Child Health in India

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Preface

With a population of 1.30 billion India is the second most populous country in the world and this include more than two thousand ethnic groups living in different parts of the country covering as many as 36 states and union territories. The population of India presents great diversity not only with regard to genes, language, culture and religion but also social, economic, demographic, environmental and so on and so forth. It is reported that 31.2% of the country's population fall under the 0-14 year category.

With many states at different levels of development, healthcare infrastructure and income levels the health scenario among the different communities living in India is subjected to high amount of disparity. It is reported that beyond medical causes there is convincing evidence of social, economic, demographic, health system, environmental and other factors that determine the health of a population. Health as defined by the World Health Organization (WHO) is 'a complete state of physical, mental and social well-being and not merely the absence of disease or infirmity'.

Childhood is a significant phase of life and deprivation during this period can have long term adverse impact on the well being of children. Infant and child mortality are sensitive indicators to determine the socio-economic development of a country. In spite of reducing child mortality, death of infants in India on the first day of birth is still way too high and likely to hamper it from achieving the millennium development goal for curbing infant mortality rate (IMR). Globally the country accounts for 29 percent of the new born deaths on

the first day of birth. However it is found that the rate of infant and child mortality is not uniform throughout the country with states like Assam, Madhya Pradesh, Uttar Pradesh, Orissa, Rajasthan, Chhattisgarh etc. registering a higher rate of mortality than the national average. It is pertinent to note that the rate of mortality is much higher in the rural areas and among those who are economically disadvantaged and underserved thereby making it clear that several indirect factors apart from the direct ones should be looked into to determine child health in a community.

Children cannot achieve optimal health alone. They are dependent upon adults in their family and community to provide them with an environment in which they can learn and grow successfully. Maternal health status, habits and environment during and even before pregnancy profoundly impact the health and well being of a child. Thus, achieving optimal child health is dependent upon optimizing the health and well-being of a child's mother.

At this backdrop, a two day national seminar on **Child Health in India with special reference to North-East India** was organized at the DHSK College, Dibrugarh, Assam on the 2nd and 3rd of May, 2015 to report and discuss about the health status of children of different communities living in India and especially that of North-East India including Assam. This Edited Volume is a result of those productive two day deliberation. It consists of 18 papers out of around 60 research papers that were presented at the national seminar covering different aspects of child health.

I wish to take this opportunity and place on record the help and cooperation of my colleagues at the department of Anthropology, DHSK College namely Dr. Moromi Talukdar, Mr. Anup Jyoti Bharali, Dr. Nitumoni Saikia and Dr. Sunanda Sahu in organizing the national seminar. My sincere thanks go to the then Principal Dr. Atikuddin Ahmed, faculties and employees of the college, the esteemed resource persons and seminar participants for their sincere cooperation in holding the seminar successfully. My sincere gratitude also goes to

my PhD and post-doctoral supervisor Prof. Sarthak Sengupta and other teachers at the Department of Anthropology, Dibrugarh University for their support and guidance in this endeavour. I am extremely thankful to language editors Rev. Sr. Yvonne Pereira SSpS and Fr. Dr. K. Jose SVD the director of Sanskriti-NEICR, Guwahati for their timely help in going through the manuscripts. I wish to register my gratefulness to the co-editors of this volume Dr. Moromi Talukdar and Mr. Anup Jyoti Bharali for their cooperation in spite of their busy schedule. Last but not the least my sincere acknowledgements go to UGC and ICSSR for funding the seminar and Omsons Publications, New Delhi for publishing the valuable papers.

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Contents

Evaluation of Undernutrition Using International Cut-offs among 2-12 Years Children of Midnapore and Purulia, West Bengal, India

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Introduction

India is one of the most populous countries in the world with a great diversity in genetic makeup, as well as cultural practices. Each and every state in India is practically equivalent to a country with its specific socio-economic level, different ethnic groups, food habits, health infrastructures and communication (Das & Bose 2012). India has achieved remarkable economic progress in the last couple of decades but the fruit of progress has failed to assure better nutritional status to our children (Shahnawaz & Singh 2014). Nutritional status of the children remains very poor for most of the states, especially in the tribal regions and lower socio-economic groups among urban populations. India is home to almost one-third of the world's total malnourished children and hence, poor nutritional health condition of children has become one of the

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major public health issues (Amirthaveni & Barikor 2001). Therefore, understanding the variation/distribution of nutritional status in terms of malnutrition or under nutrition among nutritionally vulnerable populations is very essential in developing countries like India, which accounts for the highest occurrence of childhood malnutrition in the world (Bamji 2003). Children living in rural, urban slum and particularly the children of tribal populations are the most vulnerable groups of undernourishment (Mitra *et al*. 2007). Several studies have explored the health and nutritional status of children in India (IIPS 2007; NNMB 1978). Health and the nutritional status of the children, directly or indirectly reflect the overall socioeconomic growth and development of the society. It also influences the progress in human resources and economic development of a country (Amirthaveni & Barikor 2001). Nutritional status is the status of an individual with respect to their health as defined by their nutrition intake. Thus, the nutritional status of the populations show significant variation between states/countries since it results from a varying combination of factors (Bose & Chakraborty 2005). The nutritional status of individual/children is controlled by intrinsic genetic factors and their associated environmental, socio-economic and socio-cultural behaviours. These variables can be broadly categorized into two major groups viz modifiable and non-modifiable factors. Some of the important variables of modifiable factors for poor/insufficient nutrition intake among children include poverty, illiteracy, lack of awareness, low socioeconomic status and other cultural factors (James *et al.* 1997). Moreover, poor nutritional health status contributes to an array of morbidities and mortality. From the available literatures, it has been evidenced that poor nutritional status affects all aspects of an individual child, lost productivity, intelligence, behaviour, brain growth, both pre and postnatal (Pollitt et al. 1996). Furthermore, it is also evidenced that malnourished children who had prenatal illnesses experienced more school failure (McGaughey *et al.* 1991). With this background, our paper attempted to evaluate the nutritional

status of the Bengalee children of West Bengal, using internationally accepted cut-offs of Body Mass Index (BMI).

Materials and Methods

The present study was conducted among children aged 2-12 years having Bengalee ethnicity of West Bengal (A State situated on the Eastern part of India), on a sample size of 2310 children (1144 boys and 1166 girls). It was carried out from November, 2009 to December, 2010 as part of a research investigation. Data on age, sex, weight and height were collected from all the subjects using a pretested questionnaire via household visits, following interview and anthropometric measurements. The age of children was documented from their birth certificates provided by the nearest Primary Health Centre (PHC) or polio vaccination card provided by the teachers of *Anganwadi* (An integrated child development program by the Government of India) and subsequently confirmed by their parents. The age of the subjects was considered to the nearest whole number. Thus, the appropriate (to the nearest whole age) cut-off values were utilized. The children studied were of Bengalee ethnicity of the State. Anthropometric measurements, viz. stature and body weight of all children recruited in the present study were taken only after obtaining prior consent from them and their parents (care takers). Individuals were categorized into eleven age groups, from 2 to 12 years. The body mass index (BMI; kg/m^2) was computed for evaluating the nutritional status, following internationally accepted standard equation as BMI = weight (kg)/height (m^2) (WHO 1995). Stature and body weight were recorded from each participant by the first author (SD) following standard techniques (Lohman *et al.* 1988). Technical errors of measurement were found to be within reference label (Ulijaszek & Kerr 1999) and thus not incorporated in statistical analyses. Participants were informed about the objectives prior taking all data. Visits were made mostly in the day time, when most of the responders (females) were expected to be at home. Ethical approval was obtained from competent authority before

commencement of the study. The Nutritional status was evaluated using the age-sex specific cut-off points of BMI for children described by Cole *et al.* (2007). The thinness Grades III, II and I refer to severe, moderate and mild under nutrition, respectively. (Table 1). The World Health Organization's (WHO) classification (1995) of public health problem of low BMI between populations worldwide was followed. The classification categorizes prevalence according to percentage of population with BMI <18.5 kg /m2. Low prevalence (5-9%) - Warning sign, (monitoring require); medium prevalence (10-19%) - Poor situation; High prevalence (20-39%) - Serious situation and Very high prevalence (40%) - Critical situation. Statistical analyses were performed using the SPSS software (11.0 Version) and MS-Excel. Statistical significance was set at $p < 0.05$.

Table-1: BMI (kg/m^2) Cut-off Points for Thinness Grades III, II and I for 2-12 Years Old Children (Cole et al. 2000 & 2007)

Age (Years)	Boys Thinness*			Girls Thinness*		
	Grade III (< 16.0)	Grade II (16.0 - 16.9)	Grade I (17.0 - 18.49)	Grade III (< 16.0)	Grade II (16.0 - 16.9)	Grade I (17.0 - 18.49)
2	13.37	14.12	15.14	13.24	13.90	14.83
3	13.09	13.79	14.74	12.98	13.60	14.47
4	12.86	13.52	14.43	12.73	13.34	14.19
5	12.66	13.31	14.21	12.50	13.09	13.94
6	12.50	13.15	14.07	12.32	12.93	13.83
7	12.42	13.08	14.04	12.26	12.91	13.86
8	12.42	13.11	14.15	12.31	13.00	14.02
9	12.50	13.24	14.35	12.44	13.18	14.28
10	12.66	13.45	14.64	12.64	13.43	14.61
11	12.89	13.72	14.97	12.95	13.79	15.05
12	13.18	14.05	15.35	13.39	14.28	15.623

*All values are in kg/m^2.

Result and Discussion

The age and sex wise distribution of children studied is shown in Table 2. The total no of subjects were 2310, of whom 1144 (49.52%) were boys and 1166 (50.47%) were girls. The overall female to male ratio (FMR) of subjects was 1019 females per 1000 males. The highest frequency of subjects was of 5 years which was 15.84%, where 174 were boys and 192 were girls followed by 3 years (15.15%) subjects which was 350 and the lowest frequency was observed at age 11 years (3.64%) which was 84.

Table-2: Age and sex wise distribution of studied children

Age(years)	Sex		Total	
	Boys(n)	Girls(n)	Frequency	%
2	122	127	249	10.78
3	205	145	350	15.15
4	178	118	296	12.81
5	174	192	366	15.84
6	132	143	275	11.90
7	82	71	153	6.62
8	68	78	146	6.32
9	74	92	166	7.19
10	56	66	122	5.28
11	25	59	84	3.64
12	28	75	103	4.46
Total	1144	1166	2310	100

Table 3 shows the overall sex specific descriptive statistics of weight, height and BMI of the children studied. Negative significant sex difference was observed for weight (t = -6.017; sig. = 0.001) and height (t = -6.847; sig. = 0.001). On the other hand positive, significance was observed for BMI (t = 2.719; sig. = 0.001).

Table-3: Age combined and sex specific mean, SD, t- test and significance of weight, height and BMI of the studied subject

Variables	Sex	N	Mean	Std. Deviation	t	Sig.
WEIGHT	Boys	1144	15.5921	5.40802	-6.017	.000
	Girls	1166	17.2643	7.72454		
HEIGHT	Boys	1144	1.0343	16.71013	-6.847	.000
	Girls	1166	1.0843	18.27271		
BMI	Boys	1144	14.4083	2.49848	2.719	.007
	Girls	1166	14.1356	2.31973		

Table-4: Age and sex specific descriptive statistics of weight, height and BMI of studied children

Variables →	Weight			Height			BMI		
Age (Years) ↓	Boys Mean (SD)	Girls Mean (SD)	t -test	Boys Mean (SD)	Girls Mean (SD)	t- test	Boys Mean (SD)	Girls Mean (SD)	t -test
2	10.52(1.64)	10.40(1.87)	0.543	84.97(8.01)	86.12(8.49)	-1.106	14.68(1.98)	14.04(1.73)	2.746**
3	10.94(1.39)	11.77(3.27)	-3.254***	89.40(9.53)	90.33(10.78)	-850	14.00(2.62)	14.47(2.47)	-1.676
4	13.45(1.69)	12.98(2.27)	2.033*	94.36(9.66)	97.83(8.49)	-3.175**	15.45(3.39)	13.56(1.60)	5.648***
5	15.20(2.54)	14.73(2.34)	1.846	101.85(10.18)	103.69(8.30)	-1.904	14.79(2.64)	13.70(1.62)	4.808***
6	16.17(2.54)	15.50(2.42)	2.231*	108.54(7.38)	106.92(7.12)	1.854*	13.68(1.32)	13.54(1.57)	0.790
7	18.71(3.80)	17.63(2.28)	2.081*	115.91(7.99)	113.66(5.71)	1.974*	13.80(1.35)	13.63(1.27)	0.810
8	20.37(4.88)	19.02(3.29)	1.977*	120.50(7.26)	119.53(6.03)	0.881	13.90(2.18)	13.25(1.53)	2.099*
9	22.58(5.84)	20.66(5.15)	2.254*	125.86(7.72)	122.42(8.09)	2.779***	14.08(2.36)	13.61(1.97)	1.377
10	22.38(5.23)	25.26(6.85)	-2.574**	125.03(8.41)	129.12(8.14)	-2723***	14.13(1.91)	14.94(2.83)	-1.817
11	22.78(4.37)	29.51(9.33)	-3.441***	125(8.45)	136.2(10.5)	-4.708***	14.55(2.79)	15.55(3.22)	-1.344
12	25.95(8.00)	33.11(8.94)	-3.716***	130.34(12.46)	139.05(11.74)	-3.295***	14.90(2.31)	17.02(3.77)	-2.772***
ANOVA	198.90***	247.85***		285.19***	403.67***		6.71***	22.76***	

Table 4 shows age and sex wise descriptive statistics of mean weight, height and BMI of children studied. Positive significance in weight was observed at age 4 years (t = 2.033; sig.= 0.05), 6 years (t = 2.231; sig.= 0.05), 7 years (t = 2.081; sig.= 0.05), 8 years (t =1.977; sig.= 0.05) and 9 years (t =2.254; sig.= 0.05). For height, positive significance was observed at age 6 years (t= 1.854; sig.=0.05),7 years (t= 1.974; sig.=0.05) and 9 years (t= 2.779; sig.=0.001). Positive significance in BMI was observed at age 2 years (t=2.746; sig.=0.01), 4 years (t=5.648; sig.=0.001), 5 years (t=4.808; sig.=0.001) and 8 years (t= 2.099; sig.=0.05). On the other hand negative significance in weight was observed at age 3 years (t= -3.254; sig.= 0.001), 10 years (t=-2.574; sig.=0.01), 11 years (t= -3.441; sig.=0.001) and 12 years (t= -3.716; sig.=0.001). For height, negative significance was observed at age 4 years (t= -3.175; sig.= 0.01), 10 years (t= -2.723; sig.=0.001), 11 years (t= -4.708; sig.=0.001) and 12 years (t= -3.295; sig.=0.001). Negative significance in BMI was observed only at age 12 years (t= -2.772; sig.=0.001). A significant age difference in mean weight (F= 198.90; sig.= 0.001), height (F= 285.19; sig.=0.001) and BMI (F= 6.71; sig.= 0.001) for boys was observed. Similarly among girls, a significant age difference in mean weight (F= 247.85; sig. = 0.001), height (F= 403.67; sig.=0.001) and BMI (F= 22.76; sig.= 0.001) was also observed.

According to the Table 5, the highest prevalence of thinness among boys was found at the age of 8 years (67.65%) and among girls it was at the age of 4 years (82.20 %). Grade I thinness in boys was highest (32.1%) at the age of 12 years and in girls it was 30.8% at the age of 8 years. Similarly Grade II thinness (44.0%) was highest among 11 year aged boys and most for girls (20.7%) at the age of 9 years. The highest frequency of Grade III thinness among boys and girls were found to be 33.3% and 44.9% at ages 6 and 4 years, respectively.

Table 6 shows the comparative prevalence of under nutrition (thinness) among studied children of various previous studies. The highest prevalence of thinness had been observed among the Urban slum children (81.8 %) of Delhi, India (Kapil & Bali (1989) and the lowest was reported among Anganwari children,

Table-5: Prevalence of nutritional status age and sex wise among the studied children

Age (Years)	*Sex*	*Nutritional Status*					*Chi-square*
		Thinness I (%) **(%)**	*Thinness II* **(%)**	*Thinness III* **(%)**	*Total Thinness* **(%)**	*Normal*	
2	Boys	16.4	11.5	32	59.84	40.16	7.730; df=3; p=0.052
	Girls	28.3	15.7	22	66.14	33.86	
3	Boys	29.8	5.9	19.5	55.12	44.88	8.845; df=3; p=0.031
	Girls	20	13.1	23.4	56.55	43.45	
4	Boys	12.4	11.2	28.1	51.69	37.08	8.362;df=3; p=0.39
	Girls	22.9	14.4	44.9	82.2	34.75	
5	Boys	10.9	9.8	31	51.72	48.28	6.911; df=3; p=0.075
	Girls	19.8	12	29.2	60.94	39.06	
6	Boys	17.4	15.9	33.3	66.67	33.33	1.970; df=3; p=0.579
	Girls	16.8	20.3	26.6	63.64	36.36	
7	Boys	9.8	24.4	30.5	64.63	35.37	3.505; df=3; p=0.320
	Girls	16.9	18.3	22.5	57.75	42.25	
8	Boys	23.5	13.2	30.9	67.65	32.35	1.698; df=3; p=0.637
	Girls	30.8	16.7	25.6	73.08	26.92	
9	Boys	23	13.5	29.7	66.22	33.78	3.814; df=3; p=0.282
	Girls	30.4	20.7	20.7	71.74	28.26	
10	Boys	12.5	28.6	30.4	71.43	28.57	5.971; df=3; p=0.113
	Girls	15.2	13.6	25.8	54.55	45.45	
11	Boys	12	44	16	72	28	7.031; df=3; p=0.071
	Girls	13.6	16.9	23.7	54.24	45.76	
12	Boys	32.1	10.7	14.3	57.14	42.86	5.322; df=3; p=0.150
	Girls	14.7	6.7	26.7	48	52	

Table 6: Comparative nutritional status of children of different National studies with present studied children

Sl. No.	Population	N	Age	Under-nutrition (%)	Study Area	Reference
1.	Drought affected children	914	0-5 years	28.0	Western Rajasthan, India	Singh et al. (2006)
2.	Refugee camp children	125	<5 years	34.4	Tamil Nadu, India	Bazray et al. (2005)
3.	Fishing community children	136	< 5 years	35.3	Tamil Nadu, India	Bazray *et al.* (2005)
4.	ICDS children	3157	< 5 years	62.9	Vadodara city, India	Bhalani & Kotecha 2009
5.	Anganwari children	217	< 5 years	10.6	Allahabad, India	Kumar et al. (2006)
6.	Slum children	1061	1.5-3.5 years	26.5	Lucknow, India	Awasthi & Pande (1997)
7.	Urban slum children	520	<5 years	75.0	Varanasi, India	Mishra et al. (2001)
8.	NIDS children	7413	< 5 years	42.0	Chandigarh, India	Swami et al. (2000)
9.	ICDS children	1286	<5 years	51.6	Chandigarh, India	Swami et al. (2001)
10.	Urban slum children	486	< 5 years	81.8	Delhi, India	Kapil & Bali (1989)
11.	Urban slum children	630	< 6 years	22.5	Delhi, India	Saxena et al. (1997)
12.	Urban slum pre-school children	584	< 6 years	60.5	Srinagar, India	Bhat et al. (1997)
13.	Pre-school children	6531	1-5 years	10.8	Punjab	Kaur et al. 2005
14.	Slum Children	100	0-60 months	28.0	Gujarat	Shah & Patel (2009)
15.	Kharagpur children	500	6-12	77.0	West Bengal	Das et al. 2012
16.	Bengalee children	2310	2-12 years	62.4	West Bengal	Present work

(10.6 %) of Allahabad, India (Kumar et al. 2006). The present study showed a very high (62.4 %) (Critical situation) prevalence. Thus the present children studied were under a critical nutritional stress. Many other previous studies have also reported very high rates of under nutrition indication critical nutritional stress. To overcome the problem of under nutrition, more state specific policies should be designed on a priority basis, to reduce the level of under nutrition among children and to improve their nutritional status.

