

# A study on cause of death among the tribal children of Udalguri district, Assam

Nabajit Kumar Das, Rekha Das

Department of Anthropology, Gauhati University, Guwahati, Assam, India.  
Correspondence to: Nabajit Kumar Das, E-mail: nabajitdas69@yahoo.com

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## Abstract

**Background:** Among several parameters to understand the living standard of a country, child mortality is a vital sensitive indicator. The study of child mortality has long been largely neglected by research in developing nations of world including India.

**Objective:** In this paper, an attempt has been made to see the main causes of child death and also try to find out the various factors associated with it.

**Materials and Methods:** Interview with structured schedule was the prime method of data collection, while observation method was also applied whenever necessary. The cause of death was ascertained using verbal autopsy procedure. Percentage distribution, chi-square, and logistic regression model have been used to determine the factors affecting child mortality.

**Result:** The study reveals that out of 604 live births, 562 (93.06%) children are surviving while 42 (6.95%) are dead. Female infant and child mortality are higher than that of male. The main causes of death among the infants, 1–5 years, and 5–14 years children are low birth weight (30.00%), diarrhea (44.44%), and fever unspecified (42.86%), respectively.

**Conclusion:** In this study, factors such as mothers' age at first child birth, birth order, mothers' education, institutional delivery, and immunization have played a very important role in reducing child mortality.

**KEY WORDS:** Child mortality, chi-square, infant mortality, logistic regression, verbal autopsy

## Introduction

Children are considered to be the most valuable assets of any nation. The children therefore are needed to be protected and looked after well by any country or nation with a vision of prosperity. Among several parameters to understand the living standard of a country, child mortality is a vital sensitive indicator. According to UNICEF<sup>[19]</sup> in the state of the

world's children report noted that 8.1 million children across the world who died in 2009 before their fifth birthday lived in developing countries and died from a disease or a combination of diseases that could easily have been prevented or treated. It also noted that, half of these deaths occurred in just five countries namely, India, Nigeria, the democratic republic of Congo, Pakistan, and China; while India and Nigeria both accounting for one-third of the total number of under-five deaths worldwide.

Many biological and socio-cultural factors are responsible for high mortality rate of the children, especially of the infants. The economically advanced countries were able to reduce their death rate to less than 10 per thousand largely by providing their people with adequate and wholesome food, pure drinking water, better hospital facilities, better sewage disposal, and taking proper measures to control various diseases.<sup>[3]</sup>

For infants and young children, the risk of dying is closely related to the environment where they live, if they are ill

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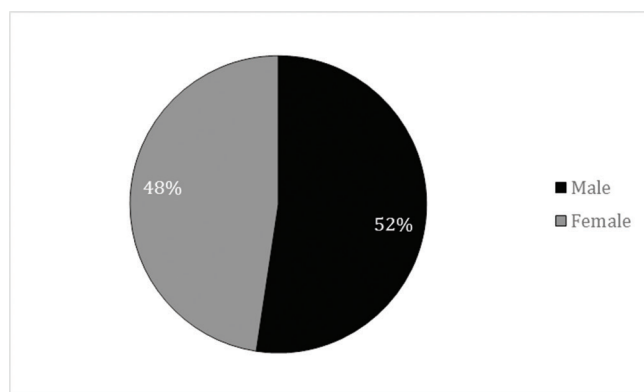
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**Table 1:** Distribution of child mortality according to age

Categories	Live birth	Surviving children	No. of death			Mortality rate (per 1000 live birth)
			Male	Female	Total	
Below 1 year	85	75	4	6	10	117.65
1–5 year	168	150	8	10	18	107.14
5–14 year	351	337	8	6	14	39.89
Total (0–14 years)	604	562	20	22	42	69.54
%		93.05	3.31	3.64	6.95	

**Figure 1:** Gender wise mortality.

equipped to deal with infection. Inadequate food and lack of elementary hygiene are the other factors. While the baby is in mother's womb, the health and the nutrition of the mother, her age, the number of children she already had, the interval between them and the care during pregnancy, etc. have profound influence on its survival. Inadequate care during delivery, incomplete or no immunization, inadequate or no breast feeding, and improper supplement feeding practices further enhance the hazard to the child. Thus, the determinants of child survival vary according to various socio-economic, cultural, demographic, and health-care factors. In reference to the above background in this paper, an attempt has been made to see the main causes of child death and also find out the various factors associated with it.

