone else, and the caregiver might not increase the fluids, as it would require more effort and time, especially if water must be sanitized before consumed. On the other hand, maintaining or slightly decreasing feeding requires little or no change in effort, thus a mother or caregiver might be inclined to follow appropriate feeding practices without increasing fluids.

Whether a family visits a public health facility or a private health facility, is the most significant and important predictor for all three components of proper treatment (appropriate feeding, increasing fluids, and prescription of ORS). In our sample of the 3,918 cases of children with diarrhoea, 1,866 visited private facilities, and 655 attended public facilities. After adjusting for caste and religion, those who visited public facilities were more likely to receive appropriate food, increased fluids, and ORS packages. Thus, holding all other variables constant, the choice of facility plays a crucial role in determining whether or not a child receives all aspects of proper treatment. In a case study by Sur et al. (2004) in Kolkata, the authors found that the reputation of a care provider was the main factor in the selection of treatment. One avenue of future research might be to investigate the possible effects that the media plays in promoting public facilities as good sources of diarrhoea treatment.

Our results indicate that, after adjusting for social class and religion, parents of male children waited fewer days than parents of female children when seeking medical treatment (significant at 1% level); moreover, rural families tended to wait longer than urban families. Although the prevalence of disease was slightly higher for males than females, gender is not a statistically significant predictor of receiving treatment. Nevertheless, as delay can affect the efficacy of treatment, females and rural children might suffer more ill-effects of diarrhoea.

Autonomous mothers and mothers above 20 years of age, with a minimum of high school education, are less likely to delay seeking treatment. More research is needed to determine the impact of delays in treatment on recovery. Policies should focus on informing the masses about the long-term detrimental effects associated with delaying treatment. Pandey et al. (2002), in a study in a rural community in West Bengal, revealed similar gender differences in healthcare provision Larson, Saha, Islam, and Roy (2006) also found improvements in gender equity in rural Bangladesh, but discrimination continues to persist against females in urban areas in terms of licensed provider utilization.

Ali, Atkinson, and Underwood (2004) indicate that the perceived role of ORS influences its use. Mothers who believe that ORS combats dehydration and replenishes salts from diarrhoea are twice as likely to use ORS, compared to those who think ORS reduces or stops stool output. Bentley (1988) suggested that 30% of mothers who did not use ORS said that the preparation was too time-consuming or that the severity of an episode of diarrhoea did not merit its use. Also, 80% of mothers who had used ORS before said that it was not useful, citing reasons for it not stopping the diarrhoea. Thus, policies should encourage private and public health facilities to more aggressively educate the public on the function of ORS.

To better reach the population that does not seek professional health care, agencies can make use of the media, which is shown here to be a significant predictor of whether or not a child is given ORS. India's high illiteracy rate suggests that radio and television play more crucial roles in helping mothers keep their children healthy, and the media has been shown to improve ORS usage (Rao, Mishra, & Retherford, 1998). Although India's Oral Rehydration Therapy (ORT) program promotes appropriate feeding to increase fluids, and ORS use, our results confirm that the frequency of media is positively correlated with children receiving ORS, but only significantly for this dependent variable. Thus, the other two aspects of ORT are not significant, nor is the function of ORS. ORT media campaigns should be expanded to include segments on increasing fluids and on using appropriate fluids. Also, Bhandari, Mazumder, Taneja, Dube, Black, Fontaine, et al.'s (2005) pilot project, that trained government and community channels to add zinc to the diarrhoea management, found a reduction in the inappropriate prescription of drugs, possibly by decreasing the short illness severity, duration, and "contact

with private practitioners". Their results imply that policies using public channels to address immediate concerns of mothers, like adding zinc to a diarrhoea treatment regiment, might reduce the reliance on private facilities.