Conclusion

Thus we can conclude that childhood under nutrition still remains a significant and major public health issue in West Bengal. Our study illustrated the magnitude of under nutrition (thinness) in the West Bengal children of ages 2-12 years. Both boys and girls had a very high (critical) prevalence of thinness. The present study is limited in sample size and area of study and hence may not be representative of all regions of West Bengal. Similar studies are needed with larger sample sizes, covering much wider geographical areas. Such investigations would generate valuable information on the nature and extent of under nutrition. Information thus gathered would assist in national nutrition policy planning. Community specific intervention programmes can be formulated to combat the problem of under nutrition.

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Child Health in India with Special Reference to North-East India

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WHO defined (1948) Health as a state of complete physical, mental and social wellbeing and not merely an absence of disease or infirmity (Park 2013).

There was a state in the world when there were marked differences in health status between people in different countries as well as between different groups in the same country. Cost of health care is increasing without much improvement in their quality. In short, there was a clear demand for a better health care (Park 2013).

In May 1977, 30th World Health Assembly took a resolution that 'the main social target of Governments and WHO in the coming decades should be the attainment by all citizens of the world by the year 2000 of a level of health that will permit them to lead a socially and economically productive life'. This culminated in the international objective of 'HEALTH FOR ALL' by the year 2000 as the goal of all Governments. And in 1978, in WHO – UNICEF joint conference held in Alma Ata (USSR) proclaimed primary health care as a way to achieving Health for all by 2000 AD (Park 2013).

During 1973 – 1977, there was considerable rethinking about better health (WHO 1986). It became increasingly clear that

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economic development alone cannot solve major problems of poverty, hunger, malnutrition & disease. On the other hand, non economic issues e.g. education, productive employment, housing, equity, freedom and dignity, welfare have emerged as major objectives in development strategies. The experiences of a few developing countries e.g. Srilanka, Costarica and Indian state Kerala, illustrate the role of development in education, social welfare & land reforms in improving health status of a place (WHO 1984).

Kerala, situated in the southern-most part of the country with a population of 33.36 million and a population density of 858 per sq.km is extremely crowded. Its annual per capita income of Rs. 83,725 (2011-12) is more than the national average of Rs. 60,603. Kerala has surpassed all the Indian states in almost all important measures of health and social development (Park 2013). So Kerala has demonstrated that, in a democratic system with a strong political commitment to equitable socio-economic development, high levels of health can be achieved even on modest yardstick for judging health status in the country (Rao 1986).

Before the Fifth Five-Year Plan (1974-79), the Government's focus was only on child welfare through the promotion of basic minimum services for children. This culminated in the adoption of the National Policy for children, in 1974. The Fifth Five-Year Plan saw a shift of focus from welfare to development and the Integrated Child Development Services (ICDS) was born in 1975. The Government of India declared its commitment to every child in the Ninth Five-Year Plan (1997-2002). The Tenth Five-Year Plan set targets for children: all children to complete five years of schooling by 2007; reduction in gender gaps in literacy and wage rates by at least 50% by 2007; reduction in Infant Mortality Rate (IMR) to 45 per 1,000 live births by 2007, and 28 by 2012; reduction of Maternal Mortality Rate (MMR) to 2 per 1,000 live births by 2007 and to 1 by 2012; arresting the decline in the child sex ratio, and universalisation of the ICDS scheme. In Eleventh Five-Year Plan (2007-2012) Planning Commission emphatically stated that 'Development of the child is at the centre of the Eleventh Plan'. The plan

recognises the importance of holistic approach, focusing both on outcomes and indicators for development as well as macro-perspective trends and governance issues (Status of children in India 2007).

In WHO guidelines for health programme evaluation, indicators of health are defined as variables which help to measure the changes of health status (WHO 1981). Some important mortality indicators related to maternal and child health are:-

Infant mortality rate: One of the most universally accepted indicators of health status not only of infants, but also of whole population and of the socio-economic conditions under which they live. IMR is also a sensitive indicator of the availability, utilisation and effectiveness of health care, particularly perinatal care.

Under – 5 mortality rate: Used to reflect both infant and child mortality rates.

Neonatal mortality rate: Very important indicator as a major portion of under 5 deaths is contributed by neonatal mortality.

Maternal mortality rate: It varies considerably according to country's level of socio-economic status.

With more than a third of its population below the age of 18, India has the largest child population in the world (Status of children in India 2007). Mortality under 5 years of age is highest in children; and neonatal mortality contributes to a major portion of infant mortality. So health status of India will improve if we can decrease the neonatal mortality rate.

State of India's Newborn (SOIN) report published in 2014, prepared by the talented and dedicated team from the Public Health Foundation of India and the All India Institute for Medical Sciences in New Delhi, supported by the Bill & Melinda Gates Foundation, provides a detailed picture of the situation of newborn health in the country. It also elaborates on the significant progress made by the country during the last decade related to child health (State of India's newborns 2014).

India contributes to 1/5th of global live births and more than a quarter of neonatal deaths; about 0.76 million neonates died in 2012, the highest for any country in the world that year. Of

the 6.6 million U 5 deaths that occur globally every year, about 44 % occur in the neonatal period; the proportion is much higher, around 56 % in India. The Millennium Development Goal-4, which stipulates a two-thirds reduction in under-five deaths by 2015, obviously cannot be achieved without ensuring a substantial reduction in the NMR (State of India's newborns 2014).

With the launch of the National Rural Health Mission (NRHM) in 2005, newborn healthcare has received unprecedented attention and resources. The country launched several new initiatives to boost maternal-neonatal care under NRHM. The Janani Suraksha Yojana provides cash incentive for childbirth in facilities; the Facility – Based Newborn Care aims to build a three-tier system of neonatal care encompassing the PHCs, the CHCs & district hospitals; the Home-based Newborn Care – for home visiting by the ASHAs for neonatal examination, sickness detection and family counselling; the Navjat Shishu Suraksha Karyakram for provision of essential newborn care including resuscitation at all delivery points; the Janani Shishu Suraksha Karyakram entitles mothers and infants to free transportation, care, medicines, and diagnostics in all public facilities. Rashtriya Bal Suraksha karyakram, is recently instituted for screening infants for selected birth defects and developmental delays (State of India's newborns 2014).

With the current NMR of 29 per 1,000 live births, about 70 % of infant deaths and more than half of U5 child deaths in the country, fall in the neonatal period. The early neonatal mortality rate is 23 per 1,000 live births (Table 1). This implies that the first week alone accounts for about 45 % of total U 5 child death (State of India's newborns 2014).

Table-1: Current child and neonatal mortality rates (2012)

Indicators	**Per 1000 live births**
Under-five child mortality rate (U5MR)	52
Infant mortality rate (IMR)	42
Neonatal mortality rate (NMR)	29
Early neonatal mortality rate (ENMR)	23
Late neonatal mortality rate (LNMR)	6

Source: SRS Statistical Report 2012

There has been a significant reduction in the quantum of neonatal and child deaths in the last two decades. The neonatal mortality rate of the country did decline from 52 per 1000 live births in 1990 to 29 per 1000 live births in 2012 (SRS 2012) but the rate of decline has been slow, and lags behind that of infant and under-five child mortality rates. The slower decline has led to increasing contribution of neonatal mortality to infant mortality. With the current infant and under-five child mortality rates of 42 and 52 per 1000 live births respectively, about 70% of infant deaths and more than half of under-five child deaths occur in the neonatal period. The annual burden of neonatal deaths has reduced from 1.35 million in 1990 to 0.76 million in 2012 (Table 2). The rate of decline in the child, infant and neonatal mortality rates has gained momentum only in the last decade eg., neonatal deaths reduced by 32 % in the period from 2000 to 2012, but only by 17 % from 1990 to 2000 (State of India's newborns 2014).

Table-2: Estimates of child deaths in India for the year 1990, 2000 and 2012

Indicators (in millions)	1990	2000	2012	Relative reduction from 1990-2000	Relative reduction from 2000- 2012	Relative reduction from 1990 - 2012
Neonatal deaths	1.35	1.12	0.76	17%	32%	44%
Infant deaths	2.33	1.75	1.10	25%	37%	53%
Under-5 child deaths	3.32	2.41	1.36	27%	44%	59%

Source: WHO data bank and SRS Statistical Report 2012

NMR is not uniform across the country. While Kerala and Tamil Nadu have low NMRs, Odisha, MP and UP have very high NMRs, four states – UP, MP, Bihar and Rajasthan alone contribute to about 55% of total neonatal deaths in India and to about 15 % of global neonatal deaths that occur every year (State of India's newborns 2014). NMR in Kerala is 7/1000 live births and in Assam, it is 38/1000 live births (Assam AHA bulletin 2010-2011).

There are important rural-urban and socioeconomic differentials also. The NMR in rural areas is twice as those in urban areas. The discrepancy is more marked in Andhra

Pradesh, Assam, Jharkhand and Kerala. In Assam, NMR in rural area is 31 and in urban area 10/1000 live births. The NMR among the poorest 20% of the population is more than double than that of the NMR of the richest 20% (State of India's newborns 2014). In Assam it is 68%. So poverty is perhaps the most important determinant of mortality (NFHS-3). In India's caste-based social hierarchy, the SCs, dalits, STs, adivasis are the most backward and disadvantaged. They contribute a higher burden of neonatal mortality (State of India's newborns 2014). States with a high NMR usually have a low per capita GDP, so there is an inverse relationship between NMR and low per capita GDP (State of India's newborns 2014).

Health budget in India (2006 – 2007) is 1.38 %, which is less than that of Bangladesh, Nepal and Thailand. In spite of repeated promises, Government has failed to increase the budget to 3% whereas WHO calls for 7% of budget allocation. In western countries it is 6% (Status of health and education in India).

Although recent sex-differentiated NMR estimates are not available, the IMR confirms this i.e. 41 for males and 44 for females (per 1,000 live births). The annual rate of IMR decline from 2007 to 2012 is also higher for males – 5.9 % compared to 4.8 % for females. The differential rate of decline is specially marked in some states like AP, Delhi, Karnataka, Kerala and MP (State of India's newborns 2014). In Assam, there is not much difference i.e. male 3.4% vs female 3.2%. However, there is huge inter-state variation in NMR. In Assam NMR in Dhubri is 50, on the other hand in Dhemaji and Kamrup it is 25/per 1000 live births (State of India's newborns 2014).

It is documented that states with higher institutional births (e.g. Kerala) have lower neonatal mortality than those with lower institutional births (e.g. Uttar Pradesh). There has been wide variation in the proportion of institutional deliveries between and within states (State of India's newborns 2014). In Assam, Nalbari shows 87.4% and Karimganj 38.2%.

Two socio-demographic determinants, namely young maternal age at child birth and short birth interval have disastrous consequences on newborn health and survival. Child

birth before the age of 20 years and a birth interval of less than 24 months are associated with excessive risk of neonatal mortality. Thus, family planning has huge neonatal survival benefits (State of India's newborns 2014).

Women's education plays an important role in improving neonatal health outcomes (State of India's newborns 2014). We can take lesson from Kerala. The current perinatal mortality rate (PMR) of India (2012) has been estimated to be 28 per 1,000 births. The PMR is also not uniform across the country. The PMR of Kerala is only 10 per 1,000 births, whereas that of Odisha is 37 per 1,000 births (SRS 2013).

The maternal mortality ratio (MMR) in India was very high in the year 1990 with 560 women dying during child birth per 100,000 live births. The latest available estimate of MMR for the year 2010-2012 is 178. The states of Kerala, Maharashtra, and Tamil Nadu have achieved the MMR level of below 100. Assam continues to be the state with the highest MMR (328), followed by UP/Uttarakhand (292) and Rajasthan (255) (State of India's newborns 2014).

Approximately 3.3 million babies are stillborn each year worldwide. The stillbirth rate (SBR) for 2012 is estimated to be 22 per 1,000 births but the country lacks a reliable system of estimating the stillbirth burden (SRS 2013). The estimated value of SBR is likely to be underestimating, as data on stillbirths is difficult to capture. Interestingly, the estimated SBR of India for the year 2009 was 22.1 per 1000 births; in contrast, the SBR as reported by SRS for year 2010 was only 7 per 1000 births (Cousens *et al.* 2011).

Assam is popularly known as the Gateway to the North-East. North Eastern States (including Sikkim) have diverse topographical and socio-cultural situation within the region, within the state and even within the districts. During the last decade, health indicators, in these states have been poor, except Mizoram, particularly in Maternal & Child Health & Family Planning services, in spite of continuous inflow of fund in health sector (Fast facts – Assam).

The Regional Resource Centre for the NE States (RRC-NE) is being established during November, 2005 by the Ministry of Health & FW, Govt. of India, with financial assistance from European Commission. NRHM being the flagship programme of Ministry of Health & FW, the RRC-NE shall assist the states to plan, implement and monitor the health activities under NRHM as required (Fast facts – Assam).

Despite a marginal reduction in the IMR from 61/1,000 live births (2009) to 54 (2010-2012), Assam continues to rank among the four highest IMR States in the country, next only to MP, UP and Odisha. Within the North East region, all the other States have better IMR as compared to Assam (Fast facts – Assam). U5 MR in Assam is 75 (78) / 1,000 live births, as compared to the all India figure of 64 (Annual health survey 2011-2012).

According to NFHS-3, in Assam, underweight children (0-3 year) is 35.4 % with a strong rural (36.7) - urban (27.9) difference, as against all India figure of 40.4 % (rural 43.7 % and urban 30.1 %). So statistics indicate that the state is relatively better off compared to the all India level, but it is still a matter of concern since more than one-third of Assam's young children remain vulnerable.

Causes of neonatal mortality are infection 33% (sepsis, pneumonia, diarrhoea, etc.), prematurity 35%, birth asphyxia 20%, malformations 9% and others 3%. The first 24 hours account for more than one-third (36.9 percent) of the deaths that occur in the entire neonatal period.

Common causes of mortality of under-five children are malnutrition, acute respiratory tract infection (pneumonia), diarrhoea, measles, malaria, tuberculosis, anaemia etc. Most of these causes are preventable.

The various morbidities prevalent amongst the adolescent girls were pallor, menstrual problems, dental caries, angular stomatitis, glossitis, bitot's spots, skin problems, lymphadenopathy, diarrhoea, goitre etc.

In sex ratio and female literacy rate, Assam is in a better position, however in child and maternal mortality rates we are lagging behind the other states of India (Table 3). Approximately 67.8% percent of adolescent girls (15-19 years) are anaemic in the state. Only one third of neonates are breastfed within one hour of birth. Less than half of the infants received 3 postnatal visits from health care providers in the first 10 days of life. Exclusive breastfeeding rate is reduced to about one third by six months of age (NFHS-3).

Table-3: Comparison of some indicators of Assam with all India figure

Indicators	Assam	India
Infant Mortality Rate (SRS 2013)	54	40
Maternal Mortality Rate (SRS 2010-12)	328	178
Total Fertility Rate (SRS 2012)	2.4	2.4
Sex Ratio (Census 2011)	954	940
Child Sex Ratio (Census 2011)	957	914
Total Literacy Rate (%) (Census 2011)	73.18	74.04
Male Literacy Rate (%) (Census 2011)	78.81	82.14
Female Literacy Rate (%) (Census 2011)	67.27	65.4

Table-4: Child health and nutritional status – NFHS-3

Key Parameters	Percentage
Age 12-23 months fully immunized	31.6
Breastfed within 1 hour of birth	50.6
Diarrhoea - last 2 wks who received ORS	13.3
Diarrhoea - last 2 wks taken to a health facility	30.6
ARI - last 2 weeks taken to a health facility	35.4
12-35 months baby receiving a Vit A dose in last 6 months	16.6
Age 0 – 3 years, who are stunted	34.8
Age 0 – 3 years, who are wasted	13.1
Age 6-35 months, who are anaemic	76.7

Conclusion

Despite its rich natural resources, Assam has not been able to achieve the desired health outcomes. Providing proper public health services is the key goal in reducing population exposure to disease. There should be a total holistic approach which looks into other public amenities such as water, sanitation, hygiene, waste disposal, education, and vaccinations

simultaneously while dealing with the disease. Infrastructure, delivery system, manpower, resources - should be strengthened enough so that it can be utilised by the people in a proper way. Poor literacy rate, low per capita income, wide urban-rural disparity, improper water and sanitation facilities etc. - have contributed to some extent to the under developed health sector. Preventive, promotive and curative system should be strong to provide proper service to its citizens. The national programmes should be sincerely carried out. More importance should be given to the underprivileged & backward populations and to outreach areas. The health department should carry out sound research to collect data and ascertain the existing conditions and facilities.

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Human Health vis-à-vis Society: Some Rambles on Medical Anthropology

R.K. Kar[*]

I

Anthropology is an integrative discipline, concerned with micro-level comparisons of human populations. It is committed to a holistic understanding of human variability and the underlying processes. It has two major divisions: **Biological** and **Cultural**, incidentally having increasing restrictions in intellectual and methodological exchanges between the two. Despite the avowed concern for integration of knowledge about man and his activities, little more than superficial accounts of the reciprocal relationship between the two sub-systems, has actually been achieved. The sophisticated developments within the sub-disciplines have brought with them the problem for maintaining the holistic approach.

On the other hand, there are other new opportunities and challenges to which anthropology can respond by strengthening its theoretical premises and relating them to practical applications. One of the main areas in which a holistic bio-cultural approach is called for, is **Medical Anthropology**.

Health is one of the most important aspects of family welfare in particular; and community development in general. As a matter of fact, it is the starting point of all welfare activities. The health of a nation depends on the health of its inhabitants. Because of its overriding bearing on every aspect of people's

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life, health is, probably very rightly considered to be one of the most sensitive indicators of human welfare. One of the primary responsibilities of any Government is therefore, to provide adequate health services to the people.

Health, as a matter of fact, is a holistic concept. It is as much societal as a biological and medical issue. As a social issue it depends on a society's technology and distribution of resources. The marked variation in health from nation to nation; and from society to society provides a strong evidence of the link between health and society in terms of its level of development (Kar & Dutta 2001: 88-95). Historical pattern too confirms this connection.

Thus, in Pre-industrial Societies, half the people died before 20 years of age, and few lived past 40 years (Lenski 1987). Agricultural revolution made the things better, but however, for the elites only. In the growing cities in medieval Europe, human waste and other refuses triggered infectious diseases including plague (Mumford 1961).

In the industrial period, during the mid-nineteenth century, health in Western Europe and North America began to improve. Infectious disease like influenza and pneumonia were no longer fatal as were earlier. But as corollaries of development, now-a-days, we find the presence of some new diseases. Cardiac problems, cancer, cerebro-vascular diseases and diabetes etc. are the new additions in the morbidity list. Around sixty percent of the deaths in the United States are believed to be caused by the hitherto unknown (or least known) diseases. It is believed that the increased use of work saving devices, the intake of the high cholesterol foods and the overall changes in the life style due to development are the main reasons behind this.

The Third World situation today is like that of Europe in 1950s. Life expectancy is around 60 years against around 70 years in the industrial countries. In Cambodia, Ethiopia and other very poor countries it is 40 years.

According to a **World Health Organization (WHO)** report one billion people around the world now suffer from poor

health; and a majority of them are from the Third World countries. Ten percent of the Third World children die during the first year of life. In many countries half the children do not survive into adulthood (cited in Kar 2008).

Improving Third World Health, to speak the truth, poses a real monumental challenge, which in turn, undermines economic productivity.

II

The Government of India, for the first time could work out a **National Health Policy (NHP)** only in 1983. The policy laid stress on the provision of preventive, promotive and rehabilitative health services to the people; upholding in the background, the philosophy of the Alma-Ata Declaration of **Health for All by 2000 A.D.** made in 1978.