## Materials and Methods

For the present study, data have been collected from five villages inhabited by the Rabha tribe under Udalguri PHC, Udalguri district. Altogether, 250 eligible couples, having 0–14 years aged children, were selected and the mothers were interviewed for collecting the data on child mortality. The children are grouped into three different age groups: infant (<1 year), preschool (1–5 year), and school going (5–14 year). The age of the deceased children was ascertained by the date of birth. If the parents could not recall, then it was ascertained by the religious and ritual events.

The causes of deaths were ascertained by using standard verbal autopsy procedure. A verbal autopsy is a method of finding out the causes of a death based on interview with next of kin or other care givers. In case of doubt, the cause of death was ascertained after discussion with the medical officer of Udalguri PHC. Interview with structured schedule was the prime method of data collection. The interlinkages between child mortality and different variables have been tested by applying cross-tabulation analysis. The cross-tabulation analysis is important in first step for studying the relationship between mortality and several characteristics. The logistic regression model was used to estimate the odds ratios for the different independent factors influencing child mortality. This analysis considered only those variables that were found significant in cross-tabulation analysis.

## Result

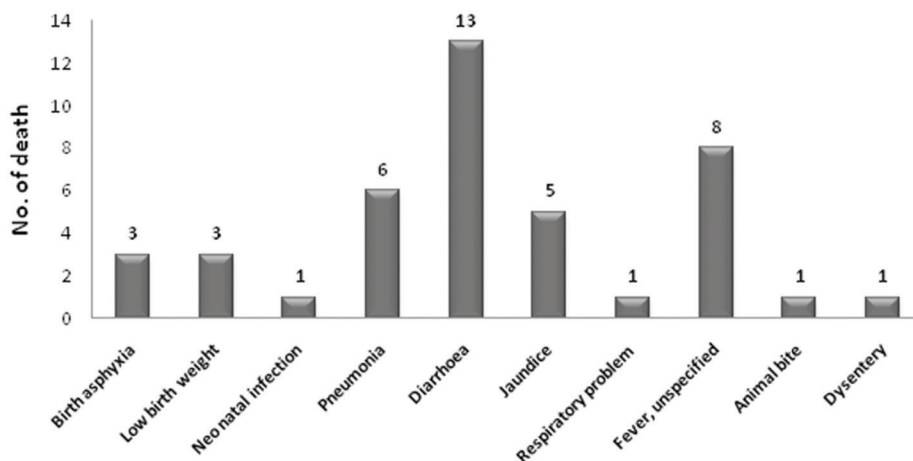
During the study period, out of 604 live births, 42 child deaths were reported. The mortality rates of infant (0–1 year), 1–5 years, and 5–14 years age group are 117.65, 107.14, and 39.89, respectively per 1000 live births. The total child mortality (0–14 years) rate is 69.54 [Table 1]. Female child mortality is found to be higher than the male child mortality (52.38% vs. 47.62%) [Figure 1].

The major causes of death during infancy is low birth weight (30.00%) followed by birth asphyxia (20.00%), pneumonia (20.00%), diarrhea (20.00%), and neonatal infection (10.00%). The major causes of death in the age group 1–5 years are diarrhea (44.44%), followed by pneumonia (22.22%), jaundice (11.11%), fever unspecified (11.11%), birth asphyxia (5.56%), and respiratory problem (5.56%). While fever unspecified (42.86%) is the main cause of death among the 5–14 years age group children followed by jaundice (21.43%), diarrhea (21.43%) animal bite (7.14%), and dysentery (7.14%) [Table 2]. In this study, diarrhea is found to be the killer disease among the children [Figure 2].