Conclusion

Despite promising results in raising awareness of ORT, improvements in actual treatment have not been observed in India. Parents of rural children and girls also wait longer periods in seeking treatment. We attribute the low usage of ORT to a combination of low health knowledge among younger and less educated mothers, and incorrect treatment practices by *private* health care facilities. Although public facilities are a significant predictor of proper treatment, negative conceptions of India's public healthcare system contribute to underutilization (what about lack of access – are public systems easily accessed in villages?). Overcoming these misconceptions may prove challenging, in the meantime we suggest using the media in three ways to improve diarrhoea management: 1) Expanding campaigns to accentuate the importance of not only ORS, but also that appropriate feeding and increasing fluids will help save children 2) Emphasizing the role of ORS as a tool to fight dehydration, as opposed to stopping diarrhoea. 3) Promoting public facilities as available resources for proper treatment.

References

Ali, M., Atkinson, D., & Underwood, P. (2000). Determinants of Use Rate of Oral Rehydration Therapy for Management of Childhood Diarrhoea in Rural Bangladesh. *Journal of Health, Population and Nutrition*, 18, 103-108.

Bentley, E. M. (1988). The household management of childhood Diarrhoea in rural North India. *Social Science and Medicine*, 27(1), 75-85.

Bhandari N, Mazumder S, Taneja S, Dube B, Black RE, Fontaine O, Mahalanabis D, Bhan MK. (2005). A Pilot Test of the Addition of Zinc to the Current Case Management Package of Diarrhoea in a Primary Healthcare Setting. *Journal of Pediatric Gastroenterology and Nutrition*, 41(5), 685-687.

Dalal, K., & Dawad, S. (2009). Non-Utilization of Public Healthcare Facilities: Examining the Reasons through a National Study of Women in India. *Rural and Remote Health*, 9, 1-10.

Desai, S. & Alwa, S. (1998). Maternal Education and Child Health: Is there a Strong Causal Relationships? *Demography*, 35(1), 71-81.

Foresberg, B. C., Petzgold, M. G., Tomson, G., & Allebeck, P. (2007). Diarrhoea Case Management in Low- and Middle-income Countries – an unfinished agenda. *Bulletin of the World Health Organization*, 85, 42-49.

Guerrant, R. L., Carneiro-Filho, B. A., & Dillingham, R. A. (2003). Cholera, Diarrhoea, and Oral Rehydration Therapy: Triumph and Indictment. *Clinical Infectious Diseases*, 37(3), 398-405.

International Institute for Population Sciences (IIPS) and Macro International. (2007). Child Health. *National Family Health Survey (NFHS-3), 2005–06:* India: 2, 233-266.

Larson, C. P., Saha, U. R., Islam, R., & Roy, N. (2006). Childhood diarrhoea management practices Bangladesh: private sector dominance and continued inequities in care. *International Journal of Epidemiology*, 1-10.

Pandey A, Sengupta PG, Mondal SK, Gupta DN, Manna B, Ghosh S, Sur D, Bhattacharya SK (2002). Gender Differences in Healthcare-seeking during Common Illnesses in a Rural Community of West Bengal, India. *Journal of Health, Population and Nutrition*, 20, 306-311.

Petri Jr., W. A., Miller, M., Binder, H. J., Levine, M. M., Dillingham, R., Guerrant, R. L. (2008). Enteric Infections, Diarrhoea, and their Impact on Function and Development. *Journal of Clinical Investigation*, 118(4), 1277-1290.

Pillai, R. K., Williams, S. V., Glick, H. A., Polsky, D., Berlin, J.A., Lowe, R. A. (2003) Factors affecting decisions to seek treatment for sick children in Kerala, India. *Social Science and Medicine*, 57(5), 783-790.

Rao, K. V., Mishra, V. K., & Retherford, R. D. (1998). Mass Media Can Help Improve Treatment of Childhood Diarrhoea. *National Family Health Survey Bulletin*, (11), 1-4.