As a matter of fact, our government, since long, seems to have been making utmost efforts to reduce the massive burden of preventable ill health through extension of services to the masses. But, standing on the threshold of the third decade of the 21st Century, when we make an objective assessment, what do we really observe? Though considerable progress has been registered in raising the health status of the people, the fact remains that India is still among the countries having the lowest health status in the world. This raises some fundamental questions. Has the conceptualization of the policy within the divergent socio-cultural background been appropriately conceived? Has there been a matching commitment to operationalize the N.H.P. in the given socio-cultural, political and administrative milieu.

III

A state of **health**, at a minimum refers to a condition of an organism that permits it to adapt to its environmental situation with relatively minimal pain and discomfort, achieve at least some physical and psychic gratification and possess a reasonable probability of survival.

A state of **disease**, on the other hand, is a condition of the organism that seriously obtrudes against these adaptive

requirements; and causes partial or complete disablement and physical and/or behavioral dysfunction. But, in any case these are necessarily relative terms; and especially so when they are applied to the human beings. "No individual human is ever completely healthy" (Landy 1977).

Health is a holistic concept and its widely quoted W.H.O definition goes as, "a state of complete physical, mental and social well-being; and not merely the absence of diseases and infirmity" (cited in Kar 1997, p. 13).

Health, as a matter of fact is not only the result of interaction between an individual's hereditary contribution with his or her natural and cultural environment, but it is also largely determined by the biological and cultural adaptation and evolution of the society and the population. Health and Disease are measures of the effectiveness with which a human group has adapted to the environment. It is thus apparent that the standard of health and well-being varies with the environment, which of course varies enormously among populations, or even among their sub-groups.

A good number of studies carried out in social epidemiology at various time points have made it inarguably clear that man's social environment is a component in the etiology of nearly all diseases and the outcome of treatment depends equally upon how favourable the social environment is. Thus to identify different communities' health needs, it is important to gain an understanding of the social and cultural contents of people's lives and to identify the needs within and in terms of such contexts.

It is in this backdrop, anthropology, becomes essential for identifying health needs and for making appropriate treatment and public health initiatives.

IV

The branch of anthropology that exclusively deals with the health perspective of a community is known as **Medical Anthropology**.

A medical anthropological enquiry, to be more precise, may be defined as one that (i) elucidates the factors, mechanisms and processes that play a role on or influence the way in which

individuals and groups are affected by; and respond to illness and disease; and (ii) examines these problems with an emphasis on pattern of behavior.

Much of the development of medical anthropology has occurred since World War II. The beginning of major anthropological involvement in medical problems was cogently reviewed by Caudill (1953) in his landmark paper on **Applied Anthropology in Medicine**. But, even at that time involvement of anthropologists and other social scientists in health programme; and medical research and education was a novelty. Since then the situation has changed considerably and there has been a marked increase in the input made by anthropologists and other social scientists in medicine and related areas (e.g., Polgar 1962; Scotch 1963).

In recent times, there is a spurt in ethnomedical studies, particularly among the rural and tribal communities (e.g., Bhat, Joshi & Vijayendra 2013; Chaudhuri 1986, 1990; Dalal & Ray 2005; Kalla & Joshi 2004).

Basically, quite a few things are common in **Anthropology** and **Medicine**. In the proper study of mankind, anthropology aims at discovering man as a human being, so should be the case with a physician. He/She should make human approach to the patient, if he/she is to remain useful to them.

As a student of anthropology we put more emphasis on the group; we are particularly concerned about the study of human beings within the framework of a culture.

Culture, in the simplest words, may be defined as a set of beliefs and behavior shared by the group of people. It is the culture that provides people with a way of perceiving the world at large, and with the ways of coming in terms with the problems they face. This includes their attitudes about the body and the ways in which a person should be treated when ill.

Obviously, people with different cultural orientations and experiences have different notions with regard to the concepts of disease, cure, and treatment; and have different expectations from the physician. If this communication is impeded, the purpose of the physician is defeated.

Even otherwise, health cannot be given to the people, nor can it be bought or sold as a commodity. It invariably calls for people's active participation (e.g., life style, food habit and attitude towards various medical systems etc.)

Thus, anthropology can assist more efficiently and satisfactorily in identifying the health needs; and in clarifying factors, influencing the acceptability and utilization of health services; and can also assist in showing how those health needs can most appropriately be fulfilled.

V

As noted earlier, the marked variations in health from nation to nation; and from society to society provide as strong evidence of the link between **Health** and **Society**. **Health** and **Disease**, in fact are related to the biological and cultural resources of a community in a specific environment. That is why the concepts of health and disease though biological are culturally comprehended.

Thus, the social and cultural elements as a whole do influence the health of a community, both positively and negatively. The various cultural '**dos'** and '**do nots'** in various spheres of life (e.g., food and drink; child bearing and rearing, and concepts of health, disease and disease etiology etc. have direct impact on the health of the bearers of the particular culture. The **Health Development Programme** for a community therefore needs to be integrated conveniently with the larger programme of overall development in such a way that the two become mutually self-supporting.

In many societies, socio-religious beliefs and practices play significant role in ensuring health prosperity and protection to the community. This may be illustrated with some examples from some of my own earlier works (e.g. Kar 1990, 1997). Thus, for example, among the tea labourers of Assam, it has been observed that despite the availability of free hospital facilities in a plantation, the expecting mothers prefer home delivery, being attended by untrained midwife (***dhai***). Their tradition demands that a child birth should take place only with female

attendants; and the placenta should be cut by a specific kin member (woman). In hospital, a physician is generally a male person; and the kin members are also not allowed to be present at the time of delivery. Under the circumstances, hospitalization of a parturient mother is generally the last resort. This practice of home-delivery is believed to be one of the factors, contributing towards an increased frequency of still-birth; and infant and maternal morbidity and mortality. Besides, their tradition also demands that a woman, after delivery should sleep on the floor which is very often a damp one. This practice is also considered to be a contributing factor towards the enhanced morbidity and mortality rates of the mothers as well as the infants.

It has further been observed that the belief in disease causation is directly related to the type of curative measures preferred by the people. Thus, for example, the Oraons believe that when a child weeps and / or laughs too much, it implies that **Kandi Devi** or **Rati Devi** or **Hashani Devi** (some malevolent spirits) has entered into the body of the child to cause the disease. The only curative measure, as prescribed in their culture, for the same is to approach an **ojha** (priest-cum-medicine man) to arrange a propitiation to appease the responsible spirit.

Besides, it has been observed that a number of diseases among the tea labourers (e.g., diarrhoea, dysentery, gastroenteritis and skin diseases of various types) are probably caused due to their insanitary habits, ignorance, traditional customs and also because of their association with the various types of germicides, fertilisers and pesticides etc., used in a tea plantation. Skin diseases also result because of the frequent use of cheaper varieties of synthetic garments.

Similarly, Singh (2000) observes among the Mishings of Assam that their attitude towards disease causation is very much influenced by culture and tradition. Thus, for example, ailments like stomach-ache, dysentery, tuberculosis, paralysis and indigestion etc., are believed to be caused by supernatural power and these can be cured only by the magico-religious

practitioner by taking resort to performing some counter-magic or arranging some propitiation as demanded by the situation. Obviously, a Mishing individual, suffering from any of the diseases referred to above, generally gives priority to a traditional medicine-man for amelioration.

Among the Bodo Kacharis and the Koch-Rajbangsis of Assam also, Guha (1990) observes that a good number of diseases (for example, pox, epilepsy, snake-bite, insomnia, delirium, emaciation of children, mental disorder, deformity of limb/s and blindness etc.) are believed to be caused supernaturally. As such these are generally treated through appropriate magico-religious therapy depending on the diagnosed supernatural spirit, responsible for the ailment.

It is thus apparent that the socio-cultural factors have deep influence on the health behavior and thereby the health scenario of a society. Health is practically the product of a number of systems and their operations which maintain a balance. Therefore, a systematic approach in understanding the determinants of health must include all these relevant factors.

Every culture, as a matter of fact, irrespective of its simplicity and complexity has its own notion regarding health and health seeking behavior. The system of treatment that is determined by the social environment of any society, tries to treat disease in its own way which varies from society to society. It is therefore, very important to understand and identify the believed cause/s of illness as the nature of treatment is connected with it.

That is why, the socio-cultural matrix of health and disease in relation to a particular society must be properly understood for introducing any change in the medicare system or for the implementation of any developmental programme. It is assumed that the socio-cultural phenomena are by and large, very important factors those act as either promoter or barrier for accepting modern practices.

Empirical ethno-medical data generated from a number of simpler societies help us, not only in understanding the medical systems in their cultural contexts, but also lend insight into the

understanding of the interface between the indigenous and western medical systems that influence socio-cultural change (cf. Khan and Ali 1992:14).

An in-depth study of folk-medicine helps to find out the forces of integration and resistance with regard to the implementation of certain modern medical programmes. Once we come to understand the cultural forces that hinder the successful implementation of the programmes, it will not be difficult to work out and modify the framework of the programmes according to the suitability of the culture or community for which they are meant.

Further, by going into an in-depth understanding of indigenous materiamedica and pharmacopoeia of various traditional cultures, it is possible to discover the medicinal value of plants and animals which are so far unknown or least known to the modern world.

The pharmacopoeia of folk medicines is copious and includes such proven drugs as **quinine**, **drossera**, **thuja** and **curare** etc.

Sometimes, some species of plant is used for a host of purposes. Thus, for example, almost all parts of the "Mahua" (**Madhucalongifolia**) plant are used by the Santals in various ailments and diseases: the root paste is given to treat stomach ulcer; it is applied on scorpion sting; the bark decoction is gargled in case of gum swelling; the decoction with that of **Ficusracemosa** is used for **leucorrhoea**; the bark is astringent and tonic; its decoction is given in diabetes and rheumatic disease; the flowers are given in bronchitis and cough; the flower paste is applied to take out the pierced thorn; the fruit paste is applied in toothache; the seed oil is massaged over the chest in the treatment of pneumonia; and the seed cake is used in snake bite – few drops of its decoction are put in the nostrils which results into vomiting and relief (Sikarwar 2002).

Therapy in ethnomedicine includes magico-religious, herbal, chemical, mechanical and etc., procedures. Indigenous medical systems, as a matter of fact, show an impressive array of practices that demonstrate empirical therapeutic knowledge (Acker 1942; Huard 1969; Langlin 1963; Simmons 1955). It is

thus apparent that anthropologically oriented medical knowledge would be of immense use as an input to benefit **disease control programmes** and **national health planning**.

It may be re-emphasized that the medical science as such is directly involved with the study of health condition, disease and its treatment. But for proper implementation of **Public health programmes**, communities' acceptance and participation are very essential. Here, a joint effort of the Medical and Social scientists is necessary.

It thus implies that a well-integrated study highlighting the different facets of the society not only helps to understand some of the realities of health problems, prevailing among the various societies, but it is also of paramount importance to make the modern health services acceptable to the community members at the maximum possible level.

It may contextually be noted here that in developing countries, despite the increased utilization of modern medicine in many areas with consequent reduction in morbidity; traditional medical systems still persist and assert a significant influence on the state of health and on medical decisions and outcomes. This appears to be partly because of lack of proper education and motivation and mainly because of their deep rooted faith in the indigenous medical practitioners. In such a condition, an increased understanding of medical realities can suitably be utilized to motivate the people to bring the desired social change. And to achieve the same it is necessary for the medical personnel to work together with anthropologists and other social scientists.

To speak a few more words about the role of anthropology in this regard, it may be emphasized that the discipline tries to find out the underlying socio-cultural, economic and other factors that relate to the health and health seeking behavior of a community. On the basis of the studies of cultural values and social norms, anthropologists are in a position to explain to the health personnel and administrators how the traditional beliefs and practices conflict with Western medical assumptions, how socio-cultural factors influence health, disease and sanitation,

how the cultural factors take care of health and can cure illness; and how health and disease are simply aspects of total culture patterns which change in the company of broader and more comprehensive socio-cultural change. In such a way anthropology can assist the planner, in the fulfillment of different developmental programmes including the health related ones.

In the recent years, it has however been increasingly realized that for the improvement of health and biological qualities of mankind, an inter-disciplinary approach is more essential.

In fine, it may once again be emphasized that the proper implementation of modern medicine and public health programmes is possible only when both medical practitioners and social scientists collaborate with one another to achieve the national goal of **Health For All**.

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Infant and Child Mortality in North East India with Special Reference to Assam

Juri Borah and Sarthak Sengupta**

Introduction

Infant and child mortality is considered as the most prominent as well as burning public health issue since children are the future hope of a Nation. They provide the basis for determining the overall health status of a community. Estimation of Infant and child mortality rate is also considered as the vital indicator for evaluating the living standard of the people. According to Barclay (1958), infant includes those children in the first years of life who have not yet reached the age one. Hence infant mortality rate measures the risk of death between the birth of the baby and its first birthday. Infant mortality comprises two categories, neo-natal and post neo-natal mortality. The neo-natal mortality rate shows the number of death of children under 4^{th} weeks of age per thousand live births occurring in a year and the post neo natal rate indicate the death of children in between the first month of life till the completion of first birthday. On the other hand child mortality covers the death between the first and the fifth birthday.

According to UNICEF (2010), in the State of World's Children Report noted that in 2009, 8.1 million children died

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before their fifth birthday lived in developing countries. They died from a disease or a combination of diseases that could have been easily treated. It also noted that half of these death occurred in five countries and India is one of them. At present, India represents the largest child population in the world with 13.22% of children below 6 years of age out of total national population (Census 2011).

The evidences of inequity within countries in regards to child mortality are widely seen (Mulholland et al. 2008; Victoria et al. 2003). Variation is also persisting among different states of a country. The reason behind the high mortality rate of child, especially the infants includes biological, geographical or socio-cultural factors.

The aim of the present chapter is to compare the probability of infant and child mortality in the States of North East India covering a period of fifteen years (1992-2006). Attempts have also been made to find out the demographic differences in various stages of mortality in Assam in comparison to the country as a whole.

Material and Methods

The data used in the study have been taken from three rounds of the National Family Health Survey (NFHS) conducted in 1992-1993, 1998-1999 and 2005-2006 respectively. Although all states from North East India are considered for the present study, however during the first round of NFHS, Sikkim was not included within north eastern state. As such, in the present study only two rounds of data for Sikkim is taken into consideration. The mortality estimates used in the NFHS report are not actually the rate but are true probability.

Results and Discussion

Table 1 provides information on level and trends in mortality as well as differences within various states of North East India. The mortality rates as reported by the National Family Health Survey (NFHS) shown in the table are for the 5 years period preceding the survey (1992-93, 1997-98 and 2005-2006). From the table it has been observed that infant mortality

is highest in Assam in NFHS I and NFHS III and lowest estimate of it is found in Mizoram in NFHS I and NFHS II. In NFHS III also the mortality rate stands very close to lowest rate in Mizoram. With respect to child mortality and under- five mortality, Assam has the highest rate in NFHS I. Though these rates come down considerably in the later rounds of the survey, yet it stands higher. With regards to child mortality in Tripura, it was considerably higher in NFHS I, but interestingly almost the lowest rate is recorded in NFHS II and NFHS III report of Tripura state.

Table-1: Probability of Infant and Child Mortality by North East Indian State

States of North East India	NFHS Survey	Neo Natal Mortality	Post Neo Natal Mortality	Infant Mortality	Child Mortality	Under Five Mortality
Arunachal Pradesh	NFHS,1992-1993	17.5	22.5	40.0	33.3	72.0
	NFHS, 1997-1998	41.8	21.3	63.1	37.4	98.1
	NFHS, 2005-2006	34.0	26.7	60.7	28.8	87.7
Assam	NFHS,1992-1993	50.9	37.8	88.7	58.7	142.2
	NFHS, 1997-1998	44.6	24.9	69.5	21.4	89.5
	NFHS, 2005-2006	45.5	20.6	66.1	20.2	85.0
Manipur	NFHS,1992-1993	25.1	17.3	42.4	20.2	61.7
	NHS, 1997-1998	18.6	18.4	37.0	19.9	56.1
	NFHS, 2005-2006	18.7	11.1	29.7	12.6	41.9
Meghalaya	NFHS,1992-1993	37.8	26.3	64.2	24.3	86.9
	NFHS, 1997-1998	50.7	38.3	89.0	36.2	122.0
	NFHS, 2005-2006	23.6	21.0	44.6	27.1	70.5
Mizoram	NFHS,1992-1993	8.3	6.3	14.6	14.9	29.3
	NFHS, 1997-1998	18.8	18.2	37.0	18.4	54.7
	NFHS, 2005-2006	16.3	17.7	34.1	19.5	52.9
Nagaland	NFHS,1992-1993	10.0	7.2	17.2	3.6	20.7
	NFHS, 1997-1998	20.1	22.0	42.1	22.7	63.8
	NFHS, 2005-2006	19.8	18.5	38.3	27.5	64.7
Sikkim	NFHS, 1997-1998	26.3	17.6	43.9	28.4	71.0
	NFHS, 2005-2006	19.4	14.3	33.7	6.7	40.1
Tripura	NFHS,1992-1993	43.6	32.3	75.8	31.2	104.6
	NFHS, 1997-1998	28.6	15.6	44.2	7.4	51.3
	NFHS, 2005-2006	33.1	18.3	51.5	8.2	59.2

Date pertinent for the 5 Year period preceding the NHFS Surveys

State wise variation is markedly observed in all rounds of the survey. In Arunachal Pradesh and Meghalaya, mortality level at all ages increased from NFHS I to NFHS II, but starts declining from NFHS II to NFHS III. In case of Assam and Manipur, gradual declination in every round of the survey is

observed in this regard. In Mizoram and Nagaland remarkable variation exist from NFHS I to NFHS II. In NFHS I, both infant and child mortality are comparatively lower than all the states of North East India. In NFHS II, although it stands closer to other states, but it increases twice than NFHS I. In NFHS III, the mortality estimates are found decreasing tenuously than two other earlier rounds of the survey.

Infant and child mortality for the 10 years period preceding the NFHS III survey by demographic characteristics have been shown in Table 2. Mortality differences in Assam in comparison with national trend are also shown. The probability of dying during infancy is not uniform throughout the North East Indian states. Studies have revealed that the risk of death during prenatal infancy is comparatively higher than post natal period. Similarly the risk of infant mortality is higher than child morality in most of the population groups. Different factors have significant impact in determining infant and child death in a country. Sex differences in child mortality are considered as one of the contributing factors to the secular decline in child's sex ratio. Various studies reported about strong sex bias or son preferences among Indian couples (Arnold, Choe & Roy 1998; Arokiasamy 2004; Das 1984, 1987; Mutharayappa *et al.* 1997). According to NFHS III, female mortality rate have been found higher than male both in Assam and India. Only in neonatal mortality reverse situation is found in India. Among the women's age at child birth, below 20 years and above 40 years, the mortality rate have been found relatively higher. These rates have been found higher in Assam than in the country as a whole. In the category of 2 – 3 birth order and also below 2 years of birth interval, mortality rate is found higher in Assam. It is also true for India as a whole. The association between mortality and birth order is likely to reflect not only the effect of birth order but also the effect of mother's age at child birth, since birth order and mother's age at child birth are positively co-related. It gradually comes down in later birth order and longer birth interval. All the mortality rates decrease sharply as the length of the previous birth interval increases.