The distribution of child mortality by different variables is shown in Table 3. From the table, it is observed that mothers' age at first child birth, birth order, place of delivery, attendant at the time of delivery, status of immunization, and mothers' education are significantly associated with child mortality. While the chi-square test has shown no statistical significant association of child mortality with other variables, viz., fathers'

**Table 2:** Distribution of dead children according to causes of death

Categories	Causes of death	Male	Female	Total	Percentage
0–1 years	Birth asphyxia	1	1	2	20.00
	Low birth weight	0	3	3	30.00
	Neonatal infection	1	0	1	10.00
	Pneumonia	1	1	2	20.00
	Diarrhea	1	1	2	20.00
	Sub-total	4	6	10	100
1–5 years	Birth asphyxia	0	1	1	5.56
	Diarrhea	3	5	8	44.44
	Jaundice	1	1	2	11.11
	Respiratory problem	0	1	1	5.56
	Pneumonia	3	1	4	22.22
	Fever, unspecified	1	1	2	11.11
	Sub-total	8	10	18	100
5–14 years	Animal bite	1	0	1	7.14
	Diarrhea	2	1	3	21.43
	Dysentery	0	1	1	7.14
	Fever, unspecified	4	2	6	42.86
	Jaundice	1	2	3	21.43
	Sub-total	8	6	14	100

**Figure 2:** Cause of death.

education and fathers' occupation. Mothers' age at first child birth plays a very significant role in child mortality. Child mortality is found to be the highest, i.e., 10.09% among those mothers whose age at first child birth is below 19 years while it is the lowest, i.e., 3.08% where mothers' age at first child birth is between 20 and 23 years. Birth order also plays a very vital role in child mortality. Child mortality is found to be 2.80% in those mothers who had given single birth; while it is 7.44% to the mothers having 2–3 children. It is 26.67% for those mothers who had given birth to more than 4 children. It is said that children born in institutions are likely to have lower risk of mortality as compared to those children born in home.

In this study also child mortality is found to be the highest in home delivery (14.67%) as compared to hospital delivery, i.e., 4.41%. Child mortality is found to be the highest when deliveries are conducted by untrained midwife (20.00%). It is found to be 15.83% when deliveries are attended by trained midwife and it is 3.78% when attended by doctor. Thus, it is clear that doctor assistance is necessary for safe child birth and safe motherhood. The child mortality is found to be the highest, i.e., 33.33% for the children who are not at all immunized. The percentages of child mortality for half-immunized, completely immunized, and not immunized categories are 4.71%, 1.67%, and 15.94%, respectively. Child mortality when studied in

**Table 3:** Factor influencing child mortality, percentage, and results of  $\chi^2$  tests

Factors	Child survival			$\chi^2$	p-value
	Live birth	Alive	Death		
Mothers' age at first child birth					
>19	218	196 (89.91)	22 (10.09)	8.94	0.011450*
20–23	227	220 (96.92)	7 (3.08)		
>24	159	146 (91.82)	13 (8.18)		
Birth order					
1	250	243 (97.20)	7 (2.80)	33.81	0.000001*
2–3	309	286 (92.56)	23 (7.44)		
4+	45	33 (73.33)	12 (26.67)		
Place of delivery					
Hospital	454	434 (95.59)	20 (4.41)	18.35	0.000019*
Home	150	128 (85.33)	22 (14.67)		
Attendant at the time of delivery					
Doctor	450	433 (96.22)	17 (3.78)	27.88	0.000001*
Trained midwife	139	117 (84.17)	22 (15.83)		
Untrained midwife	15	12 (80.00)	3 (20.00)		
Status of immunization					
Still continuing	138	116 (84.06)	22 (15.94)	31.52	0.000001*
Half-done	340	324 (95.29)	16 (4.71)		
Completely immunized	120	118 (98.33)	2 (1.67)		
Not done	6	4 (66.67)	2 (33.33)		
Mothers' education					
No education	328	296 (90.24)	32 (9.76)	10.54	0.005143*
Primary	142	134 (94.37)	8 (5.63)		
Secondary and above	134	132 (98.51)	2 (1.49)		
Fathers' education					
No education	194	180 (92.78)	14 (7.22)	5.16	0.076543
Primary	193	174 (90.16)	19 (9.84)		
Secondary and above	217	208 (95.85)	9 (4.15)		
Fathers' occupation					
Business	109	102 (93.58)	7 (6.42)	1.86	0.761834
Cultivator	272	256 (94.12)	16 (5.88)		
Service	19	18 (94.74)	1 (5.26)		
Unskilled labor	176	160 (90.91)	16 (9.09)		
Skilled labor	28	26 (92.86)	2 (7.14)		