Simpson, Evan et al, (2007). Use of Formative Research in Developing a Knowledge Translation Approach to Rotavirus Vaccine Introduction in Developing Countries. *BMC Public Health*, 7(281), 1-11.

Sur, Dipika et al. (2004). Factors Associated with Reported Diarrhoea Episodes and Treatment-seeking in an Urban Slum of Kolkata, India. *Journal of Health, Population and Nutrition*, 22, 130-138.

Victora, C. G., Bryce, J., Fontaine, O., & Monasch, R. (2000). Reducing Deaths Through Oral Rehydration. *Bulletin of the World Health Organization*, 78(10), 1246–1255.

Table 1: Summary Statistics

Treatments		N	Proportion	Std. Error	95% Conf Interval	
Had Diarrhoea					lower	upper
	0	37735	0.906	0.002	0.902	0.910
	1	3918	0.094	0.002	0.090	0.098
Increased Fluids						
	0	3506	0.895	0.007	0.882	0.908
	1	412	0.105	0.007	0.092	0.118
Appropriate Feeding						
	0	1226	0.313	0.010	0.294	0.332
	1	2692	0.687	0.010	0.668	0.706
Sought Treatment						
	0	1221	0.312	0.010	0.293	0.330
	1	2697	0.688	0.010	0.670	0.707
Those who sought treatment						
Given ORS						
	0	1770	0.673	0.011	0.650	0.695
	2	861	0.327	0.011	0.305	0.350
Days waited						
	0	669	0.254	0.011	0.233	0.276
	1	856	0.325	0.011	0.303	0.348
	2	749	0.285	0.011	0.263	0.307
	3	191	0.073	0.006	0.060	0.085
	4	67	0.026	0.004	0.017	0.034
	5	31	0.012	0.003	0.007	0.017
	6	18	0.007	0.002	0.002	0.012
	7	13	0.005	0.002	0.001	0.009
	8	9	0.003	0.001	0.000	0.006
	9	5	0.002	0.001	0.000	0.004
	10 or more	23	0.009	0.002	0.004	0.013

Table 2: Determinants of Whether Children with Diarrhoea Receive Treatment

Logistic Regression

Dependent Variable: Parents Seek Advice or Medical Treatment

	Model 1		Model 1a	
Mother's Age: 20-29	1.25	(1.36)	1.17	(0.92)
Mother's Age: 30-39	1.19	(0.94)	1.23	(1.04)
Mother's Age: 40 & above	0.93	(0.22)	0.98	(0.05)
Pregnant	0.98	(0.15)	1.02	(0.14)
Mother's Education: Less Than Primary	0.82	(1.44)	1.05	(0.34)
Mother's Education: Primary School	0.88	(0.90)	0.93	(0.44)
Mother's Education: Middle School	0.97	(0.29)	1.14	(1.23)
Mother's Education: High School and above	1.21	(1.09)	1.44*	(2.03)
Employment: Mother Currently Working or has worked in last 12 months	0.96	(0.41)	0.97	(0.28)
Mother Works Away from Home	0.82+	(1.89)	0.90	(0.95)
Autonomy: Mother Allowed to Visit Health Facility by Herself	0.85*	(2.09)	0.92	(1.06)
Frequency of Media	1.02	(0.75)	1.02	(1.09)
Male Child	1.13+	(1.65)	1.06	(0.78)
Birth Order of Child 2^{nd} to 4^{th}	0.95	(0.54)	0.95	(0.57)
Birth Order of Child 5^{th} to 8^{th}	0.99	(0.10)	1.00	(0.00)
Birth Order of Child 9^{th} to 16^{th}	1.32	(0.74)	1.26	(0.60)
Number of Siblings aged 0-3 years	1.00	(0.04)	1.02	(0.34)
Poorer	1.24+	(1.84)	1.28*	(2.06)
Middle	1.28*	(2.07)	1.40**	(2.67)
Richer	1.56**	(3.20)	1.73**	(3.77)
Richest	2.00**	(3.95)	2.15**	(4.17)
Living In Joint Household with Extended Family Members	1.12	(1.52)	1.10	(1.23)
Rural	1.10	(1.04)	1.13	(1.24)
Distance to Health Facility	0.87**	(2.94)	0.89*	(2.44)
Schedule Caste			1.43**	(2.98)
Schedule Tribe			1.11	(0.77)
Other Backward Classes			1.22*	(2.04)
Muslim			1.32*	(2.41)
Christian			0.31**	(7.59)
Sikh			1.33	(0.89)
Observations	3647		3504	