Table-2: Comparative Data on Infant and Child Mortality by Demographic Characteristics

Characters	NFHS Survey (2005-2006)	Neonatal	Post Neonatal	Infant Mortality	Child Mortality	Under Five Mortality
CHILD'S SEX						
Male	Assam	45.5	23.8	69.3	22.6	90.3
	India	40.9	15.4	56.3	14.2	69.7
Female	Assam	52.3	20.3	72.6	29.9	100.3
	India	36.8	20.9	57.7	22.9	79.2
MOTHER'S AGE AT CHILD BIRTH						
< 20	Assam	70.1	23.5	93.6	32.4	123.0
	India	54.2	22.3	76.5	20.1	95.0
20 – 29	Assam	44.0	23.6	67.6	24.0	89.0
	India	34.2	16.3	50.4	15.9	65.5
30 – 39	Assam	36.3	13.1	49.5	23.4	71.8
	India	37.9	18.5	56.4	25.7	80.6
40 - 49	Assam	*	*	*	*	*
	India	42.9	29.2	72.1	(37.3)	106.7
BIRTH ORDER						
1	Assam	61.9	15.7	77.7	12.2	88.9
	India	47.8	16.4	64.1	11.4	74.8
2 – 3	Assam	46.0	24.7	70.7	29.6	98.2
	India	30.3	16.2	46.5	16.5	62.3
4 +	Assam	38.6	24.8	63.4	35.4	96.5
	India	[45.05]	[25.8]	[70.85]	[32.10]	[100.7]
PREVIOUS BIRTH INTERVAL						
< 2 years	Assam	71.7	29.2	100.9	48.4	144.4
	India	57.9	27.8	85.7	32.5	115.5
2 – 3 years	Assam	35.1	28.2	63.3	28.8	90.3
	India	[25.05]	[14.6]	[39.7]	[17.6]	[56.5]
4 years or more	Assam	(26.9)	(23.3)	(50.2)	(18.5)	(67.8)
	India	24.2	12.8	37.0	8.6	45.3
Total	Assam	48.9	22.0	70.9	26.2	95.2
	India	[39.0]	[18.0]	[57.0]	[18.4]	[74.3]

Data pertinent for the 10 Year period preceding the NHFS Survey, 2005-2006
( ) = Based on 250 – 499 un weighted cases.
* = Based on fewer than 250 un weighted cases.
[ ] = Calculate by the present author

Annual Health Survey (2011-2012) in Assam reports that the infant mortality rate is 57 per thousand live births. The infant mortality rate varies considerably across the district, e.g., Dhemaji (40) and Kamrup (42) district records relatively lower rates while it is 74 in Kokrajhar and 73 in Darrang district of Assam. Similarly, neonatal mortality also witnessed wide inter-district variations. Neonatal mortality in the districts of Dhemaji (26), Kamrup (28) and Bongaigaon (29) records noticeably lower rate whereas Dhubri (50), Nalbari (44) and Golaghat (45) districts records quite higher rate. Post-neonatal mortality in the districts like Barpeta (12), Jorhat and Dhemaji (13) and Golaghat (14) records considerably lower rate whereas

Kokrajhar (31) and Darrang (32) districts shows relatively higher rate. Dhemaji (48) district registered very low under-five mortality rates, succeeded by Kamrup (52) and Lakhimpur (61), whereas Kokrajhar (100) recorded the highest rate preceded by Hailakandi (98) and Darrang (95) district of Assam.

Table-3: Children under age 3 who were ill with fever, diarrhea and cough accompanied by fast breathing (ARI symptoms)

States of North East India	NFHS Survey	Fever	Diarrhea		Cough
			Any	Blood	
Arunachal Pradesh	NFHS,1992-1993	20.1	17.6	2.0	8.7
	NFHS, 1997-1998	38.5	23.4	3.0	25.4
	NFHS, 2005-2006	20.2	14.9	-	6.7
Assam	NFHS,1992-1993	24.6	6.3	1.3	11.3
	NFHS, 1997-1998	28.4	8.2	2.2	17.8
	NFHS, 2005-2006	13.6	8.1	-	7.3
Manipur	NFHS,1992-1993	25.3	12.4	1.7	14.5
	NHS, 1997-1998	36.8	16.6	4.1	26.9
	NFHS, 2005-2006	13.3	9.9	-	4.7
Meghalaya	NFHS,1992-1993	15.8	8.3	0.5	5.9
	NFHS, 1997-1998	41.2	21.8	6.1	28.8
	NFHS, 2005-2006	7.0	5.7	-	1.9
Mizoram	NFHS,1992-1993	26.6	22.3	5.0	4.1
	NFHS, 1997-1998	35.9	23.0	3.5	11.2
	NFHS, 2005-2006	17.0	11.0	-	4.1
Nagaland	NFHS,1992-1993	15.9	11.2	2.4	6.1
	NFHS, 1997-1998	34.0	21.7	2.6	18.4
	NFHS, 2005-2006	12.2	6.4	-	4.2
Sikkim	NFHS, 1997-1998	35.5	31.0	2.5	30.0
	NFHS, 2005-2006	44.2	16.5	-	5.0
Tripura	NFHS,1992-1993	20.1	3.6	0.6	22.8
	NFHS, 1997-1998	31.3	0.7	2.3	28.2
	NFHS, 2005-2006	29.4	8.3	-	14.2

Data pertinent for the period preceding two weeks of NFH Survey

In Assam, incidence of Low birth weight (i.e. less than 2.5 kg) is highest in Hilakandi (37.5%) district followed by Karimganj (33.7%) and Dibrugarh (33.6%) while it is much lower in Lakhimpur (9.7%) district preceded by Dhemaji (13.5%) and Dhubri (16.7%) district.

Conclusion

The study reveals that infant and child mortality is high in North East India, varying widely from state to state. The state of Assam records highest mortality rate in North East India which is higher than the average mortality rate of the country. Again neo-natal mortality rate is higher than the post natal

mortality and the child mortality, which reflect relatively more influence of biological factors on mortality. Sex difference in mortality rates is also reported. This suggests prevalence of discrimination against female children. Positive relationship between different socio-economic factors and infant and child mortality are also in conformity with the earlier findings made by different scholars at different times.

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Assessment of Demographic and Socio-economic Factors on Child Mortality by Using Verbal Autopsy

Nabajit Kr. Das and Rekha Das**

Introduction

Child mortality is the most sensitive index to measure socio-economic development and the quality of life. According to UNICEF (2012), 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. It has been proved in many studies that some demographic and socio-economic factors are responsible for high mortality rate of the children, especially of the infants. The economically advanced

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countries were able to reduce their death rate to less than ten 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 (Agarwala 1988).

The determinants of child survival vary according to various socio-economic, cultural, demographic and health care factors. In this paper an assessment has been made to see the impact of various demographic and socioeconomic variables on child mortality.

Material and Method

The present study was undertaken in 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 like infant (<1 year), preschool (1-5 year) and school going age (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 death 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.

Result

In the present study a total of 42 nos. of child deaths (0-14 yrs.) are 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 birth. The total child mortality (0-14 years) rate is 69.54. Female child mortality is found to be higher than the males (22nos. vs 20 nos.) (Table 1).

The main cause during the infancy (<1 year) is low birth weight (30.00%) followed by birth asphyxia (20.00%),

Table-1: Distribution of child mortality according to age

Age group (In yrs.)	Live birth	Surviving children	No. of death			Mortality rate (per 1000 live birth)
			Male	Female	Total	
<1	85	75	4	6	10	117.65
1-5	168	150	8	10	18	107.14
5-14	351	337	8	6	14	39.89
Total (0-14 yrs.)	**604**	**562**	**20**	**22**	**42**	**69.54**
Percentage (%)		**93.05**	**3.31**	**3.64**	**6.95**	

pneumonia (20.00%), diarrhoea (20.00%) and neo-natal infection (10.00%). On the other hand, diarrhoea (44.44%) is found to be the main cause of death in the age group of 1-5 years children 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%), diarrhoea (21.43%) animal bite (7.14%) and dysentry (7.14%) (Figure 1). In the present study, diarrhoea is found to be the killer disease among the children (Figure 2).

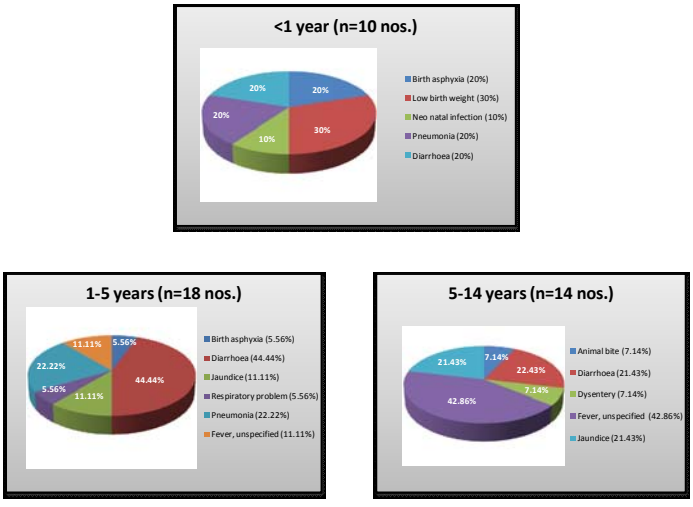

Figure-1: Leading causes of death by age

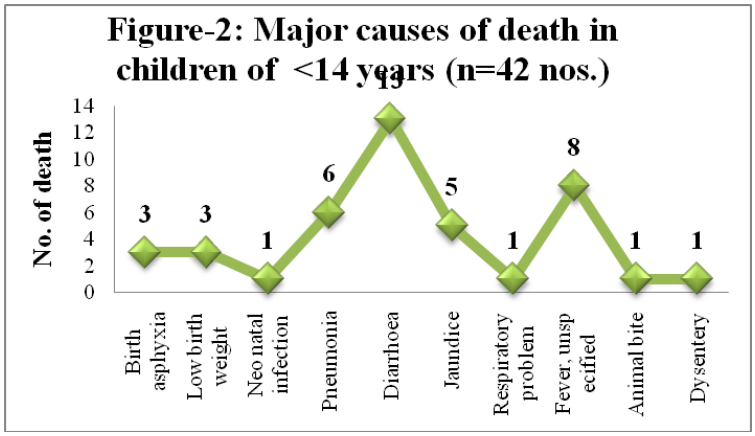

Table 2 shows the distribution of child mortality by different variables. It is observed that mothers' age at first child birth, birth order, place of delivery, attendant at the time of delivery, status of immunization, and mothers' education are significantly associated with child mortality. While the chi-square test has shown no statistical significant association of child mortality with other variables viz. fathers' 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 in between 20-23 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 gave 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

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

Sl. No	Factors	Child Survival			$\chi 2$	p value
		Live birth	Alive	Death		
1.	**Mothers' age at first child birth (in yrs.)**					
	>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)		
2.	**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)		
3.	**Place of delivery**					
	Hospital	454	434 (95.59)	20 (4.41)	**18.35**	**0.000019***
	Home	150	128 (85.33)	22 (14.67)		
4.	**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)		
5.	**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)		
6.	**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)		
7.	**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 labour	176	160 (90.91)	16 (9.09)		
	Skilled labour	28	26 (92.86)	2 (7.14)		
8.	**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)		

***P value <0.05 significant**

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 percentage of child mortality for half immunized, completely immunized and not immunized categories are 4.71%, 1.67% and 15.94% respectively. 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 labour category i.e 9.09% and the lowest is found among the service category i.e 5.26%. Mothers' education is another important factor which affecting child mortality. In the present study child mortality is found to be the highest (9.76%) among the illiterate mothers, followed by for primary educated mothers (5.63%) and secondary and above educated mothers (1.49%). It is clear that the child mortality rate decreases with the increase of mothers' education.

The results of logistic regression analysis are shown in table 3 in which it is observed that all the explanatory variables have significant effect on child mortality. In the present study mothers' age at marriage play 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

Table-3: Logistic Regression Estimates for the effects of some selected variables on Child Mortality

Factors	Coefficient	S.E.	Sig.	Exp(B)	95% C.I.
Mothers' age at first child birth (in yrs.)					
>24 (Ref.)				1	
>19	0.380	.368	.302	1.462	.711-3.005
20-23	-1.029	.481	.032	.357	.139-.917
Birth Order					
1 (Ref)				1	
2-3	1.027	.440	.020	2.792	1.178-6.618
4+	2.536	.510	.000	12.623	4.641-34.333
Place of delivery					
Hospital(Ref)				1	
Home	1.316	.325	.000	3.730	1.973-7.051
Attendant at the time of delivery					
Doctor(Ref)				1	
Trained midwife	1.566	.339	.000	4.789	2.463-9.313
Untrained midwife	1.851	.691	.007	6.368	1.643-24.681
Status of immunization					
Completed(Ref)				1	
Still continuing	1.346	.346	.000	11.190	1.950-7.566
Half Done	-1.069	.758	.158	2.914	.078-1.515
Not Done	2.315	.903	.010	29.500	1.725-59.445
Mothers' education					
Secondary and above (Ref.)				1	
Illiterate	1.965	.736	.008	7.135	1.685-30.212
Primary	1.371	.800	.087	3.940	.821-18.902

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 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 which plays a very significant impact 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 which affect on 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

Diarrhoea was found to be the main cause of death in the present studies. In overall scenario of Assam and India also diarrhoea is found to be the main killer disease of children (NFHS-3 2007). According to the NFHS-3 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. Present studies show 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 (NFHS-3 2007).

Extremes of maternal age (< 20 and > 30 years) are considered as risk factors associated with infant mortality (Bhandari et al. 1988; Choudhary & Jayaswal 1989). 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 (Adlakha & Suchindra 1985). Therefore, it can be said that the present findings seem to be same with the findings mentioned above.

In the present study, child mortality is found to be the highest when the mothers have more conceptions. It may be mentioned here that in some previous studies also child mortality recorded to be the highest when the mothers have more conceptions (Islam *et al.* 2013; Rutstein 1984). 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 (2013) 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 (Pandey *at al.* 1998; Rajaram 1990).

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 the present studies child mortality was found to be the lowest when the deliveries were attended by the doctor. Khongsai (2012) found higher infant and child mortality among the Khongsai Kukis of Imphal town and Saikul sub division 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 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 the present study child mortality were found

to be the highest among those children who are not at all immunized. The findings of NFHS-3 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. Some earlier studies also support the present findings (Agarwal, Pandey & Agarwal 1995; Kabir & Long 2002; Kabir *et al.* 2013).

The present finding is in conformity with the study of Alam (2011) who found child mortality to be the highest among the labour categories. Bajkhaif & Mahadevan (1993) also found high infant mortality among those of lower categories of occupation and it is very low among those of higher occupation.

Mothers' education is another important factor which 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 (Alam 2011; Bhattacharya 1999). Same result is also found to exist between mothers' education and child mortality among the Rabhas.

Conclusion

In the present study a number of demographic and socio-economic factors have shown significant statistical association with child mortality and those factors are: mothers' age at first child birth, birth order, and mothers' education, place of delivery, delivery attendant and status of immunization of the children. Majority of child death can be preventable by giving proper health care facilities to the newborn. Thus from the present study it can be said that increase of age at first child birth, increase in mothers education, proper utilization of health care services like hospital delivery, complete immunization may decrease infant & child mortality.

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Birth Defects: An Emerging Public Health Problem

Hemonta Kr. Dutta[1] *and Debasish Borbor*a[2]

Under the aegis of the United Nation's millennium development goal 4 (MDG 4), the global under five childhood mortality rate (U5MR) has declined from 12.7 million in 1990 to 6.3 million in 2013. But despite these gains, the infant mortality rate (IMR) in 2013 was 4.6 million (74% of U5MR) with India accounting for nearly a quarter of these deaths (UNIGME 2014). One of the leading causes of this high mortality and morbidity are birth defects (BD) or congenital malformations (CM).

Birth defects are abnormalities affecting body structure or function that are present from birth. Some of these defects are major and life-threatening, but majority are minor defects affecting bodily function in various ways. They can occur in any family and can have devastating effect on the parents and the family. An estimated 8 million babies (6% of worldwide births) are born with BD each year and along with preterm births they account for over 4 million deaths annually. India has the largest number of infants born with birth defects in the world (UNIGME 2014). An analysis of the data from the World

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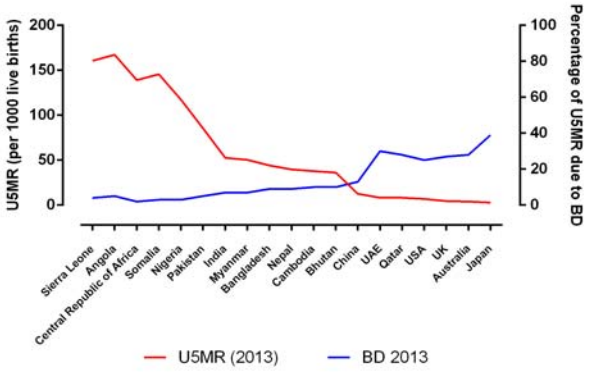
Health statistics 2015 reveals that as the number of under 5 deaths due to malaria, diarrhoea and measles have declined between 2000 and 2013, U5MR due to CM has witnessed a gradual increase (WHO 2015). Figure I depict the percentage of U5MR due to BD among the third world and the developed nations.

Under five mortality rate (U5MR) and percentage of deaths due to birth defects (BD) for selected countries, 2013



In India, the impact of BD on U5MR has increased from 6% in 2000 to 7% in 2013. Studies indicate that the pattern and incidence rates of BD vary all over the nation. One of the highest incidences was reported from Ludhiana at 3.6% (Verma et al. 1991). The overall incidence ranged from 0.08% to 3.6% (Bhat & Babu 1998; Datta & Chaturvedi 2000; Dutta et al. 2010; Swain et al. 1994; Taksande et al. 2010). The reported incidence was higher in centers where autopsy is carried out as a routine (Verma 1983). Dutta et al. (2010) in a multicentric study found the prevalence of birth defects in Assam at 0.08% but in a recent follow up by Baruah et al. (2015) the prevalence was found to be 1.2%. The variable rates reported may be due to several factors; such as, lack of a birth defect registry, lack of awareness among public causing are much more than late or non-reporting of minor malformations, socio-economic conditions etc. But anybody even remotely connected to the health care delivery system in India will agree that magnitudes of BDs what is reported and it is growing rapidly. The proportion of births

with birth defects as well as the absolute number of births are much higher in the third world countries than in high-income countries because of sharp differences in maternal health and other significant risk factors, including poverty, a high percentage of older mothers, a greater frequency of consanguineous marriages and the survival advantage against malaria for carriers of sickle cell, thalassemia, and glucose-6-phosphate dehydrogenase (G6PD) deficiency genes. Several studies have attributed consanguinity as an independent risk factor of BD, independent of ethnic origin (Cornel et al. 2014; McGregor et al. 2010). They also observed that the risk of birth defects was higher in population with high frequency of consanguineous marriages. For instance the reported incidence of consanguineous marriages in Assam is just 1.4% (Dutta et al. 2010) whereas it is 30.8% in Pondicherry (Verma et al. 1992) and 26.4% in Maharashtra (Malhotra 1979).

Exact cause of many of the BD is not known. Some genetic and environmental factors, either alone or in combination may be responsible. The five most common birth defects of genetic and partially genetic origin are: congenital heart disease, neural tube defects, hemoglobin disorders such as Thalassemia and Sickle cell disease, Down's syndrome and Glucose 6-phosphate dehydrogenase deficiency. These defects account for about 25% of more than 7000 birth defects of genetic and partial genetic origin. Non-genetic or post-conception birth defects are more common in low and middle income countries, where teratogenic environmental factors play a significant role. Dietary factors, life-style choices, environmental pollutants, poor living conditions, use of non-prescription medications before and during pregnancy etc are some of such factors.