\*p-value <0.05 significant.

relation to mother's education, it is found to be the highest, i.e., 9.76% for the illiterate mothers, followed by 5.63% for primary educated mothers, and 1.49% for secondary and above educated mothers. It is clear that the child mortality rate decreases with the increase in mothers' education. When the child mortality is studied in relation to fathers' educational status, the primary educated fathers have experienced the highest incidence of child death and the percentage is 9.84%. However, no significant association is found between child death and fathers' education. Child mortality when studied in relation to fathers' occupation, the highest mortality is found among the unskilled labor category, i.e., 9.09% and the lowest is found among the service category, i.e., 5.26%.

The results of logistic regression analysis are shown in Table 4 in which it is observed that all the explanatory

variables have significant effect on child mortality. In this study, mothers' age at marriage plays an important role on child mortality. The relative risk of child mortality is found 1.462 times higher for younger age group mothers (<19 years) and 0.357 times lower for mothers of 20–23 years as compared to 24 years and above age group mothers. Birth order shows a very strong relationship with child mortality risk. The risk of child mortality is 2.792 times higher for birth order 2–3 and 12.623 times higher for the birth order 4+ as compared with single birth order. It is often assumed that delivery in hospital is relatively safe for both mother as well as their children. The risk of child mortality is 3.730 times higher for those babies delivered at home as compared with those babies delivered at hospital, which is in agreement with the predetermined assumption. When child mortality is compared with attendant

**Table 4:** Logistic regression estimates for the effects of some selected variables on child mortality

Factors	Coefficient	S.E.	Sig.	Exp(B)	95% CI
Mothers' age at first child birth				1	
>24 (Ref.)					
>19	0.380	0.368	0.302	1.462	0.711–3.005
20–23	–1.029	0.481	0.032	0.357	0.139–0.917
Birth order				1	
1 (Ref.)					
2–3	1.027	0.440	0.020	2.792	1.178–6.618
4+	2.536	0.510	0.000	12.623	4.641–34.333
Place of delivery				1	
Hospital(Ref)					
Home	1.316	0.325	0.000	3.730	1.973–7.051
Attendant at the time of delivery				1	
Doctor(Ref)					
Trained midwife	1.566	0.339	0.000	4.789	2.463–9.313
Untrained midwife	1.851	0.691	0.007	6.368	1.643–24.681
Status of immunization				1	
Completed(Ref)					
Still continuing	1.346	0.346	0.000	11.190	1.950–7.566
Half-done	–1.069	0.758	0.158	2.914	0.078–1.515
Not Done	2.315	0.903	0.010	29.500	1.725–59.445
Mothers' education				1	
Secondary and above (Ref.)					
Illiterate	1.965	0.736	0.008	7.135	1.685–30.212
Primary	1.371	0.800	0.087	3.940	0.821–18.902

at the time of delivery, the risk is found 4.789 times and 6.368 times higher in case of trained midwife and untrained midwife, respectively as compared to delivery assisted by doctor. Status of immunization is another important factor that plays a very significant role on child mortality. Child mortality is found 29.500 times higher among the non-immunized children when it is compared with immunized children. However, the risk is found to be 11.190 and 2.914 times higher for still continuing and half-immunized children, respectively. Mothers' education is another important factor that affects child mortality. Child mortality is found to be 7.135 and 3.940 times higher for illiterate and primary educated mothers, respectively, when it is compared with secondary and above educated mothers.