Results in odds-ratios; Absolute value of z statistics in parentheses
+ significant at 10%; * significant at 5%; ** significant at 1%

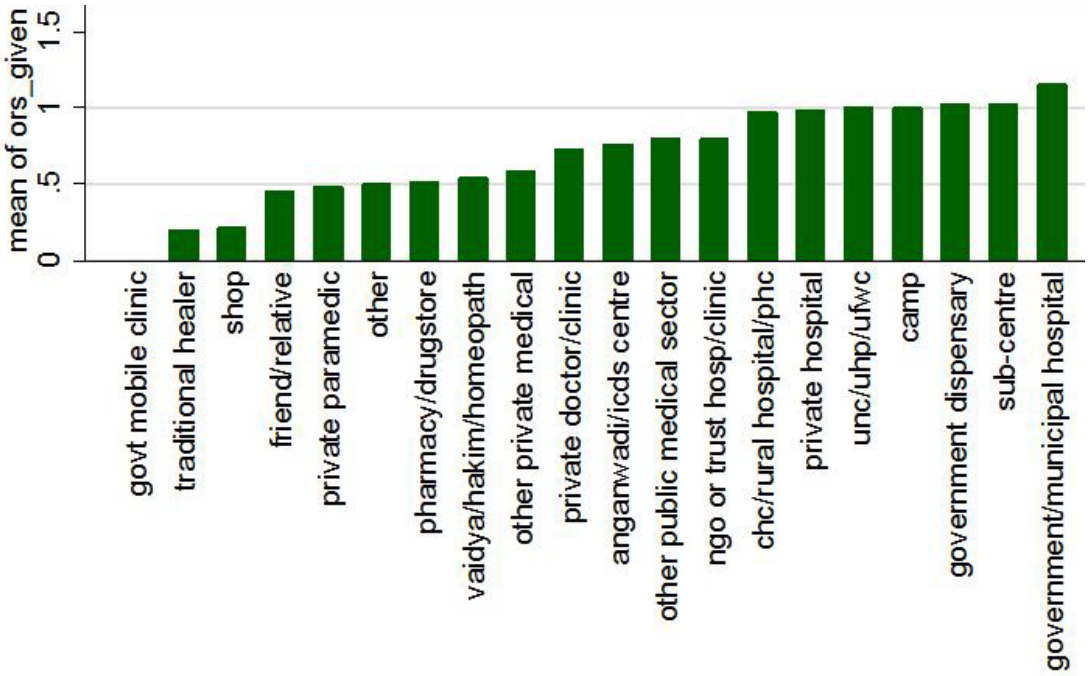
Table 3: Delays in Seeking Treatment for Child's Diaarhea.