Early diagnosis, appropriate care and intervention and proper preventive strategies in early pregnancy go a long way in bringing down the death and disability rates among these children. It is now known that 70% of birth defects can either be prevented, or that affected children can be offered care that could be life saving or would reduce the severity of disability. Preventive strategies include taking multivitamin

tablets with folic acid daily since peri-conceptual period, maintaining a healthy weight, having regular checkups, learning about family history and genetic risk, managing maternal medical conditions like diabetes and minimizing unnecessary medication exposure during pregnancy. Studies have demonstrated several important steps women can take to help prevent birth defects:

- Take 400 mcg of folic acid daily from the beginning of menstruation through menopause
- Eat a healthy diet and aim for a healthy weight
- Keep diabetes under control
- Get a medical checkup before pregnancy and address specific health issues
- Stop smoking and avoid second-hand smoke
- Stop drinking alcohol prior to pregnancy or as soon into pregnancy as possible
- Do not take illegal or indigenous medicines
- Plan carefully. Use contraception if taking medications that are known risk factors
- Know your family medical history and potential genetic risk.
- In the United States alone, fortification of the grain food supply with folic acid has produced a one-third decline in neural tube defects each year, with an overall cost savings calculated at $400 million annually.

Strategies for improving the health of women, mothers, newborns and children are essential for effective prevention and care of those with birth defects. However, care and prevention of birth defects have received little attention in developing countries till now, because of various reasons:

- Health policy makers have not been aware of the immense global toll of birth defects, including the true extent of death and disabilities arising from it.
- The belief that effective care and prevention of birth defects require costly high-technology interventions that

are beyond the health budgets of low- and middle-income countries.

- The belief that attention to birth defects will draw funding away from other high-priority maternal and child health efforts.

In fact, effective interventions—including family planning, optimizing women's diets, managing maternal health problems and avoiding maternal infections—are both feasible and affordable, even for financially constrained health systems, and have proven cost effective where implemented. Moreover, increasing efforts to reduce birth defects will also contribute to the overall health of women, mothers, newborns and children.

The World Health Assembly report (2010) describes the basic components for creating a national programme for the prevention and care of birth defects before and after birth (Blencowe et al. 2013). It also recommends priorities for the international community to assist in establishing and strengthening of these national programmes. WHO in collaboration with few other international agencies have developed normative tools, including guidelines and a global plan of action, to strengthen medical care and rehabilitation services to support the implementation of the Convention on the Rights of Persons with Disabilities. WHO also supports countries to integrate medical care and rehabilitation services into overall primary health care and development of community-based rehabilitation programmes. In India, Rashtriya Bal Swasthya Karyakram, a Child Health screening and Early Intervention Services Programme was launched in 2013 to cover 30 health conditions of children aged 0-18 years. It is time the policy makers in our country formulate effective programmes and strategy for prevention of BDs as well to root out this evil from our society.

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Morbidity and Nutritional Status of Tea Garden Population of Assam: An Analysis

*G. K. Medhi**

Introduction

The tea garden population of Assam makes up around 20% of total population of the state. The ancestors of tea garden population came to Assam in the latter half of nineteenth to early twentieth century to work in the tea plantation industry mostly from central and south Indian states like Madhya Pradesh, Bihar, Orissa and Andhra Pradesh. Racially, mostly they are considered as Dravidians and belong to many tribes, e.g. Bhil, Saotal, Kol and Munda etc. (Griffiths 1967; Hazarika *et al.* 2002; Medhi *et al.* 2006b). They are scattered over more than 900 tea estates in different districts of Assam, but many of them have settled on their own in nearby tea garden areas and are known as ex-tea garden labourers. The tea garden population has gradually assimilated with greater Assamese society, but still maintaining their unique sociocultural identities intact (Hazarika *et al*. 2002).

The tea garden labourers are the backbone of tea industry of Assam. The contribution of tea garden population to the economy of the state is enormous, but their own socioeconomic situation is remaining pathetic. Accumulated scientific

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evidences reflect a gloomy situation of health and nutritional status among tea garden population of Assam. Most of the diseases in this population are related to poor sanitation and unhygienic living conditions, overcrowding, poor health seeking behaviours because of ignorance, lack of enabling environment and inadequate dietary intake. Along with the persisting problem of infectious diseases and malnutrition, noncommunicable diseases (NCD) like hypertension, strokes are also emerging as a major public health concern among this population (Biswas *et al*. 2002; Chelleng & Mahanta 1998; Hazarika *et al*. 2002; Medhi *et al*. 2006a, 2006b; Medhi & Mahanta 2004).

In general, burden of infectious morbidities is very high among tea garden population. A survey conducted by Indian Council of Medical Research (ICMR) revealed high magnitude of undernutrition and infectious diseases (Table 1) (Medhi *et al.* 2006b). Nutritional problems like underweight among children (59.9%), thinness among adults (69.8%) and micronutrient deficiency disorders like anaemia (72%) were widespread. Common infectious diseases were worm infestation (65.4%), respiratory problems (6.7%), diarrhoea (1.7%), skin infections such as scabies, filariasis (0.6%) and pulmonary tuberculosis (11.7 per thousand) (Medhi *et al.* 2006b). It is a concern that children are particularly more vulnerable to various infectious diseases and undernutrition (Medhi *et al.* 2006b; Medhi & Mahanta 2004).

Table-1: Prevalence of major diseases and undernutrition among tea garden

Name of the disease	Male (%)	Female (%)	Total (%)
Diarrhea	1.7	1.8	1.7
Pulmonary tuberculosis	9.7	13.5	11.7
Leprosy	1.1	0.5	0.8
Filariasis	1.0	0.23	0.6
Intestinal worm	65.5	65.1	65.4
Skin infections (scabies etc)	3.0	2.8	7.4
Anaemia	71.8	72.2	72.0
Epilepsy	6.5	7.9	7.3
Hypertension	49.1	43.3	45.9
Respiratory problems	6.9	6.5	6.7
Gastritis	1.7	3.3	2.6
Other dermatitis	2.3	1.7	2.0
Joint pain/arthritis	0.4	0.7	0.5
Musculo-skeletal pain	7.5	9.9	8.7
Pain abdomen	2.3	2.7	2.5
Thinness (adult)	65.7	73.1	69.9
Underweight (under five)	59.3	60.5	59.9

Source: Medhi et al. (2006b)

Orofeacally transmitted diseases including various intestinal worms such as *Ascaris*, *Trichuris* and hookworm and other infections causing diarrhoea/dysentery etc are most important public health problem in this population (Medhi *et al*. 2006b; Narain *et al.* 2004; Traub *et al*. 2004). Although, major outbreak/epidemic of cholera and other diarrheal diseases have gradually receded in the population due to better public health surveillance and interventions, yet diarrhea continues to be prevalent. Ingestion of food and water contaminated with fecal borne parasites is the main reason of these infections. Fecal borne pathogens contaminates the environment because of open field defecation practiced by many tea garden populations. Although, latrines are available to many households, they are not well maintained and contamination to environment is always possible. Even many people prefer to defecate or allow children to defecate outdoors, perceiving it to be a cleaner practice (Medhi *et al.* 2006b; Traub *et al.* 2004).

Hookworm infection which is a significant factor of anemia is also endemic in tea garden population (Medhi *et al*. 2006b; Traub *et al.* 2004). This infection occurs through skin penetration, hence those walk barefooted may be vulnerable to hookworm infection. Cysticercosis-another orofeacally transmitted infection seems also prevalent in tea garden causing higher prevalence of epilepsy in some tea gardens (ICMR Annual Report 2008-09; Medhi *et al*. 2006b). C**ysticercosis** is a parasitic infection caused by larval cysts of the pig tapeworm *Taenia solium*. These larval cysts infect different tissues including brain (known as Neurocysticercosis), and can cause epilepsy. Cysticercosis is acquired by ingestion foods or drinks contaminated with eggs of tapeworms. People harboring the intestinal tapeworm can spread the infection to others through food chain in a community with poor sanitation. In pork eating community, human being gets intestinal tapeworm by eating undercooked pork meat.

Apart from orofeacally transmitted infectious diseases, other infectious diseases such as pulmonary tuberculosis, filariasis, respiratory infections, are major public health problems among tea garden population (Medhi *et al.* 2006b).

An ICMR study recorded higher prevalence of tuberculosis among tea garden population compared to overall prevalence of Assam and India. Greater vulnerability of tea garden population to tuberculosis infections and also other respiratory infections may be attributed to congested household without proper ventilation, use of biomass for cooking and poor nutrition (Chelleng *et al*. 2014; Medhi *et al.* 2006b). Although, government programme for control of tuberculosis i.e. directly observed treatment short course (DOTS) is available in tea gardens, non-compliance to treatment is becoming an emerging public health issue.

Lymphatic filariasis, a vector borne disease, continues to be an important public health concern in this population (Medhi *et al*. 2006b), although there is a national programme for elimination of filariasis in India. Vector borne disease like filariasis is endemic among tea labourers due to abundance of disease vectors, availability of *mf* (i.e. the organism that causes the disease) carriers acting as reservoir and abundant mosquito breeding places in peri-domestic surroundings due to presence of stagnant water bodies (Medhi *et al.* 2006b). Malaria is also prevalent in some tea gardens situated in malariogenic region such as foot hills and forest fringe areas. Leprosy is another infectious disease which is found to be still prevalent in tea garden population (Medhi *et al.* 2006b). Scabies and other skin infections related to poor personal hygiene are also known to be highly prevalent (Medhi *et al.* 2006b).

Along with infectious morbidities, undernutrition is also remaining as a serious public health concern among tea garden population in Assam particularly among vulnerable populations such as women in reproductive age group and growing children (Biswas *et al.* 2002; Medhi, Baruah & Mahanta 2006; Medhi *et al.* 2006b; Medhi, Hazarika & Mahanta 2007; Medhi & Mahanta 2004). Poor nutrition among children is a concern because poor nutrition may impede the cognitive development and learning abilities in children. Similarly, poor nutritional among women in reproductive age may adversely affect pregnancy outcome including impediment of fetal growth. Nutritional conditions

like anemia are considered as one of the important cause of maternal mortality in the population. Furthermore, there is a link between malnutrition and infections. Poor nutrition makes individuals more susceptible to infectious diseases, which in turns leads to nutritional deficiencies. The vicious cycle of undernutrion and infections is common public health phenomenon often observed in underprivileged community like that of tea garden population. Because of various public health initiatives such as introduction of iodized salts, Vit A prophylaxis programmes etc, micronutrient deficiency diseases such as iodine deficiency disorders (IDD), Vit A deficiency diseases have significantly declined. But, anaemia is still widespread among tea garden population. Medhi et al recorded clinical signs of Vit A, Vit B-complex and Vit C deficiency 2.2%, 3.2% and 1.3% respectively among the 0-15 years tea garden children, but prevalence of anaemia was found to be 71.8% and 72.2% respectively among male and female (Medhi *et al.* 2006b).

Prevalence of protein energy malnutrition (PEM) among children and chronic energy deficiency (CED) or thinness among adults is also unacceptably high among tea garden population. Different studies have shown a very high prevalence of stunting (indicator of chronic undernutrition), wasting (indicator of acute undernutrition) and underweight (composite indicator of chronic and acute undernutrition) among tea garden children (Medhi *et al.* 2006b; Medhi & Mahanta 2004). A study by Medhi *et al* (2006) showed that nearly 60% of tea garden under five children was underweight (Medhi *et al.* 2006b). In another study by Medhi et al, prevalence of stunting was found to be 47.4% and 51.9% among adolescent boys and girls respectively (Medhi, Hazarika & Mahanta 2007). It was also observed that prevalence of underweight, stunting and wasting among infants aged 6 to 12 months was 64.6%, 41.7% and 39.6%, respectively in one study by Medhi & Mahanta (2004). Similarly, prevalence of chronic energy deficiency (CED) or thinness among adults was also found to be very high (69.8%) in one ICMR study (Medhi *et al.* 2006b). Biswas et al found that 17% of tea garden adult population

had severe undernutrition. Apart from dietary inadequacy and high loads of infections, cultural factors such as non-exclusive breast during first 6 months of life and delay in introducing appropriate solid foods to infants appear to play an important role in nutritional deficiency in children and infants (Medhi & Mahanta 2004). Similar cultural factors also play important role in the restriction of certain important foods during pregnancy. Deprivation of appropriate maternal care perhaps is also a factor that adversely affects health and nutrition of children in tea garden. As most of the women in tea gardens are working mothers, quality child care has to be compromised most often. More research is needed to explore various adverse cultural factors that have detrimental effects on nutrition in this community in order to initiate appropriate interventions.

The disease profile of tea garden population is not all about infectious morbidities or undernutrition. Non-communicable diseases (NCD) such as hypertension, strokes are also recently emerging as major issues in this population needing public health attention (Hazarika *et al.* 2002; Medhi *et al*. 2006a, 2006b). Hypertension is a major NCD among the tea garden population. The study of Hazarika *et al*. (2002) recorded about 60% prevalence of hypertension among tea garden population aged 30 years and above. Similarly Medhi *et al.* (2006b) also recorded about 46% prevalence among adult aged 20 years and above. Such high prevalence of hypertension is surprising in absence of important risk factors such as obesity or sedentarism in this population. Researchers have ascribed such higher prevalence of hypertension to various modifiable risk factors such as frequent and excessive salt intake with red tea, use of alcohol and tobacco, work-stress etc (Hazarika *et al.* 2002; Medhi *et al.* 2006b). Use of alcohol and tobacco is very rampant among tea garden population even among children and adolescents (Medhi, Hazarika & Mahanta 2006a, 2006b). Underage drinking and tobacco use seems to be socially acceptable in this population. High prevalence of hypertension is found to be one of the harmful effects of alcohol and tobacco use in the population. Cirrhosis of liver is another important alcohol related disease prevalent in the population. Primordial

prevention approach targeting youths and adolescents to eliminate various NCD common risk factors such as alcohol and tobacco use will be one of the important strategies to control various NCDs including hypertension, cirrhosis of liver in the community. NCDS such as musculoskeletal problems are also found to be prevalent among the adult population that may be related to their occupation (Medhi *et al.* 2006b). The burden of NCDS such as hypertension, stroke, cataract, musculoskeletal conditions are more common among geriatric population (Medhi *et al.* 2006a).

Genetical factors seem also plays an important role in the disease burden of tea garden population. For example, variations (polymorphism) in several important genes have been found to be associated with hypertension among tea garden population in studies carried out by ICMR (Borah, Shankarishan & Mahanta 2011; Shankarishan *et al.* 2014). So far genes found to be associated with hypertension in tea garden population are glutathione S-transferees T1 (GSTM1) gene polymorphisms, endothelial nitric oxide synthase (eNOS) gene polymorphisms and angiotensin converting enzyme (ACE) gene polymorphism (Borah, Shankarishan & Mahanta 2011; Shankarishan *et al.* 2014). Some studies also indicates that individuals with particular gene may be more salt sensitive, thus may be more prone to hypertension indicating gene environmental interactions (Borah, Shankarishan & Mahanta 2011; Shankarishan *et al*. 2014). Some other important diseases linked to genetical factors are s*ickle cell anaemia and glucose-6-*phosphate dehydrogenase (G-6P-D) enzyme deficiency. ICMR reported high prevalence of Sickle *cell anaemia (13.1%) and glucose-6-*phosphate dehydrogenase (G6PD) enzyme deficiency (6.3%) among tea garden population (Balgir 1992; Balgir & Dutta 1990). Glucose-6-phosphate dehydrogenase deficiency (G6PD deficiency) also known as favism is a genetic condition that predisposes individuals to hemolysis in response to certain foods, illness, or medication.

Review of health profiles of tea garden population of Assam suggests most of the diseases in the community are related to

poverty and underdevelopment. Evidences have been found that a small proportion of their relatively socioeconomically better off section enjoys a considerably better health compared to those who are socioeconomically lagging behind-indicating an epidemiological polarizations (Chelleng *et al.* 2014; Medhi *et al.* 2006b; Medhi & Mahanta 2008). Bringing about changes in the health status of the population will require an accelerated socioeconomic development and committed implementation of preventive, promotive and curative public health services. Poor sanitation and hygiene, poor housing conditions, dietary inadequacy, lack of health awareness and lack of appropriate health care services are some of the primary factors responsible for most of the prevailing diseases which need to be addressed by the garden authority and government. A significant numbers of diseases in this population are related to poor sanitation and hygiene. Public health measures such as provision of sanitary latrines for proper disposal of excreta and safe drinking water to all households, promotion of proper hygienic practices (such as discouraging open field defecation, hand washing after defecation, personal cleanliness and maintenance of domestic hygiene) will help in reducing the burden of these disease in the community. Another important urgent public health priority in the population is to address rampant undernutrition particularly among children and women in child bearing age. Combination of adequate dietary supply and prevention/ treatment of infections along with nutritional education can solve the problem of undernutrition. Noncommunicable diseases such as hypertension demands special attention because of high prevalence in this community. Key strategy for hypertension control in the population will be to create awareness about risk factors, provision for regular screening and treatment. Simple strategy such as awareness to reduce high intake of salt can be a cost-effective strategy in controlling hypertension in the population.

Ignorance appears to be an important barrier in the attainment of optimal health in the population. High adult illiteracy and lower level of education is the main factor of widespread ignorance. Appropriate health awareness

programme suitable for illiterate population should be developed to enable them to take various diseases preventive and health promotive measures. Educational programme should aim to make them aware about the preventive measures to be taken against commonly prevalent diseases, harmful effects associated with alcohol and tobacco, adverse cultural practices related to nutrition, child health and diseases. Greater emphasis should be placed on providing health education to women as women's role is always vital for health of family members particularly those of growing children. Health education should also aim for improving health and treatment seeking behavior among tea garden population as non-seeking or delay in treatment seeking behaviours, non-compliance to treatment are factors often responsible for deterioration of their health conditions from many treatable and curable health conditions despite availability of health care facilities. Various national health programmes such as DOTS, immunization, maternal child health (MCH) and other disease control programmes can be more effectively implemented with greater community awareness and participation. 'Mothers club' formed in different tea gardens is one such example how community involvement can be effective in creating health awareness and ameliorating poor health (Medhi *et al.* 2006b). Besides all these measures, there is also need for periodic review and rectification of deficiencies in the health care system. Apart from availability, health care system in tea gardens should be made more resilient and responsive to the health care needs of the population.

This analysis is an attempt to understand the health and nutritional status of tea garden population of Assam. Although, it is fact that the health condition of tea garden population is poor, many of the facts regarding their health and nutrition are still remaining at anecdotal level. Therefore, there is need to carry out more research in this population in representative samples to reliably explore their health problems and also to get better insight on the determinants and dynamics of their health in order to plan appropriate health promotion and disease prevention strategies among them.

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A Demographic Study on Child Morbidity and Mortality Pattern in a Semi-rural Setting of Dibrugarh, Assam

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Introduction

Health which is multidimensional in nature and difficult to measure is often captured through a range of indicators like morbidity and mortality. Although India has made an appreciable progress in improving the overall health status of its population, it is far from satisfaction. Improving the health condition of children still remains a major challenge. Studies by Anathakrishnan, Pani & Nalini (2001), Gupta & Walia (1980), Santhanakrishnan, Peter & Raju (1973) etc. are some of the important researches on the present topic. Studies pertaining to reporting of morbidity patterns reveals important facts which informs not only about the health status of various groups but also helps in identifying about type and extent of prevalent morbidities, which provides vital feed back in setting priorities in health services reforms. In this backdrop, the present study is an attempt to investigate the morbidity and mortality pattern of children in a small semi-rural setting viz. Boiragimath Kachari village in Dibrugarh, Assam.

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Materials and Methods

The study area - Boiragimath Kachari village is a small semi-rural setting in Dibrugarh, Assam. The study subjects consist of 67 Sonowal Kachari children within the age group of 0-14 years chosen by complete enumeration method from the total population of 281 individuals. Data for one year (January–December' 2014) was collected through door-to-door survey; besides, in-depth personal interviews were carried out to generate relevant qualitative data. Statistical analysis was done with Microsoft Excel and SPSS software and chi-square test. Morbidity conditions were coded according to the alphanumeric coding of the WHO 10th revision of International Classification of Diseases (WHO ICD-10).