## Discussion

According to the NFHS-3<sup>(11)</sup> report infant (0–1 year) and child mortality (1–5 years) rates among the tribal populations of India are 62.1 and 35.8, respectively. It can therefore be said that the infant and child mortality rates of the Rabhas are quite higher as compared to the national figure. This study shows higher female child mortality over male child mortality. In some earlier studies also, infant and child mortality rates for females were found to be higher than the males<sup>11</sup>. Diarrhea was found to be the main cause of death in this study. In overall scenario of Assam and India, diarrhea is found to be the main killer disease of children<sup>(11)</sup>.

Many studies in India showed extremes of maternal age (<20 and >30 years) as risk factors associated with infant mortality.<sup>[6,8]</sup> The examination of the determinants of infant and child mortality variations in Jordan, Yemen, Egypt, and Tunisia using data from WFS Surveys indicated that mortality risk was higher for infants born to very young and very old mothers with short previous birth orders and where previous infants had died.<sup>[1]</sup> Therefore, it can be said that the present findings seem to be same with the findings mentioned above.

In this study, child mortality is found to be the highest when the mothers have more conceptions. It may be mentioned here that Rutstein<sup>[16]</sup> and Islam and Islam<sup>[12]</sup> in their studies also recorded higher child mortality when the mothers have more conceptions. Higher birth orders are likely to be born to older mothers and these children may face competition for resources such as food and medical care.

Due to good health hygiene and care at the time of birth, children born in institutions are generally expected to have low risk of death as compared to children born at home. The present findings show conformity with the study of Chowdhury<sup>[9]</sup> who examined the determinants of under-five mortality in Bangladesh. He found that the risk of child mortality is higher in home deliveries as compared to hospital deliveries. Many others studies also support the present findings.<sup>[16,17]</sup>

It is generally expected that the chance of survival of a child is higher when the birth is attended by a trained health



personnel. In this study, child mortality was found to be the lowest when the deliveries were attended by the doctor. Khongsai<sup>[5]</sup> found higher infant and child mortality among the Khongsai Kukis of Imphal town and Saikul subdivision when deliveries were assisted by elderly person than the trained health personnel.

The immunization of children against six serious but preventable diseases, viz., tuberculosis, diphtheria, Pertussis, tetanus, Poliomyelitis, and measles is an important aspect of child health-care system in India. According to NFHS-3<sup>[11]</sup> reports, only 43.5% children in India and 31.4% in Assam are vaccinated against the six dreadful diseases. A strong significant relationship is found between child mortality and status of immunization. In this study, child mortality was found to be the highest among those children who are not at all immunized. The findings of NFHS-3<sup>[11]</sup> also reveal the similar results, i.e., the risk of child mortality is found to be the highest among those children who are not at all immunized. The studies of Kabir et al.,<sup>[14]</sup> Kabir and Long,<sup>[13]</sup> and Agarwal et al.<sup>[2]</sup> also support the present findings.

Maternal education is another important factor affecting the child mortality. Children of illiterate mothers have higher risk of dying during infancy compared to literate mothers as a strong link is seen between female education and child survival.<sup>[4,7,10]</sup> Same result is found to exist between mothers' education and child mortality among the Rabhas.

The present finding is in conformity with the study of Alam,<sup>[4]</sup> who found child mortality to be the highest among the labor categories. Bajkhaif and Mahadevan<sup>[5]</sup> also found high infant mortality among those of lower categories of occupation and it is very low among those of higher occupation.

## Conclusion

The findings suggest that a number of factors have been found to have statistically significant association with child mortality and these factors are (1) bio-demographic factors such as mothers' age at first child birth and birth order; (2) socio-economic factors such as mother's education, and (3) health-care factors such as place of delivery, delivery attendant, and status of immunization of the children. Thus, from this study, it can be said that increase in age at first child birth, increase in mothers' education, proper utilization of health-care services such as hospital delivery, and complete immunization may decrease infant and child mortality among the Rabhas.

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