Poisson Regressions

Dependent Variable: Time Waited (in days) Before Seeking Treatment				
	Model 2:		Model 2a	
Mother's Age: 20-29[2]	-0.33**	(4.69)	-0.33**	(4.55)
Mother's Age: 30-39	-0.26**	(3.17)	-0.26**	(3.01)
Mother's Age: 40 & above	-0.33*	(2.07)	-0.33*	(2.01)
Pregnant	-0.10	(1.55)	-0.11+	(1.65)
Mother's Education: Less Than Primary	0.06	(0.83)	0.00	(0.05)
Mother's Education: Primary School	0.10	(1.42)	0.07	(0.99)
Mother's Education: Middle School	-0.00	(0.06)	-0.04	(0.89)
Mother's Education: High School and above	-0.20*	(2.53)	-0.28**	(3.41)
Employment: Mother Currently Working or has worked in last 12 months	-0.06	(1.08)	-0.06	(1.20)
Mother Works Away from Home	0.08	(1.45)	0.09+	(1.74)
Autonomy: Mother Allowed to Visit Health Facility by Herself	-0.09*	(2.47)	-0.10**	(2.65)
Frequency of Media	0.01	(1.08)	0.01	(0.70)
Male Child	-0.10**	(3.02)	-0.10**	(2.96)
Birth Order of Child 2nd to 4th	0.07+	(1.69)	0.06	(1.33)
Birth Order of Child 5th to 8th	0.04	(0.64)	0.04	(0.56)
Birth Order of Child 9th to 16th	0.28+	(1.75)	0.26	(1.58)
Number of Siblings (aged 0-3 years)	0.14**	(4.48)	0.15**	(4.76)
Poorer	-0.08	(1.38)	-0.05	(0.92)
Middle	-0.29**	(4.84)	-0.24**	(4.01)
Richer	-0.21**	(3.16)	-0.15*	(2.18)
Richest	-0.23**	(2.86)	-0.17*	(2.02)
Living in Joint Household with Extended Family Members	0.00	(0.10)	0.02	(0.66)
Rural	0.17**	(3.96)	0.19**	(4.28)
Distance to health facility	-0.00	(0.01)	0.01	(0.47)
Schedule Caste			-0.11*	(1.99)
Schedule Tribe			-0.07	(1.03)
Other Backward Classes			-0.15**	(3.42)
Muslim			-0.01	(0.25)
Christian			0.11	(1.28)
Sikh			-0.57**	(3.59)
Constant	0.73**	(7.93)	0.80**	(7.70)
Observations	2443		2334	
Estimated Poisson Regression Coefficients; Absolute value of z statistics in parentheses				
+ significant at 10%; * significant at 5% ; ** significant at 1%				

[2] Mother's age <20 is the comparison group.

