Social determinants of morbidity during infancy: Results from a cross-sectional study in rural areas of Assam, India

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ABSTRACT

Background: Assam, one of the seven North Eastern states of India has achieved the highest decline in maternal and child mortality compared to other states, still neonatal mortality and infant mortality rates are very high. Apart from other causes, certain social factors unique to Indian subcontinent are also responsible for high mortality and morbidity among children here. **Objectives:** To know the prevailing morbidity conditions among the infants and to assess the social determinants of morbidity of infants in rural areas of Assam. **Materials and Methods:** It was a cross-sectional study conducted among 250 rural families having an infant in each family. The primary caregiver was interviewed using pre-tested semi-structured interview schedules and investigators also clinically evaluate the index child for any morbidity. Data collected regarding various sociodemographic variables of the family, morbidity status of the infant and also the environmental variables relevant to the study were analyzed tabulated and percentages, and proportions were calculated. Chi-square test was done to see the relationship between the factors. **Results:** The study observed that prevalence of teenage mothers was high (32.4%). Most of the mothers were primipara (41.2%), and were belonging to nuclear families of lower socioeconomic strata (57%). In our study, acute respiratory infections (33.3%), fever (24.6%), and diarrhea (21.7%) were found to be the most common morbidities among infants. Statistically significant association was also found between morbidity of infants and male gender (p=0.003) and numbers of siblings (p=0.005), use of sanitary water source (p=0.001), and excreta disposal (p=0.001). **Conclusion:** This study observed that social factors which influence infant morbidity included male gender and numbers of siblings, use of sanitary water source and excreta disposal, less education of mothers, less family income, and lower social class of the family.

Key words: *Acute respiratory infections, Cross-sectional study, Diarrhea, Infancy, Morbidity, Social factors*

In the last 25 years, since millennium development goals (MDGs) were set up in 1990, the world has achieved some significant milestones in reducing child mortality. Although the target of two-thirds reduction of under-five mortality (MDG Goal 4) could not be achieved by year 2015, yet combined efforts all over the world to reduce the child mortality has saved lives of approximately 48 million children under the age of 5 years until date [1]. In India, child mortality has declined from 125 deaths/1000 live births in 1990 to 55 deaths/1000 live births in 2014. Similarly infant and neonatal mortalities also reduced [2]. Still, around 70,000 newborn die every year in India, which represent approximately 20% neonatal deaths in the whole world. India also contributes 21% of under 5 deaths globally [3,4]. Major causes of deaths during infancy and childhood in India are low birth weight (LBW), prematurity, diarrhea, and pneumonia [5]. Diarrhea, pneumonia, and malnutrition are also the three major morbidity conditions during infancy and childhood leaving a lasting effect on health and well beings of Indian children [6]. Apart from these major causes various social factors unique to Indian subcontinent are also responsible for high mortality and

morbidity among children in India. Mother's education and socioeconomic condition of the family play a very important role in infant's well-being. It was also found that more infant deaths were occurring in rural tribal families in India than other social groups [7,8]. Younger age of mothers, Poor health seeking behaviors among rural tribal mothers, gender discrimination at the time of reporting of illness, and lack of health facilities also negatively influence the health status of infants [9].

Assam is one of the seven North Eastern states of India facing the problems of high maternal and child mortality. Latest figures indicated that state is achieving the highest decline in maternal and child mortality compared to other states, still, neonatal mortality is 37/1000 live births and infant mortality rate of 55/1000, which are quite high. High prevalence of malnutrition among children (36% under 5 children were stunted, 30% underweight, and 35% children anemic), presence of infectious diseases such as Japanese Encephalitis, malaria, diarrhea, and acute respiratory infections (ARI) among under 5 children indicated the gravity of the child health problem the state is facing [10,11]. Therefore, it is very pertinent to know the determinants of infant and childhood

mortality and morbidity in the state of Assam; specially, in rural areas as mortality and morbidity rates are worse there. Since there is very few literature available regarding social determinants of infant morbidity in rural areas in this part of the country, therefore this study was attempted with objectives to know the prevailing morbidity conditions among the infants and to assess the social determinants of morbidity of infants in rural areas of Assam.