Results and Discussion

Among the 67 children, 33 were male (49.25%) and 34 were female (50.74%). During the study period viral fever (57; 85.07%) was found to be the most common illness among the study population. Severe cough and cold (55; 82.08%) accounts for the second most prevalent morbidity condition. Diarrhoea (24; 35.82%) was the third most common morbidity among the children. Measles (21; 31.34%), skin disease (15; 22.38%), followed by jaundice and dental problem (11; 16.41% each) were the other prevailing morbidities found in the present study. A number of other morbidities (26; 38.80%) that include eye and ear disorders, injuries, worm infestation, menstrual disorder, etc. were found to be occurring in lesser frequencies (Table 1).

Table-1:Distribution of morbidity conditions among the study subjects

Sl. No.	Name Of the disease/ailment	ICD –10 Code	Sex		Total (n = 67)
			Male (%)	Female (%)	
1	Cough and Cold	J00	31 (46.28)	24 (35.82)	55 (82.08)
2	Skin Disease	L00	6 (8.95)	9 (13.43)	15 (22.38)
3	Diarrohea	A09	15 (22.38)	9 (13.43)	24 (35.82)
4	Measles	B05	7 (10.44)	14 (20.89)	21(31.34)
5	Abdominal Pain	R10	4 (5.97)	6 (8.95)	10 (14.92)
6	Tongue Disease	K14	2 (2.98)	1 (1.49)	3 (4.47)
7	Dental Problem	K02.61, K03	7 (10.44)	4 (5.97)	11 (16.41)
8	Bronchitis	J20	2 (2.98)	0(0.00)	2(2.98)
9	Jaundice	R17	5(7.46)	6 (8.95)	11 (16.41)
10	Viral Fever	R50	27 (40.29)	30 (44.77)	57 (85.07)
11	Others	---	8 (11.94)	18 (26.86)	26 (38.80)

Table 2 provides a chi-square analysis for attitude of parents of the study population towards the use of modern and traditional medicare systems for different types of morbidities. It shows that the attitude of parents towards use of medicare system is independent of sex (male/female) i.e. there is no association between attitude of parents towards medicare system and sex of the parents.

Table-2:Association for attitude of parents towards use of modern and traditional medicare systems for different types of morbidities

	Modern	Traditional
Male	20	8
Female	15	13

** Chi-square = 0.154, critical value at 5% level of significance = 3.841 for 1 d.f..

During the study only one mortality case was reported. It was an infant death within the first year of birth, causes being reported as low birth weight, high fever and jaundice. Majority of the morbidity episodes (27.84%) were treated with modern medicare system or allopathic medicine. Sometimes, modern and traditional medicines (6.59%) are found to be considered simultaneously (Figure 1).

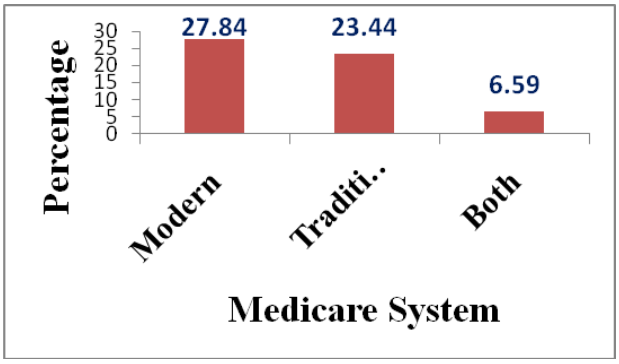

Figure-1: Distribution of morbidity conditions according to different medicare system (n = 67)

Viral fever was reported to be more prominent during winter and rainy season. Severe cough and cold usually begins as a viral infection in the nose with congestion, either in the

nasal sinuses or lungs, runny nose, sore throat and high fever and chills. When the disease advances it is termed as acute respiratory infection (ARI). Studies conducted by Gupta & Walia (1980) and Venkatesh & Bansal (1986) also found ARI and diarrhoea as the most common causes of morbidity among children. Diarrhoea remains a major cause of morbidity in developing countries because rotavirus and other gastrointestinal infections and infestations have remained high despite the UNICEF and WHO campaigns (Ugwu 2012). Our study reveals that the sickness load in the children from the study area is not so serious. The main causes of morbidity (and mortality) are diseases that are preventable or easily treatable. The improvements in diagnosis and therapeutics of many infectious agents of disease and increasing access to healthcare services have lead to the better health scenario of the children. Besides, better transport facilities from the study area to the urban center where advanced health care facilities are located, impact of modern education and relatively a sound economic condition of the people are also important factors that contribute to the above situation. Another important observation from the present study is that the better hygienic conditions and vaccination has resulted in very fewer cases of child morbidity. There is one Anganwadi Centre (AWC) in the village that provides supplementary nutrition and immunization to children less than 6 years of age and immunization against tetanus for all expectant mothers; besides nutrition and health education to all women in the age group of 15 -45 years, among a number of other services.

Conclusion

Children are the future citizen of the country and hope of the world. They are the country's biggest human investment for development. The present study, despite its inherent limitations identifies certain morbidity causes that can hamper the educational process and the intellectual growth of children in rural areas. Hence, their health should be the utmost priority for us and the health needs should be properly addressed.

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A Study on Health and Nutritional Status among the Nepali Kshattriya Children of Sonitpur District, Assam

Deepali Das (Saikia)[1] *and Deepanjana Dutta Das*[2]

Introduction

The child population is one of the most important sections of society. A wise investment in children's health, nutrition and education is the foundation stone for all national development. Health and nutrition are two sides of the same coin. The condition of health of the individual as influenced by the utilization of the nutrients is termed as the nutritional status. India has progressed dramatically in various fields but its malnutrition level has not shown any desired reduction. Therefore, the effect of malnutrition and poor health indicators like infant mortality rate, under-five mortality rate and maternal mortality rate in India are higher than some of the developing countries of the South East Asia.

The national health and quality of life is regarded as an indicator of nutritional status of an individual or a community and can be assessed in a number of ways viz clinical examination, biochemical examination, diet survey and anthropometric measurements.

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During first developmental plan priority was accorded to MCH services and emphasis had been put on raising nutritional status of under five children through a number of initiatives including Integrated Child Development Scheme. It is now realized that nutritional result at earlier ages leaves their mark during adolescence. Besides this, this is a period of great turbulence. Because of puberty spurt, rapid physical growth does take place during this period and therefore nutritional requirements are quite different. In adolescent ages, psychosocial and emotional problems are of considerable magnitude and they may exert significant influence on their nutritional status.

Though many studies have been done on nutritional status on various population groups of India yet, nutritional status are limited in North East India. As such very little is known about the nutritional status of the children of North East India. In this region, data on nutritional status from birth to puberty stage are still very scanty.

The presence of the Nepalis in North-East India is historical and their role in unification and economic development of this region is very crucial. The varnas of Nepali are Brahman, Kshattriya, Vaishya and Sudra. Chetri constitutes Kshatriya varna, the warrior and ruler caste group or varna of Hinduism. Their medium of speaking is Nepali language.

Objectives of the Study

This study makes an attempt to focus on the "Health and Nutritional Status" among the Nepali Kshattriya children of Sonitpur District, Assam. The objectives of the present study is given below -

(1) To assess the nutritional status of children based on dietary consumption.

(2) To assess the nutrient intake of different age groups of the children.

Materials and Methods

The materials for the present study were collected from one ethnic group namely the Nepali Kshattriya population. The data was collected from two Nepali villages namely Shitalmari

and Borbhogia of Sonitpur district, Assam. These villages are exclusively inhabited by the Nepali Kshattriya population. A total of 305 households from two different villages were selected.

For the present study indirect assessment were conducted with the help of diet survey. The quantity of food consumed by the children and the number of children within the age group of 1-3 years, 4-6 years, 7-9 years,10-12 years and 13-14 years. Only 30% of children in each group were selected. Children below 1 year were excluded as they were mainly breast-fed children. The energy, protein, fat, calcium content of diet was calculated using food composition table. Question regarding food items consumed was asked to the head of the families through distributions of questionnaires. To assess the nutrient intake of the sample population, the collected information were recorded in a suitably prepared schedule (Thimmayamma 1987). The amount of each individual was determined by using the following formula.

$$\text{Raw weight of consumed item} = \frac{\text{weight of raw ingredient (g)}}{\text{Total amount of the cooked item (g)}} \times \text{amount consumed per head (g)}$$

(Thimmayamma 1987)

The data were analysed in terms of simple frequencies, percentages and mean.

Results and Discussion

Dietary consumption

Regarding the type of food consumption by the children, the diet of the Nepali Kshattriya children by and large, is monotonous consisting of mainly rice, pulses, different types of vegetables which are available in the area of their habitation. But potato is the chief constituent of their daily diet. All the children belonging to the age group of 0-14 years consumed non-vegetarian diet. Therefore, fish, eggs, meats etc. are also taken sometimes in their diet.

The villagers have not heard about the "balanced diet". The method of cooking is frying, boiling and roasting. Usually, the children of these villages consumed twice or thrice a day depending on their appetite but majority of the children take food thrice daily. At first, they eat food - before going to school, the second time is after returning from school and third time is at night. Mustard oil is used as a cooking medium. Majority of the children did not bring tiffin in the school due to the supplementation of govt. mid-day meal in the school. Some of them brought tiffin only in the school and children whose house is situated in the nearby school, those children went to their respective houses during tiffin break and eating lunch during the tiffin period.

In order to know the dietary consumption of the children of the studied area, seven days is taken as a unit. As reported by the mother of the respective households, the majority of the children drunk milk always in their diet, meat one time and fish two times during the week before enquiry. Not a single household had reported that they consumed meal prepared on previous day. They thought that meal prepared on previous day contain less amount of nutrient and disturb the metabolism system and thereby, provide the ill effect on health. Otherwise, 85 percent of the houses had no refrigerator to preserve the edible foods.

65 percent of the children reported that they drunk 3 glass/day of water followed by 4 glass/day. Most of the village women reported that their children drunk more water in the summer season than in the winter season. Only 25 percent of children had drunk adequate health drinks viz. horlicks, maltova, complan etc. which are required for energy yielding and body building . 70 percent of the children did not drunk health drinks because their economic condition is not good and hence they were not capable to buy any health drinks for their children and 5 percent of children do not take health drinks as they does not actually like any type of health drinks due to their lack of knowledge regarding the nutritive values. All of the women reported that they did not care to select

food items according to their nutritive value. But if their children health is not good, then they give special attention to his/her diet according to the doctor advice or elderly person's advice. They did not consume off-season foods. Some of the mother reported that their children did not like the bitter taste food, some had reported that the children did not like to eat ridge-gourd (*jika*), ladies-finger etc. But the mother of those children had tried to consume those vegetables by narrating the usefulness of those vegetables. Maximum number of the village women reported that sometimes they had given fruits or fruit juice according to the availability of fruits. They usually consumed all the green leafy vegetables i.e. spinach leaves, amaranth, fenugreek leaves, pumpkin leaves, jute leaves, plantain fruits (*Koldil*), cabbage, carrot, radish etc. Usually they used frying and boiling methods for preparing in their daily diet.

Nutrient Intake

An individual's well being and health are directly related to his or her food intake. For maintaining good health and vigour proper diet is the key factor. Generally, it was observed that due to low economic status, intake of various essential constituents of food may be inadequate. However, the nature and extent of deficiency may vary from different age groups and from season to season. Nepali Kshattriya people usually consumed more milk than other items. However, this may be changed because of non-availability of milk.

The dietary intake was assured for three consecutive days. The nutrient intakes for the different age-groups were then compared with the recommended dietary allowances (RDA) of ICMR (1991). According to different age groups the result derived are presented below:

Mean nutrient intake of 1-3 year old children

The mean nutrient intake and daily recommended allowances (ICMR 1991) of children belonging to age group of 1-3 years are presented in Table 1.

Table-1: Mean nutrient intake of 1-3 year old children

Nutrients	RDA, ICMR (1991)	Age groups (1-3 years)	
		Mean	% Excess or deficit
Energy (Kcal)	1240	1270.4	+2.45
Protein (g)	22	22.5	+2.27
Calcium(mg)	400	402.67	+0.67
Fats(g)	25	26.06	+4.24
Iron (mg)	12	11.05	-7.92

The mean nutrient intake of 1-3 year children indicates that the energy intake was higher. In this group the calorie intake was about 2.45 percent more than the RDA. The protein intake was adequate. The adequate consumption of rice and other cereals supplied the adequate amount of calorie and protein.

The fat intake of 1-3 year children was found to be higher than the recommended allowances. This is due to the intake of fats and oils in their diets is higher as the most common method of cooking used among them was frying. The fat intake was mainly in the form of invisible fats.

Calcium intake was found to be higher when compared with the RDA. This is due to the consumption of milk/milk products in their dietaries. The iron intake was low.

Mean nutrient intake of 4-6 year old children

The mean nutrient intake and daily recommended allowances (ICMR 1991) of children in the age group of 4-6 year are presented in the Table 2.

Table-2: Mean nutrient intake of 4-6 year old children

Nutrients	RDA, ICMR (1991)	Age groups(4-6 year)	
		Mean	% Excess or deficit
Energy (K Cal)	1690	1600	-5.33
Protein(g)	30	35.0	+16.67
Calcium(mg)	400	410.25	+2.56
Fats(g)	25	24.12	-3.52
Iron (mg)	18	17.80	-1.11

The data reveals that the children belonging to 4-6 years age group had a deficient intake of energy, the deficit being 5.33 percent. Protein intake was higher than daily recommended allowances the excess being 16.67 percent. This was due to higher intake of cereals. The fat intake was deficit.

The calcium intake pattern was adequate. It may be because the children drink adequate quantity of milk/milk product. The low intake of iron may be due to the intake of lesser amounts of fruits and animal product.

Mean nutrient intake of 7-9 year old children

The mean nutrient intake and daily recommended allowances (ICMR 1991) of children in the age group of 7-9 years are presented in Table 3.

Table-3: Mean nutrient intake of 7-9 year old children

Nutrients	RDA, ICMR (1991)	Age groups(7-9 year)	
		Mean	%Excess or deficit
Energy(K Cal)	1950	2001.00	+2.62
Protein (g)	41	51.63	+25.93
Calcium (mg)	400	510.00	+27.5
Fats (g)	25	23.96	-4.16
Iron(mg)	26	24.56	-5.54

The mean nutrient intake of 7-9 years children indicates that the energy intake was higher. In this group the calorie intake was about 2.62 percent more than the RDA. Protein intake was higher than recommended allowances the excess being 25.93 percent. This may be due to higher intake of cereals. The fat intake was much lower than the RDA with percentage 4.16, when compared to RDA.

Calcium intake was found to be higher when compared with the RDA. The iron intake was low the deficit being 5.54 percent.

Mean nutrient intake of 10-12 year old children

The mean nutrient intakes of children (both boys and girls) in the age group of 10-12 years are presented in Table 4 and Table 5. These are all random selection.

Table-4: Mean nutrient intake of 10-12 year old children (boy)

Nutrients	RDA, ICMR (1991)	Age groups (10-12 years)	
		Mean	% Excess or deficit
Energy(K Cal)	2190	2103	-3.97
Protein (g)	54	65	+20.37
Calcium (mg)	600	581.07	-3.15
Fats (g)	22	35.0	+59.09
Iron(mg)	34	40	+17.65

Table-5: Mean nutrient intake of 10-12 year old children (girl)

Nutrients	RDA, ICMR (1991)	Age groups (10-12 years)	
		Mean	% Excess or deficit
Energy(K Cal)	1970	2010	+2.03
Protein (g)	57	66.2	+16.14
Calcium (mg)	600	599.14	-0.14
Fats (g)	22	19.05	-13.41
Iron(mg)	19	18.05	-5.00

It is evident from Table 4 and Table 5 that the calorie intake was lower than the recommended allowances in case of boys while, in case of girls the calorie intake was higher than the recommended allowances. High intake of energy was due to the high consumption of cereals. The protein intake was also high amongst both the groups, the excess being 20.37 and 16.14 percent respectively for boys and girls. The fat intake was 13.64 percent excess for boys and 13.41 percent deficient for girls than the recommended allowances. The low fat intake was due to the inadequate consumption of fats and oils.

Calcium intake was lower than the RDA for both sexes. Iron intake was excess in case of boys (the percentage is 5.88) and intake was below the RDA in case of girls, the percentage is 5.00 percent of RDA.

Mean nutrient intake of 13-14 year old children

The mean nutrient intakes of children (both boys and girls) in the age group of 13-14 years are presented in **Table 6** and **Table 7**. These are all randomly selected.

Table-6: Mean nutrient intake of 13-14 year old children (boy)

Nutrients	RDA, ICMR (1991)	Age groups (13-14 years)	
		Mean	% Excess or deficit
Energy(K Cal)	2450	2356	-3.87
Protein (g)	70	75.7	+8.14
Calcium (mg)	600	581.07	-3.15
Fats (g)	22	28.3	+28.64
Iron(mg)	41	43.96	+7.22

Table-7: Mean nutrient intake of 13-14 year old children (girl)

Nutrients	RDA, ICMR (1991)	Age groups (13-14 years)	
		Mean	% Excess or deficit
Energy(K Cal)	2060	2260	+9.71
Protein (g)	65	70	+7.69
Calcium (mg)	600	585.05	-2.49
Fats (g)	22	24.64	+12.00
Iron(mg)	28	28.07	+0.25

It is evident from **Table 6** and **Table 7** that the calorie intake was lower than the recommended allowances in case of boys while in case of girls the calorie intake was higher than the recommended allowances. It may be because of high consumption of cereals. The protein intake was also high amongst both the groups, the excess being 8.14 percent in case of boys and 7.69 percent in case of girls. The fat intake was excess both for boys and girls. These are 28.64 percent and 12.00 percent respectively. Calcium intake was lower than the RDA for both sexes. Iron intake was excess for both the sexes.

The overall picture for nutrient adequacy according to different age groups revealed that the economic status of Nepali Kshattriya did influence their diet but to a lesser extent. In terms of protein, the intake was higher than the RDA among the all age groups. The consumption of energy was higher than the RDA in the age ranged from 1-3 years, 7-9 years, 10-12 years (girls) and 13-14 years (girls) respectively. However, it is lower than the RDA in the age ranged from 4-6 years, 10-12 years (boys) and 13-14 years (boys) respectively.

The consumption of fat and iron was lower than the RDA for 4-6 years, 7-9 years, and 10-12 years age groups of girls. A similar observation was found by Kolay & Bagchi (1996) where they reported that among the tribal of Jharkhand region, they consumed low intake of fat and other nutrients like vitamin B and C.

The intake of calcium was in excess to the RDA for the age range of 1-3 years, 4-6 years and 7-9 years but deficient in the age group of both the sexes of 10-12 years and 13-14 year old children respectively.

Again it was observed that the consumption of energy was higher than the RDA in the age ranged from 10-12 years and 13-14 years girls respectively than the boys.

Conclusion

Nutrition plays a very important role in the physical, mental and socio-emotional development of a child. The infants and pre-school children are most vulnerable to retardation in growth as a result of malnutrition particularly under-nutrition. Children derive various nutrients through the food he/she eats in his daily diet. The type and quantity of various foods children includes in his diet is based on socio cultural and economic considerations.

The diet of the Nepali Kshattriya children by and large was monotonous consisting of mainly rice, pulses, and different types of vegetables. The chief constituent of their daily diet was potato. All the children belonging to the age group of 0-14 years consumed non-vegetarian diet.

The Nepali Kshattriya women had not heard about balanced diet and for this reason they did not provide balanced diet to their children. Usually, while cooking they used different methods viz., frying, boiling and roasting. Majority of the children took food three times daily. Mustard oil was used as a cooking medium.