Figure 1: Health facility: ORS Given



phc-Primary health center; chc-Community Health center

uhp – Urban Health Posts; ufwc-urban family welfare center

Icds-Integrated child development services

Table 4: Appropriate Treatment: Logistic Regressions

Sample-Children that had Diarrhoea	Model 3: Appropriate Feeding	Model 3a: Appropriate Feeding	Model 4: Increased Fluids	Model 4a: Increased Fluids	Model 5: Given ORS	Model 5a: Given ORS
Mother's Age: 20-29	1.41* (2.06)	1.50* (2.34)	1.03 (0.10)	1.25 (0.70)	1.08 (0.43)	1.14 (0.67)
Mother's Age: 30-39	1.62* (2.49)	1.66* (2.50)	1.30 (0.84)	1.49 (1.15)	1.22 (0.93)	1.30 (1.22)
Mother's Age: > 40	3.02** (2.85)	2.74* (2.54)	2.31+ (1.84)	2.31+ (1.68)	1.70 (1.46)	1.71 (1.40)
Pregnant	2.39** (5.18)	2.48** (5.18)	1.23 (1.06)	1.21 (0.94)	1.49** (2.93)	1.43* (2.57)
Mother's Education: Less Than Primary	1.47* (2.44)	1.35+ (1.83)	1.66* (2.49)	1.55* (2.06)	0.94 (0.36)	0.98 (0.11)
Mother's Education: Primary School	0.96 (0.23)	0.94 (0.39)	1.23 (0.85)	1.13 (0.49)	1.27 (1.46)	1.19 (1.03)
Mother's Education: Middle School	0.94 (0.60)	0.89 (1.01)	1.69** (3.33)	1.58** (2.82)	1.44** (3.34)	1.46** (3.30)
Mother's Education: High School and above	1.20 (1.04)	1.13 (0.68)	2.74** (4.57)	2.60** (4.18)	2.21** (4.92)	2.24** (4.83)
Mother Currently Working / worked in last 12 m	1.26* (2.06)	1.24+ (1.85)	0.66** (2.59)	0.65* (2.56)	1.07 (0.54)	1.02 (0.18)
Mother Works away from home	0.91 (0.85)	0.89 (1.01)	1.26 (1.39)	1.23 (1.22)	0.97 (0.23)	0.91 (0.78)
Autonomy: Mother Allowed to Visit Health Facility by Herself	1.28** (3.09)	1.23* (2.51)	1.24+ (1.90)	1.20 (1.62)	1.13 (1.49)	1.11 (1.29)
Frequency of Media	1.02 (1.06)	1.02 (1.07)	1.01 (0.45)	1.02 (0.64)	1.05* (2.32)	1.05* (2.14)
Male Child	0.94 (0.79)	0.96 (0.51)	1.08 (0.74)	1.12 (1.06)	1.07 (0.86)	1.09 (1.03)
Birth Order of Child 2^{nd} to 4^{th}	0.84+ (1.85)	0.86 (1.62)	1.30* (1.99)	1.32* (2.05)	0.94 (0.65)	0.97 (0.33)
Birth Order 5^{th} to 8^{th}	0.84 (1.15)	0.85 (1.06)	1.26 (1.07)	1.28 (1.10)	0.64** (2.72)	0.66* (2.51)
Birth Order 9^{th} to 16^{th}	0.58 (1.41)	0.57 (1.42)	0.48 (0.96)	0.53 (0.82)	0.46 (1.48)	0.49 (1.36)
Number of Siblings aged 0-3 years	0.78** (3.67)	0.78** (3.62)	0.72** (3.34)	0.69** (3.70)	0.96 (0.56)	0.96 (0.52)
Poorer	1.08 (0.59)	1.15 (1.10)	1.16 (0.73)	1.08 (0.36)	1.03 (0.19)	1.11 (0.71)
Middle	1.07 (0.50)	1.11 (0.78)	1.25 (1.10)	1.21 (0.93)	1.25 (1.58)	1.31+ (1.84)
Richer	1.16 (1.05)	1.21 (1.29)	1.55* (2.04)	1.47+ (1.73)	1.45* (2.43)	1.47* (2.42)
Richest	1.01 (0.04)	1.03 (0.15)	1.24 (0.83)	1.31 (1.01)	1.94** (3.73)	2.05** (3.89)
Living in Joint Household	0.90	0.90	0.86	0.89	1.10	1.09

	(1.32)	(1.28)	(1.33)	(0.97)	(1.18)	(1.02)
Rural	0.81* (2.21)	0.79* (2.39)	1.20 (1.47)	1.27+ (1.85)	0.96 (0.48)	0.94 (0.68)
Sought Treatment at a Public Health Facility	1.31* (2.56)	1.29* (2.38)	1.55** (3.41)	1.52** (3.14)	3.27** (12.42)	3.13** (11.58)
Schedule Caste		0.99 (0.10)		1.02 (0.14)		1.04 (0.29)
Schedule Tribe		1.36* (2.02)		0.94 (0.29)		1.34+ (1.95)
Other Backward Classes		0.95 (0.50)		1.00 (0.03)		1.05 (0.47)
Muslim		1.08 (0.65)		1.06 (0.36)		0.90 (0.90)
Christian		1.30 (1.45)		1.53* (2.02)		0.95 (0.33)
Sikh		1.35 (1.01)		0.34+ (1.77)		1.04 (0.15)
Observations	3652	3509	3652	3509	3647	3504
Results in odds-ratios; Absolute value of z statistics in parentheses + significant at 10%; * significant at 5% ; ** significant at 1%						