MATERIALS AND METHODS

Our study was a community-based cross-sectional study conducted in rural areas of Kamrup district of Assam. Ethical clearance was obtained from the Institutional Ethics Committee. The study period was from January 2013 to April 2013. For the study, we selected 5 sub centers (SC) through simple random sampling method out of total 40 numbers of SCs under Boko Bongaon Block Primary Health Center using random number table. There were total 34 villages under these selected SCs, and we surveyed all these villages and made a list of all the families having a child <1 year of age. For our study, we had a sample size of 250 which was obtained by applying the formula 4pq/L2 where prevalence (p) taken as prevalence of undernourished children in Assam as 30%, q is (1-p), and taking relative error (L) of 20% of p [11,12]. Therefore, total 250 families were selected through simple random sampling from the eligible families of the villages who fulfilled our eligibility criteria. The families who were permanent residents of the study area having children <1 year of age and the primary respondent gave informed consent to be part of the study was included in the study. Family not giving consent, gave incomplete information, when primary caregivers were not available, age of the child could not be verified, were excluded from our study.

For the study, mother of the child was selected as the primary respondent but if mother was unavailable either father or any other primary caregiver of the child was selected as the respondent. These mothers and primary caregivers were interviewed in their home using semi-structured interview schedules and investigators also observed the social environment of the family as a whole. The investigators also clinically evaluate the index child at the time of interview for any morbidity and if any morbidity was found present in the child adequate health advice was given to the caregiver and the family. Data collected regarding various sociodemographic variables of the family, morbidity status of the infant and also the environmental variables relevant to the study.

Operational Definitions

Morbidity status
We considered acute diarrhea, ARI, fever, ear, skin, and eye disorders as the common morbidities of childhood. These morbidities were defined according to IMNCI guidelines [13].

Acute diarrhea
Infant was considered to be suffering from diarrhea if the stools had changed from usual pattern and were many and watery (more watery than fecal matter) or a recent change in consistency or frequency of stool.

Fever
Mother giving history of high temperature of the infants. Fever within 48 hours of taking immunization was not considered.

ARI
An infant was considered to be suffering from ARI when she/he had running nose, cough with or without fever, fast breathing, and difficulty in breathing with or without chest in drawing.

Ear infection
History of discharge from ear and swelling or redness in and around the ear was taken as an ear infection.

Skin disorder
An infant was considered to be suffering from skin disease if she/he had localized skin eruption (papule and pustule), itching, umbilical redness, and draining pus.

Eye disorder
An infant was considered to be suffering from eye disease if mother gave history of reddening of eye, watering or discharge.

Congenital anomaly
The presence of any congenital anomaly in the child was diagnosed through clinical evaluation by the investigators.

Socioeconomic status
Modified BG Prasad classification (year 2014) was used to determine socioeconomic status [14].

Alcoholism
A person was considered alcoholic if he/family gave a history of consumption of alcohol for last 12 months and frequency of consumption was more than 3 times per week [15].

Exposure to mass media
Primary caregiver was considered exposed to mass media if she/he gave history of exposure to either radio/television/newspaper/magazine at least once a week regularly [16].

A recall period of preceding 3 months was considered for the study. Primary care giver's version of morbidity was correlated with any available medical records and verified with local Accredited Social Health Activist and Auxiliary Nurse Midwife.

Statistical Analysis

Data thus collected were processed, tabulated and analyzed using Microsoft EXCEL software. Percentages and proportions were calculated. Chi-square test was done to see relationship between the factors. 95% confidence interval was taken as level of statistical significance.

RESULTS

The study was conducted among 250 families having a child of <1 year of age in rural areas of Kamrup district of Assam, regarding the social determinants of infant morbidities. We found that out of 250 families we interviewed and observed for infant morbidities and its social factors, in 231 families (92.4%) mother of the index child was the primary respondent while in 12 (4.8%) families father was the primary respondents as mother was not available at that time. We found that 32.4% of the mothers were adolescent mothers while 14.8% were older than 30 years. Out of 250 families in 103 families (41.2%), the index child was the only child of the family, while 34.4% families got 2-4 children and 24.4% families had more than 4 children. 55.3% families we surveyed were joint type of family and rest 44.7% were nuclear ones.

Among the families, 13.6% belonged to upper and upper middle socioeconomic status families while most of the families (57.1%) were from lower middle class, and 29.3% families belonged to lower class according to BG Prasad Classification. On analysis of the educational status of mothers, most of the mothers (20.4%) had studied up to high school, only 11.2% had studied beyond 10th standards and 13.6% were illiterate. Among the fathers, 16% were illiterate, 12.7% studied up to primary school while 18.5% were high school passed or above. Out of the 250 families, most of the 167 (66.8%) families belonged to Hindu religion. According to caste, 34 (13.6%) were from general caste and 132 (52.9%) were from Schedule caste and Schedule tribe families are shown in Table 1.