The majority of the children always had drunk milk in their diet, meat once and fish twice during the week before enquiry. Not a single household had reported that they consumed meal prepared on previous day. 65 percent of the children reported that they drunk water- 3 glass/day followed by 4 glass/day. Only 25 percent of children had drunk adequate health drinks. 70 percent of the children's mother reported that they were not capable to buy any health drinks and 5 percent of the children did not take health drinks as they did not actually like any type of health drinks due to their lack of knowledge regarding the nutritive values.

If their children's health was not good then they gave special attention to his/her diet according to the doctor's advice or

elderly person's advice. They did not consume off-season foods. Maximum number of the village women reported that sometimes they had given fruits or fruit juice according to the availability of fruits.

The mean nutrient intake of 1-3 year children indicates that the energy intake was higher. The protein intake was adequate. The fat intake was found to be higher than the recommended allowances. Calcium intake was found to be higher when compared with the RDA. The iron intake was low.

The children belonging to 4-6 years age group had a deficient intake of energy. Protein intake was higher than daily recommended allowances. The fat intake was deficit. The calcium intake pattern was adequate. The iron intake was low.

While analyzing the mean nutrient intake of 7-9 years children, it indicates that the energy intake was higher. Protein intake was higher than recommended allowances. The fat intake was much lower than the RDA with a percentage of 4.16 when compared to RDA. Calcium intake was found to be higher when compared with the RDA. The iron intake was low.

The calorie intake was lower than the recommended allowances in case of boys of age ranged from 10-12 years while the calorie intake was higher than the recommended allowances in the girls of same age groups. The protein intake was also high amongst both the groups. The fat intake was 13.64 percent excess for boys and 13.41 percent deficient for girls than the recommended allowances. Calcium intake was lower than the RDA for both sexes. Iron intake was excess in case of boys and intake was below the RDA in case of girls.

In the children belonging to 13-14 years age group the calorie intake was lower than the recommended allowances in case of boys while in case of girls the calorie intake was higher than the recommended allowances. The protein intake was also high amongst both the groups. The fat intake was excess both for boys and girls. Calcium intake was lower than the RDA for both sexes. Iron intake was excess for both the sexes.

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Influence of Biosocial Factors on Child Mortality among the Jaintias of the Jaintia Hills District, Meghalaya

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Introduction

Infant mortality may be defined as "mortality or death during the first year of life" and child mortality may be defined as "mortality or death during the age of 1 to 4 years" (Kabir *et al.* 1995). Infant mortality rate is "the ratio of infant deaths registered in a given year to the total number of live births registered in the same year, usually expressed as a rate per 1000 live births". Child mortality rate, on the other hand, is the number of deaths of children aged 1 to 4 years per 1000 children in the same age group in a given year (Raza & Nangia 1984). Mortality is the most traumatic and final of the vital events. It is a form of attrition for the society. Although death is certainly a biological event, both social and psychological factors are clearly involved. Demographers have focused on mortality more than any of the other vital events, possibly because it is most obvious and its traumatic is inevitable. How mortality occurs in the population is of extreme importance to the society being studied (Swedlund & Armelagos 1976).

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The Jaintia Hills District of the state of Meghalaya is predominantly inhabited by the Jaintia people who belong to the Scheduled Tribe category. According to 2011 census, Jaintia Hills district has a total population of 3, 92,852 of whom, males and female are 195,641 and 197,211 respectively with astounding sex ratio at 1008 (Jaintia Hills Census 2011). Jowai is the Headquarters of Jaintia Hills District. Present study was conducted among the Jaintias of Jowai town.

It is interesting to know that the rule of inheritance of property is purely matrilineal in organization. There have been many noticeable changes in Jaintia society with regard to the institution of marriage. Factors like Christianity, education, exposure to the outside world amongst others have contributed to these changes particularly in the urban areas.

With this view, study is conducted among the Jaintias to find out the status of infant and child mortality and also to venture the biological factors and socio-economic background of the mothers that could influence infant and child mortality.

Materials and Methods

Fieldwork was conducted among the Jaintias of Jowai town in Meghalaya. A total of 23 localities in Jowai town were identified and listed out. In the first phase of sampling, 5 localities namely Panaliar, Dulong, Chutwakhu, Ladthadlaboh and Khimmusniang were selected based on the descending order of the household size. 25% (approx.) of the total households from the above 5 localities was selected at random to constitute about 10% of the sample for this study. A total of 276 households out of 3876 in Jowai town were surveyed.

Data were collected on biological determinants such as, age of the mother, interval between births, high fertility, etc., and the social determinants of infant and child mortality like family type, size, education, income, occupation of parents, etc. as suggested by Mahadevan (1986).

The nature of data and methods of data collection are as follows:

Fertility records: This included present age of the mother, age at marriage, age at first child birth, total number of live births, birth spacing, name, age, sex of each offspring, place of delivery etc.

Mortality records: Frequency of deceased children, sex, date of birth, age at death, causes of death etc. were collected and studied.

Data on socio-economic factors: Information relating to socio-economic factors like family size, education, income, occupation of parent, etc. of the mothers was collected as suggested by Mahadevan (1986).

Such data were collected by interviewing the ever-married women aged 15-49 years from the sample with the help of interview schedule.

Statistical analysis: For statistical analysis, special attention has been given to find out the factors influencing infant and child mortality. All data were managed and analyzed using SPSS (PC Software), version 16 in which the level of significance was set at 5%. Some of the data were also calculated manually. The statistical significance of the differences between two means like age at marriage, age at child birth, etc. was recorded. The differences between proportions were tested, using chi-square (χ^2) test.

Results

In the following passages, we shall be examining the various biological and socio-economic factors determining infant and child mortality among the Jaintias of Jowai town in Jaintia Hills District, Meghalaya.

Table 1 shows the percentage frequency of infant and child mortality by age group among the Jaintias of Jowai town. It shows that the percentage of infant mortality decreases from 3.49% to 2.81% in the age group 20-29 to 40 years and above. However, the relationship between the infant mortality and mother's age group is statistically insignificant ($\chi^2 = 0.14$, df = 3, $p > 0.05$). It further shows that, unlike infant mortality, child mortality in Jowai town is inversely related to the mother's

age group. The highest occurrence of child mortality is recorded in the age group ≥ 40 years (2.20%) followed by 20-29 years (1.16%) and then 30-39 years (1.06%). No child death was recorded in the age group ≤ 19 years. χ^2 test between the live births and child mortality does show significant association with the mother age. ($\chi^2 = 8.05$, df = 3, $p < 0.05$).

Table-1: Percentage frequency of infant and child mortality by mother's age group

Age group of mother	No. of mothers	No. of live births	Infant mortality	Child mortality
19 years and below	1	1	0	0
(%)			(0.00)	(0.00)
20 – 29 years	45	86	3	1
(%)			(3.49)	(1.16)
30 – 39 years	119	376	11	4
(%)			(2.93)	(1.06)
40 years and above	110	499	14	11
(%)			(2.81)	(2.20)

- *χ^2 between live births and infant mortality in respect of mothers' age group is 0.14, df = 3, p > 0.05*
- *χ^2 between live births and child mortality in respect of mothers' age group is 8.05, df = 3, p < 0.05*

Table 2 shows the percentage frequency of infant and child mortality by age at marriage of the Jaintia mothers. For the present study, mother's age at marriage is categorised into two groups viz., 19 years and below, and 20+ years. The percentage of infant mortality among the mothers who got married at the age of 19 years and below are found to be 5.67%. However, the finding is reverse in the age group 20 years and above (i.e. 1.76%). Unlike the infant mortality, the percentages of child mortality observed higher among the mothers who married at 20 years and above. The percentage of child mortality among mothers marrying at 19 years and below is 0.71%. The percentage (2.06%) of child mortality found higher among the mothers who got married at 20 years and above. The table further shows that, χ^2 test between live births and infant mortality in respect of mothers' age at marriage is statistically significant ($\chi^2 = 10.03$, df = 1, $p < 0.005$). However, χ^2 test between the live births and child mortality in respect of mothers' age at marriage is found insignificant ($\chi^2 = 2.16$, df = 1, $p < 0.05$).

Table-2: Percentage frequency of infant and child mortality by mothers' age at marriage

Age at marriage	No. of mothers	No. of live births	Infant mortality	Child mortality
19 years and below(%)	67	282	16(5.67)	2(0.71)
20 years and above(%)	209	680	12(1.76)	14(2.06)

- *χ^2 between live births and infant mortality in respect of mothers' age at marriage is 10.03, df = 1, p < 0.005*
- *χ^2 between live births and child mortality in respect of mothers' age at marriage is 2.16, df = 1, p > 0.05*

The percentage frequency of infant and child mortality by birth spacing is highlighted in Table 3. It is seen that the duration between the last two children born were longer. It ranges between 1 and 6+ years. The frequency of infant mortality is found high in the beginning but it tends to decrease with the increase in birth spacing. The least recorded by 3 years (0.68%) and gradually increase with the increase in birth spacing. Highest percentage of infant mortality was recorded in the spacing duration of 6+ years and above (6.94%).

Table-3: Percentage frequency of infant and child mortality by birth spacing (based on the last two child births)

Duration (in years)	No. of mothers	No. of live births	Infant mortality	Child mortality
1 year(%)	61	240	8(3.33)	5(2.08)
2 years(%)	80	298	8(2.68)	5(1.68)
3 years(%)	41	147	1(0.68)	3(2.04)
4 years(%)	26	100	2(2.00)	2(2.00)
5 years(%)	16	69	3(4.35)	0(0.00)
6+ years(%)	21	72	5(6.94)	0(0.00)
Coefficient of correlation (r)			0.07	-0.08

The table further illustrate that there seems to be no consistent pattern in respect of both the infant and child mortality. The percentage of child mortality in the same area is more or less similar in all the birth spacing durations with no child death in 5 and 6+ years. However, it is found highest in the spacing period of 1 year (2.08%) followed by 3 years (2.04%) and least in 2 years (1.68%). The relationship between

birth spacing and infant as well as child mortality in this study population is statistically insignificant.

Table 4 shows the percentage frequency of infant and child mortality by mothers' education. Surprisingly, all women are found having access to modern educational facilities as far as the present studied population is concerned. The χ^2 test between live births and infant mortality in respect of mothers' education is significantly associated in the study population ($\chi^2 = 8.69$, df = 2, $p < 0.025$). The infant mortality varies from 6.21% among primary educated mothers to 2.19% among the higher secondary and above level, whereas, the child mortality varies from 3.11% to 1.31% respectively. Therefore, mother's education is found to be an important factor in regulating the infant mortality.

Table-4: Percentage frequency of infant and child mortality by mothers' education

Educational levels	No. of mothers	No. of live births	Infant mortality	Child mortality
Illiterate(%)	0	0	0(0.00)	0(0.00)
Primary(%)	36	161	10(6.21)	5(3.11)
Secondary(%)	94	344	8(2.33)	5(1.45)
Higher secondary+(%)	146	457	10(2.19)	6(1.31)

- *χ^2 between live births and infant mortality in respect of mothers' education is 8.69, df = 2, $p < 0.025$*
- *χ^2between live births and child mortality in respect of mothers' education is 2.36, df = 2, $p > 0.05$*

The percentage frequency of infant and child mortality by occupation among the Jaintias mothers is given in Table 5. In Jowai town, the percentage of infant mortality is recorded to be highest among the cultivators (9.68%) followed by those who run business (3.66%), housewives (3.02%) and then employees (2.29%). The child mortality in the same area is 2.01%, 1.22% and 1.76% for housewives, business and services respectively. χ^2 test between live births and infant and child mortality do not show significant relationship in respect of mothers' occupation in the present population.

Table-5: Percentage frequency of infant and child mortality by mother's occupation

Occupation	No. of mothers	No. of live births	Infant mortality	Child mortality
Housewives	58	199	6	4
(%)			(3.02)	(2.01)
Cultivators	9	31	3	0
(%)			(9.68)	(0.00)
Business	40	164	6	2
(%)			(3.66)	(1.22)
Services	169	568	13	10
(%)			(2.29)	(1.76)

- *X^2 between live births and infant mortality in respect of mothers' occupation is 5.41, df = 3, p > 0.05*
- *X^2 between live births and child mortality in respect of mothers' occupation is 1.17, df = 3, p > 0.05*

The percentage frequency of infant and child mortality by monthly household income of the Jaintias family is given in Table 6. The income groups were categorised into Low Income Group (LIG), Middle Income Group (MIG) and High Income Group (HIG). In Jowai town, these are Rs. < 19000, Rs. 19000 – 29000 and Rs. > 29000 respectively.

Table-6: Percentage frequency of infant and child mortality by monthly household income of the family

Income Groups	No. of mothers	No. of live births	Infant mortality	Child mortality
LIG (Rs. < 19000)(%)	133	469	14(2.99)	12(2.56)
MIG (Rs. 19000 - 29000) (%)	73	256	4(1.56)	2(0.78)
HIG (Rs. > 29000)(%)	70	237	10(4.22)	2(0.84)

- *χ^2 between live births and infant mortality in respect of household income is 2.92, df = 2, p > 0.05*
- *χ^2between ;'live births and child mortality in respect of household income is 4.35, df =2, p > 0.05*

The above table further shows that the percentage of infant mortality among the LIG, MIG and HIG in Jowai town are 2.99%, 1.56% and 4.22% respectively, whereas, the child mortality are 2.56%, 0.78% and 0.84% respectively. The χ^2 test between live births and infant and child mortality in respect of household income are statistically not significant in the study population.

Table 7 shows the percentage frequency of infant and child mortality by family type. The percentages of infant and child mortality in Jowai town are found higher in joint families compared to the nuclear families. The percentages of infant mortality in this area are 2.36% for nuclear family and 3.98% for joint family. The child mortality in the same area is 1.57% and 1.83% respectively. χ^2 test between live births and child mortality in respect of family types in this study area is statistically significant (χ^2= 14.08, df = 1, p < 0.025). However, infant mortality in respect of family type does not show any significant association.

Table-7: Percentage frequency of infant and child mortality by family type

Family type	No. of mothers	No. of live births	Infant mortality	Child mortality
Nuclear	179	635	15	10
(%)			(2.36)	(1.57)
Joint	97	327	13	6
(%)			(3.98)	(1.83)

- *χ^2 between live births and infant mortality in respect of family types is 1.86, df = 1, p > 0.05*
- *χ^2 between live births and child mortality in respect of family types is 14.08, df = 1, p < 0.005*

Percentage frequency of infant and child mortality by family size is shown in Table 8. Households having less than 5 members are categorised as Small family, 5-6 members as Medium family and more than 6 members are large family size. In the present population, there is a slight increase in the infant mortality from small to large size families, which is

Table-8: Percentage frequency of infant and child mortality by family size

Family size	No. of mothers	No. of live births	Infant mortality	Child mortality
Small	43	72	2	0
(%)			(2.78)	(0.00)
Medium	85	279	8	2
(%)			(2.87)	(0.72)
Large	148	611	18	14
(%)			(2.95)	(2.29)

- *χ^2 between live births and infant mortality in respect of family size is 21.63, df = 2, p < 0.005*
- *χ^2 between live births and child mortality in respect of family size is 4.11, df = 2, p > 0.05*

varying from 2.78% to 2.95% respectively. Child mortality is found higher in large size family (2.29%) compared to that of the medium size family (0.72%). χ^2 test between live births and child mortality do not show statistically significant association. However, the χ^2 test between live births and infant mortality shows significant association in respect of family size (χ^2 = 21.63, df = 2, $p < 0.005$).

Table 9 shows the percentage frequency of infant and child mortality by place of delivery. The percentage of infant mortality found high (8.24%) at home as compared to those mothers whose delivery took place at hospital (2.39%). The place of delivery is associated significantly with infant mortality (χ^2 = 8.44, df = 1, $p < 0.005$) and not with child mortality. χ^2 between live births and child mortality in respect of place of delivery is significantly associated (3.74, df = 1, $p > 0.05$).

Table-9: Percentage frequency of infant and child mortality by place of delivery (based on the last pregnancy)

Place of delivery	No. of mothers	No. of live births	Infant mortality	Child mortality
Home(%)	20	85	7(8.24)	0(0.00)
Hospital(%)	253	877	21(2.39)	16(1.84)

- *χ^2between live births and infant mortality in respect of place of delivery is 8.44, df = 1, $p < 0.005$*
- *χ^2between live births and child mortality in respect of place of delivery is 3.74, df = 1, $p > 0.05$*

Conclusion

In the present population, the influence of various biosocial factors such as, mothers' age, their age at marriage, education, income, occupation, birth spacing, family type and size, and place of delivery were studied in relation to the infant and child mortality among the Jaintias of Jowai town. In the light of the present findings, it may be concluded that poor socio-economic and biological factors like the household income, mother's education, types of family, parent occupation, birth spacing, lower age of the mothers are the factors that influence infant and child mortality in the present study populations.

In general, the incidence of child mortality has slowed down in the urban areas than in the rural areas in other parts of the world. The factors contributing to this decline include improved social cultural and health status of women. Thus, improving female education and providing better health services during pregnancy and delivery would further lower infant and child mortality. Necessary policies and programme interventions have to be developed to tackle the factors which are liable for infant and child mortality. Health education programmes should be designed for the families who have experienced infant and child deaths so that further risk of death may be substantially reduced. The effect of birth order and younger maternal age is mediated through short birth interval. Young mothers at high parity, those bearing children at short birth intervals, and mothers who had suffered child loss before are vulnerable to excessive infant and child mortality. This may be used for future planning and policy decisions aimed at reducing infant and child mortality.

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Screening Tools of Child Developmental Delays and Statistical Modeling to Assess Risk Factors of it: A Bird's Eye View

Jiten Hazarika and Irani Saikia**

Introduction

Child development is an important determinant of health over the course of life. Children grow and learn an amazing amount in their first five years. Within this period, they learn to roll, crawl, stand, talk, walk and run. These skills are called developmental milestones. There are five main groups of skills-gross motor, fine motor, language, cognitive and social, that make up the developmental milestones. Child Developmental delay (CDD) is said to exist if the child does not reach developmental milestones at the expected age. There are two types of tests to diagnose developmental delays: developmental screening and developmental evaluation. Developmental screening provides information on whether a child's development is similar to other children of the same age. The developmental screening test will help to tell, if the child needs to see a specialist. Screening always involves the use of a

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standardized tool. Screening tool questions are based on developmental milestones. It does not give a diagnosis, but identifies areas in which child's development differ from same age norms. If the test results in developmental delay of a child, then the child should be referred for a developmental evaluation.

The developmental evaluation is an in-depth assessment of a child's skills and should be administered by highly trained professionals such as developmental psychologist, developmental pediatrician or pediatric neurologist. Again, once a child is identified as having developmental delay, it is important to identify the associated risk factors so that, the health professionals can take effort to optimize developmental delays by working on that identified risk factors. For a child, developmental delays can be normal and without the need of further intercession, a child can lead a normal and healthy life. But, some children have significant delay that may indicate possible future learning disabilities, which persist throughout their lives. So, it is very important to predict the risk factors associated with child developmental delays using appropriate modeling to identify the developmental problems earlier and prevent complications. The statistician plays an important role in developing screening tools and statistical modeling to assess determinants of Child Developmental Delays.

This paper is based on an extensive review of

- ❖ Prevalence of Developmental Delay's (CDD) at international and national level
- ❖ Different Screening Tools of CDD's
- ❖ Statistical modeling to trace risk factors of CDD's.

The paper ends with further scope of the study which is presented in last section (concluding remarks) of the same.