Out of 250 children, 21(8.4%) infants were suffering from any morbidity at the time of the study, while total 82 (32.8%) children were found to be suffering from any listed morbidity in the last 3 months. Total 138 episodes of morbidities were documented during the 3 months recall period of the study. Out these morbidity episodes, the prevalence of ARI was highest of 33.3% followed by fever 24.6%, diarrhea 21.7%, and others 20% which include skin, ear, and eye problems (Table 2).

In Table 3, we described the relationship between morbidity during infancy and prevailing social factors. We found that more male infants had morbidity episodes than their female counterparts (p=0.003). A significant association (p=0.005) between number of siblings and morbidity of the infant was also seen. The use of sanitary water source by the family (p=0.001), and use of sanitary latrine by the family; especially, primary caregiver (p=0.001), was associated with less morbidity of the infant. We also found more infants in the lower socioeconomic categories (90%), mothers having less education (48.8%), from nuclear families (60%), and from Hindu community (69.5%) were suffering from morbidity. As shown in Table 3, history of alcoholism was present in 30% families of those infants who had morbidity during the study period; however, this association was not significant (p=0.21). Exposure to mass media was observed to be high (81%) among the primary caregivers, but no statistically significant relationship was observed (p=0.14) with morbidity status of the child. Similarly, no significant association was found between age of the mother and morbidity of the child (p=0.36).

Table 1: Distribution of respondents according to sociodemographic characteristics

Variable	n=250 (%)
Primary respondent	
Mother	231 (92.4)
Father	12 (4.8)
Grandparent	7 (2.8)
Age of the mother	
≤19 years	81 (32.4)
20-29 years	132 (52.8)
≥30 years	37 (14.8)
Age of the father	
≤19 years	28 (11.2)
20-29 years	178 (71.2)
≥30 years	44 (17.6)
Number of children	
Only 1	103 (41.2)
2-4	86 (34.4)
More than 4	61 (24.4)
Type of family	
Nuclear	138 (55.3)
Joint	112 (44.7)
Socioeconomic status	
Upper and upper middle	34 (13.6)
Lower middle	143 (57.1)
Lower class	73 (29.3)
Education of mother	
Illiterate	34 (13.6)
Up to primary school	67 (26.8)
Up to middle school	70 (28)
High school	51 (20.4)
High school pass and above	28 (11.2)
Education of father	
Illiterate	40 (16)
Up to primary school	32 (12.7)
Up to middle school	90 (36)
High school	42 (16.8)
High school pass and above	46 (18.5)
Religion	
Hindu	167 (66.8)
Muslim	32 (12.7)
Christian	51 (20.5)
Caste	
General	34 (13.6)
OBC	84 (33.5)
ST/SC	132 (52.9)

DISCUSSION

Our cross-sectional study on social factors of morbidities of infants conducted among 250 rural households having infants <1 year of age observed that prevalence of teenage mothers was high, most of the mothers were primipara, belonging to nuclear families of lower

Table 2: Distribution of infants according to different morbidity episodes

Type of morbidity	Number of episodes (%)
Diarrhea	30 (21.7)
ARI	46 (33.3)
Fever	34 (24.6)
Ear disorder	13 (9.4)
Eye disorder	7 (5.2)
Skin disorder	8 (5.8)
Total	138 (100)

ARI: Acute respiratory infection

socioeconomic strata. School educations of mothers in most of the cases were less as most of them were educated up to primary school only. Most of the fathers were also educated up to middle school only. More than two-third families belonged to backward castes and Hindu religion. Alcoholism was found in 30% families, penetrations of mass media channels among rural families were found to be high, and sanitation in many families was found to be lacking. Our study revealed that in those families where mothers had less education, less family income and belonging to backward caste families, the infants had more episodes of morbidities than the others. Analysis of various national level surveys revealed lower economic condition

Table 3: Relationship between different social factors and morbidity status

Variable	Infants with morbidity (n=82)	Infants without any morbidity	Chi-square test	p value
Sex of the child				
Male	50 (61)	68 (40.5)	8.48	0.003
Female	32 (39)	100 (59.5)	Df=1	Significant
Number of siblings				
Nil (only child)	22 (26.8)	81 (48.2)	10.69	0.005
1-2	23 (28.1)	37 (22)	Df=2	Significant
3 or more than 3	37 (45.1)	50 (29.8)		
Socioeconomic status				
Upper class and upper middle	8 (10)	26 (15.5)	1.53	0.21
Lower middle and lower class	74 (90)	142 (84.5)	Df=1	Not significant
Mothers education				
Illiterate or up to primary school	40 (48.8)	61 (36.3)	5.48	0.06
Middle school or up to class 10	31 (37.8)	90 (53.5)	Df=2	Not significant
10th pass or above	11 (13.4)	17 (10.2)		
Type of family				
Nuclear	49 (60)	89 (53)	0.79	0.38
Joint	33 (40)	79 (47)	Df=1	Not significant
Caste				
General	7 (8.5)	27 (16.1)	3.96	0.13
Backward caste	33 (40.2)	51 (30.4)	Df=2	Not significant
ST/SC	42 (51.3)	90 (53.5)		
Religion				
Hindu	57 (69.5)	110 (65.5)	0.4	0.52
Others	25 (30.5)	58 (34.5)	Df=1	Not significant
Age of the mother				
≤19 years	6 (7.3)	22 (13.2)	1.9	0.36
20-29 years	62 (75.6)	116 (69)	Df=2	Not significant
≥30 years	14 (17.1)	30 (17.8)		
Source of water				
Sanitary	15 (18.3)	81 (48.2)	20.86	0.001
Insanitary	67 (81.7)	87 (51.8)	Df=1	Significant
Type of excreta disposal				
Sanitary	31 (37.8)	110 (65.5)	17.16	0.001
Insanitary	51 (62.2)	58 (34.5)	Df=1	Significant
Exposure to mass media				
Adequate exposure present	67 (81.7)	123 (73.2)	2.18	0.14
Not adequate exposure	15 (18.3)	45 (26.8)	Df=1	Not significant
Alcoholism in the family				
Present	24 (29.3)	54 (32.2)	0.21	0.64
Absent	58 (70.7)	114 (67.8)	Df=1	Not significant

of the family, and low literacy status of the mother was likely to be disadvantaged in terms of infant and child survival. Children born in schedule caste and schedule tribe families were also found to be at higher risk of dying than the others [7,17]. Improved sanitation, pucca house, and presence of electricity were also found to be associated with decreased neonatal and infant deaths in the previous studies. Male gender and birth order was also reported as risk factors of ill health during infancy [18,19].

In our study, ARI, fever, and diarrhea were found to be the most common morbidities among children <1 year of age. Other studies on child mortality also revealed ARI and diarrhea as the 2 major causes of under 5 deaths [5,20]. More than one-third of the infants had at least one episode of morbidity during the preceding 3 months with 0.5 morbidity episodes per child. Poor social indicators among the study population might be a reason for this high prevalence of morbidity among infants. Similar observations were obtained in studies conducted in South India and Odisha among vulnerable population [21,22].

The study observed that those infants who had more siblings they were suffering from more morbidities than others. Lack of proper care to individual child in a large family might be the reason. Other studies conducted in rural areas also got similar results [23]. Male gender was found to be significantly associated with morbidity in our study. Similar results were observed in the previous studies also [24,25]. We also found a significant association between use of sanitary water source and excreta disposal by the family and morbidity of the infant as use of clean water and sanitary excreta disposal are very essential to prevent diseases such as ARI and diarrhea. Different surveys and analysis indicated the important role of water source and excreta disposal on child morbidity [18,26].

Our analysis on role of mass media and morbidity among infants showed that penetration of different mass media channels such as newspapers, radio, and TV were good among rural households which can be used in future for health education of the families as these mass media channels can effectively address a wide range of health behaviors related to child survival [27]. High prevalence of alcoholism among the study population was one important social problem and might be a factor for morbidity episodes among the infants in our study. Analysis of the National Family Health Survey data had found that children from those households that use tobacco or alcohol were less likely to be immunized, more likely to have acute respiratory tract infection, more likely to be malnourished, and more likely to die within 1st year of life [28]. Hence to reduce infant deaths and morbidity, alcoholism, and other social problems are needed to be addressed.

Limitation of our study was that our study was conducted with a small sample size, and not all the social variables could be included due to limited resource and manpower, but the key findings from our study are important and need further detailed studies for better outcomes of child health interventions.

CONCLUSION

This study on role of social factors on health and morbidity status of infants showed the amount of risk that can be eliminated if

we focus on these social factors more aggressively. Major study findings included high prevalence of ARI and diarrhea among rural infants, male gender, and numbers of siblings were associated with occurrence of morbidities, statistically significant association was also found between morbidity of infants and use of sanitary water source and excreta disposal and the study also revealed that infants in those families where mothers had less education, less family income and belonging to backward caste families, they had more episodes of morbidities then the others.

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