Prevalence of CDD's – International and National Status

The study of the development of child had been the interest of man since the end of the 18th century. Tiedemann (1787) first published the detailed record of the child development in Germany. After that another detailed account of child

development was published by Darwin (1872). Darwin published the record up to 18 years of age in which cephalocaudal sequence and the continuous developmental process was described. Another study made by Stern & Kuhlman (1912) suggested that the ratio between a child's mental age and his chronological age- the Intelligence Quotient(IQ) could indicate his/her relative status. The norms of development of children were established by Arnold Gesell in 1925 (Marchese 1995). Again, the norms of cognitive development of children were established by Bayley (1933). However, the sample based studies on prevalence of CDDs have been started during the last three decades. Bendel et al. (1989) made a study on 9854 two to three years old children of Israel that showed 8.9% disability rate. Another study based on 5478 children, reported 9.4% prevalence in Jamaica (Paul, Desai & Thorburn 1992). Durkin *et al.* (1994) reported the childhood disability prevalence in Jamaica as 15.2%, in Pakistan 14.7% and in Bangladesh it was found 8.2%. The prevalence of developmental delays ranges from 3.5% to 10% of the general population in various studies (Lewis & Judith 1994; Louise *et al.* 2002; Nair & Radhakrishnan 2004; Rydz *et al.* 2005; William 1994). The World Health Organization (WHO) estimated that about 10% of the world's population has some form of disability (Boyle *et al*. 1996). The American Academy of pediatrics (2001) estimated that about 12% to 16% of American children have developmental or behavioral disorders. However, less than 50% of the children with developmental delays were identified as having a problem before starting school. The Korean society of Neonatology (2005) estimated about 8% premature birth in Korea. The overall prevalence of questionable development was reported as 11.1% in Korea (Bang 2008).

In India, Government launched the Integrated Child Development Services Scheme in 1975 for enhancing the health, nutrition and learning opportunities of infants and young children (0-6) years and their mothers also. The millennium Development Gold (MDG5, 1990-2015) is also giving emphasis on child development as, if the child cannot grow and develop

properly, he/she cannot resist infections or learn to their full potential. In the study (Nair, George & Philip 1991), the prevalence was 3% among less than 2 years old. Again, a nationwide survey under NSSO, 2002 in India, showed a prevalence rate of 1.77% disabilities among all age groups. In a study made by Kour *et al.* (2006) indicated that the awareness of developmental delays as well as possible interventions is low in India. Another study made in Bhopal found out that the prevalence of developmental delays is 9.5% of the apparently healthy children as early as three months of age (Meenai & Longia 2009). In a survey conducted in Delhi on 3560 children in the age group (0-6) years showed disability in 6.8% of those assessed. The study made by Nair *et al.* (2009) in Kerala, the prevalence of developmental disabilities up to 2 years was 2.31% and from 2-5 years it was 2.62%. However, the studies on overall risk factors affecting child development are still very limited around the globe.

Screening Tools for CDD's

As mentioned above, the statistician plays an important role in developing screening tools. However, so far there is no globally accepted screening tool to detect status of a child development. The Korean Denver II (Shin *et al.* 2002) is a widely used developmental screening tool. The term "Denver" reflects that this screening test was created at the University of Colorado Medical Center in Denver and was developed by William K Frankenberg. He first introduced this screening test with J.B. Dodds in 1967. Frankenberg *et al.* (1981) later described a revised and abbreviated Denver screening test. Since its publication, it has been standardized in many countries and has been used internationally. The Korean version of Denver Development Screening Test (DDST) was made in 1987. After a number of concerns regarding DDST have been raised, the test was revised, re-standardized and published as Denver II in 1992. The purpose of the study was to test the Denver II on Seoul children to compare the development of Denver and Seoul children and to see whether Denver II can be used to Korean children without modification. Due to cultural

differences, several items of Denver II were excluded and a total of 116 test items were included in the study. The test or instrument can be applied to children under 6 years to screen child developmental delay among them. According to Shin *et al.* (2005), the sensitivity and specificity of Denver II were 0.82 and 0.62 in the context of Korean population. Bang (2008) used the Denver II instrument to screen child developmental delays. Some other screening tools are also available for diagnosis child developmental delays. Some of them are:

- The Neonatal Behavioral Assessment Scale (NBAS) devised by the Harvard pediatrician T. Berry Brazleton, better known as "The Brazleton"
- The ELM (Early Language Milestone) scale of children 0-3 years of age.
- The CAT (Clinical Adaptive Test) and CLAMS (Clinical Linguistic and Auditory Milestone Scale) for children 0-3 years of age.
- The Infant Monitoring System for children aged 4-36 months.
- The Early Screening Inventory for children3-6 years of age.
- The Peabody Picture vocabulary Test (the "Peabody") for children 2½ to 4 years of age.
- Parent completed developmental screening questionnaire.
- Ages and Stages Questionnaires: Social-Emotional (ASQ:SE)
- Parents'' Evaluation of Development Status (PEDS).
- Bayley Scales of Infant and Toddler Development.
- NIMH Development Screening Schedule.
- NIMH Development Assessment Schedule.
- David Werner's record forms on Physical, Social and Cognitive Development.

- Ten Question Screen (T.Q) by Lillian Belmont and others, etc.
- Child Disability Questionnaires (CDQ) by Lillian Belmont and others, etc.

Through all these tools, we can diagnose the developmental delays in child so that after recognizing a child having developmental delay, one can refer the child for developmental evaluation as a next step.

Among the tools, the Denver II has some gain which differentiates it from other screening tests:

- It enables the tester to compare a child development with that of over 2,000 children who were in the standardized population, like growth curve.
- It consists of items in which a sub sample (race, less educated parents, gender and place of residence), which varied a clinically significant amount from the composite sample are identified and their norms provided in the Denver II technical manual.
- It provides a broad variety of standardized items to give a quick overview of the child's development.
- It also contains a behavior rating scale.
- The test is primarily based upon an examiner's actual observation rather than parental report.

In our country, so far as tools to diagnose Child Developmental Delays are concerned, following tools are notable:

- Trivandrum Development Screening Chart (TDSC).
- Screening Proforma for mental retardation developed by Genetics Units, AIIMS.
- Developmental Screening Tool (DST)

There has been substantial debate about the adequacy of commonly used statistical methods including above screening tools for screening CDDs. Although, the DDST is the most widely used test for screening developmental problems in

children, the test has been criticized to be unreliable in predicting less severe or specific problems. However, Frankenberg (2002) has replied to such criticism by pointing out that the Denver scale is not a tool of final diagnosis, but a quick method to process large number of children in order to identify those that should be further evaluated. In other words it is a tool kit from the basket of statistical tool kits. The statistician's duty is to develop tool so that one can use this tool for identifying children having developmental delays and to choose/ develop appropriate statistical model(s) to be used for assessing risk factors for such types of problems.

Studying Risk Factors Using Statistical Modeling

After identifying a child as having developmental delay, next step is to identify associated risk factors, so that the concerned agencies can take effort to optimize intensity of the problem by working on the identified risk factors. It necessitates statistical modeling. In this context, some studies have been carried out by different researchers using statistical tools such as descriptive statistics and basic tests of significance etc. The findings of some of them have been delineated here.

Earlier studies showed that the developmental courses and their outcomes are influenced by the complex relationship between biological (Hollomon, Dobbins & Scott 1998; Schendel *et al.* 1997; Sonnander & Claesson 1999; Were & Bwibo 2006) and environmental (Beck 1999; Bradley & Corwyn 2002; Liaw & Brooks-Gunn 1993; Najman *et al.* 1992; To, Cadarette & Liu 2001) factors. As biological factors, premature birth, low birth weight, congenital anomalies, perinatal brain injuries, pregnancy and delivery related complications and as environmental risk factors, maternal education level, socio-economic status, maternal depression, maternal nutrition, infection, home environment, family functioning, social support were reported.

Some other studies (Bradely *et al.* 1989; Bronfren-brenner & Morris 1998; Hart & Risley 1995; Hoff-Ginsburg 1991; Katz & Snow 2000; Sameroff 1983; Tomasello & Farrar 1986) also showed that- to enhance social, cognitive and language

development in early childhood, infants and preschoolers need responsive and stimulating interactions with adults-parents and other caregivers.

From the above studies, it is observed that influencing factors on child development are environmental and biological conditions and these affect children in a complicated way. In brief, following are the probable characteristics which determine risk factors of CDD:

- General characteristics:

  Child's gender, birth order, birth interval, age, mother's job, family type, mother's and father's age etc.

- Obstetrical related characteristics:

  Maternal food habits during pregnancy, delivery type, and complications.

- Biological factors:

  Child's prematurity, birth weight, twin, disease and mother's disease, child's rearing burden.

- Environmental factors:

Parent's education level, family income, residential status, family type, home environment, mother's depression, family functioning, and social support.

The first four components of environmental factors are categorical in nature.

The HOME (Home Observation for Measurement of the Environment) inventory (Caldwell & Bradley 1984) is an instrument that can be used for the systematic assessment of the quality of children's home environment. The initial version of HOME (0-3) can be used to obtain information through interview with the primary caregivers and also through observation. The HOME inventory takes into account some other factors also such as parent's education level, family income, living region, family type, mother's depression, family functioning, social support etc. Various works (Bang 2008; Bradley 1993; Bradley & Caldwell 1979; Bradley, Caldwell &

Rock 1988; Bradley et al. 1989; Elardo, Bradley & Caldwell 1975; Han, Bang & Yun 2001; Johnson *et al.* 1993; Luster & Dubow 1992; Molfese, DiLalla & Bunce 1997; Saudino & Polmin 1997; Tong *et al.* 2007; Totsika & Sylva 2004) had been carried out using HOME inventory to examine the relationship between home environment, daycare and children's development.

Mother's depression can be assessed using the Beck Depression Inventory (BDI), an instrument having 4 point 21-items Likert scale (Rhee *et al.* 1995) and Han's inventory (Han 1997) may be used for assessing child rearing burden. Child development process includes the factor family functioning also, so, for assessing this factor Lee's Korean family functioning instrument (Lee *et al*. 2002) can be utilized.

Again, for child's healthy development, social support also plays its role in its own way. Thus, the Personal Resource Questionnaire (PRQ) (Brandt & Weinert 1981) may be used as an instrument for measuring social support, which is an intuitive and ubiquitous concept. That questionnaire was developed in the late 1970s. Since its development, it has gone through various generations like PRQ82, PRQ85 (Weinert 1988) etc. The latest version of PRQ is PRQ2000 (Weinert 2003)

To modeling the dependency of the risk factors on child developmental delays (response) and also to study the impact of risk factors on the response, the regression models can be considered. There are two types of regression models- general linear regression model and the generalized linear regression model. The general linear regression model is a special case of generalized linear regression model. The family of generalized regression models was first introduced by Nelder & Wedderburn (1972) and encompasses normal error linear regression models and the non-linear exponential, logistic and Poisson regression models, as well as many other models, such as log-linear model for categorical data. The negative Binomial regression model (Lawless 1987), generalized Poisson regression model (Consul & Famoye 1992; Ismail & Jemain 2005), restricted generalized Poisson regression model (Famoye 1993), zero-inflated Poisson regression model (Bohning *et al.*

1999; Hall 2000; Lambert 1992), zero-inflated generalized Poisson regression model (Famoye & Singh 2006) etc. belong to this family of regression models. The benefit of using this class of models is that here fulfillment of the assumption of normality and constant variant is not mandatory. Any regression model that belongs to the family of generalized regression models can be analyzed in a unified fashion. The maximum likelihood estimates of the regression parameters can be obtained by iteratively re-weighted least squares. Tests for model development to determine whether some predictor variables may be dropped from the model can be conducted using likelihood ratio tests. But majority of earlier researches to assess determinants of CDD are limited to study of relationship between variables taking two at a time only. A few studies (Bang 2008; Duncan 2003 etc.) have been undertaken using logistic regression model which is a member of the family of generalized regression models. But it ignores the other candidates of the generalized linear regression models. No justification of considering this particular model has been found.

Concluding remarks

The child's personality is a product of slow gradual growth. They become mature in sequences, i.e. it sits before it stands or babbles before it talks. All these are the part of growth. Since today's child is the backbone of the future nation, so for a healthy nation, we should start from the beginning i.e. from the healthy growth of child. But from the above discussion, it is observed that no tool for assessing CDD has been found developed in Indian context. However, a few studies have been undertaken using existing tools. So, it is an open area of research and requires more and more studies on CDDs, so that, the intensity of the problem can be reduced and thus the future nation will be in healthy hands.

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Influence of Demographic and Socio-economic Factors on Infant and Child Mortality among the Rural Kabui Nagas of Manipur

*Chunthuiliu Kamei**

Introduction

Infant and child mortality rate differs from society to society depending on a number of socio-economic factors such as age, sex, education, occupation, diseases, health-care practices, etc. Gubhaju, Streatfield & Majumder (1991) reported that the relative importance of socio-economic determinants to infant and child mortality risks varies with the level of social and economic well-being of a society. Studies have shown that low economic status is associated with increased rates of infant and child mortality (Gwatkin *et al.* 2007; Wagstaff 2000). Socio-economic and demographic factors related to mother play a very important role in influencing infant and child mortality. Factor such as mother's education strongly influenced child's health and also the ability to get better access to ante-natal care (Caldwell 1986; Gaiha *et al.* 2009; Gragnolati *et al.* 2006; Ware 1984). Socio-economic status has a strong relation with maternal education which influences the risk of diseases through child-rearing practices such as breastfeeding, appropriate care-

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seeking (Bicego & Boerma 1993). Research on infant and child mortality among the rural Kabui Nagas of Manipur is very scanty particularly in Tamenglong area. Therefore, the present study has been carried out to get a better understanding of the various demographic and socio-economic factors influencing infant and child mortality in the study population.

Objective

This paper is an attempt to study the influence of demographic and socio-economic factors on infant and child mortality among the rural Kabui Nagas of of Manipur.

Materials and Methods

Tamenglong district was chosen for the study as this district is the most backward of all the districts of Manipur. The data for the present study was collected from three villages namely Langkhong, Khongjaron Khunthak and Duigailong of Tamenglong district. The selection of the villages was purposive and the villages were identified on the basis of higher concentration of population concern. Data collection was carried out between December 2011 to April 2013. The Kabui Nagas are a major tribe of Manipur concentrated mostly in Tamenglong Distrct. Data was collected from 260 ever-married women who are aged between 15 and 49 years. House to house visit was done for data collection which involves interacting with the head of the family and married women in the house. Demographic variables considered for the study are- age of mother, mother's age at marriage, and birth interval. The socio-economic variables considered are mother's education, mother's occupation, household income, type of house. Adoption of family planning method is also another variable considered in the present study. Household income was classified into three quartiles using Microsoft Office Excel, 2007 and those that fall above the 75^{th} percentile, within 50^{th} -75^{th} percentile and below 50^{th} percentile are classified as High Income Group (HIG), Middle Income Group (MIG) and Low Income Group (LIG) respectively. A complete enumeration of the households was made for demographic information. Data was collected using

interview schedule. Data was analysed using SPSS 16 version. Pearson's correlation coefficients test was done to determine and observe the influence of specific demographic and socio-economic variables on infant and child mortality.

Results

Table 1 shows the infant and child mortality rate by age group of the Kabui Naga mothers. Infant mortality rate in Tamenglong sub-division is found to be 5.30%, 3.70%, 3.53% and 3.30% for the age group ≤ 25, 26-35, 36-45, and ≥ 46 respectively. The infant mortality does not show any significant correlation with the age group of mothers (r=0.101, p>0.05). **Table 1** also shows that no child death is found in the age group of ≤ 25 and 26-35 years. However, child mortality shows a positive and significant correlation with age group of mothers (r=0.306, p<0.01).

Table-1: Infant and child mortality rate by age group of the Kabui Naga mothers

Age group (in years)	No. of mothers	No. of live births	Infant and child Mortality		
			Below 1 year	1-14 years	Total
≤ 25	52	76	4 (5.30)	0 (0.00)	4 (5.30)
26-35	114	352	13 (3.70)	0 (0.00)	13 (3.70)
36-45	73	309	11 (3.53)	10 (3.21)	21 (6.73)
≥ 46	21	121	4 (3.30)	5 (4.13)	9 (7.44)
Coefficient of correlation (r)			0.101	0.306**	0.233**

Figures in parentheses indicate percentage; ** p < 0.01

In Table 2, it is observed that majority of the mothers got married before reaching 20 years of age. This age group shows the highest infant mortality rate of 4.76% and the rate decreases with an increase in age at marriage of mothers. Infant mortality

Table-2: Infant and child mortality rate by age at marriage of the Kabui Naga mothers

Age at marriage (in years)	No. of mothers	No. of live births	Infant and child Mortality		
			Below 1 year	1-14 years	Total
≤19	115	399	19 (4.76)	5 (1.25)	24 (6.01)
20-23	81	282	10 (3.55)	5 (1.77)	15 (5.33)
≥24	64	184	3 (1.63)	5 (2.71)	8 (4.34)
Coefficient of correlation (r)			-0.122*	0.019	-0.091

Figures in parentheses indicate percentage; *p<0.05

shows a negative and significant correlation with mother's age at marriage (r= -0.122, p<0.05).Child mortality however shows a positive correlation with mother's age at marriage though it does not show any statistical significance (r=0.019, p>0.05).

Table 3 shows the infant and child mortality rate by birth interval. From the table it is observed that infant mortality rate is highest in the interval of <24 months (7.54 %) and the rate decreases with an increase in the interval length. However, infant mortality does not show any significant correlation with birth interval (r= 0.111, p > 0.05). Child mortality rate also decreases with an increase in the birth interval length. However it does not show any significant correlation with birth interval(r=0.080, p > 0.05). However, pooling data for infant and child mortality it shows significant and positive correlation with birth interval (r= 0.132, p < 0.05).

Table-3: Infant and child mortality rate by mean birth intervals of the Kabui Naga mothers

Birth interval (in months)	No. of mothers	No. of live births	Infant and child Mortality		
			Below 1 year	1-14 years	Total
< 24	15	53	4 (7.54)	1 (1.88)	5 (9.43)
24-36	155	607	21 (3.45)	12 (1.97)	32 (5.27)
> 36	45	172	7 (4.06)	2 (1.16)	9 (5.23)
Coefficient of correlation (r)			0.111	0.080	0.132*

Figures in parentheses indicate percentage; * p<0.05

Table 4 shows the infant and child mortality rate by education level of the Kabui Naga mothers. There is a negative and significant correlation between infant mortality and education of mothers (r= -0.164, p<0.01). Child mortality also shows a negative and significant correlation with mother's

Table-4: Infant and child mortality rate by educational level of the Kabui Naga mothers

Educational levels	No. of mothers	No. of live births	Infant and child Mortality		
			Below 1 year	1-14 years	Total
Illiterate	69	334	13 (3.89)	10 (2.99)	27 (8.08)
Primary	78	263	12 (4.56)	2 (0.76)	14 (5.32)
Secondary	56	142	7 (4.92)	1 (0.70)	8 (5.63)
Higher Sec. and above	57	126	0 (0.00)	2 (1.58)	2 (1.58)
Coefficient of correlation (r)			-0.164**	-0.163**	-0.211**

Figures in parentheses indicate percentage; **p<0.01

education (r= -0.163, p<0.01). Pooling the data for both infant and child mortality, there is a negative and significant correlation with education of mothers (r= -0.211, p < 0.01).

Table 5 shows the infant and child mortality rate by occupation of mother. It is observed that there is a negative correlation between infant mortality and occupation of mother. However, it is not statistically significant (r= -0.084, p > 0.05). Again, there is a negative correlation between child mortality and occupation of mother which is not statistically significant(r= -0.019, p > 0.05). Pooling the data for infant and child mortality, no significant correlation was observed with occupation of mother (r= -0.077, p > 0.05).

Table-5: Infant and child mortality rate by occupation of the Kabui Naga mothers

Occupation	No. of mothers	No. of live births	Infant and child Mortality		
			Below 1 year	1-14 years	Total
Housewife	143	424	18 (4.24)	4 (0.94)	22 (5.18)
Cultivators	64	280	9 (3.21)	8 (2.85)	17 (6.07)
Business	28	92	5 (5.43)	1 (1.08)	6 (6.52)
Services	25	69	0 (0.00)	2 (2.89)	2 (2.89)
Coefficient of correlation (r)			-0.084	-0.019	-0.077

Figures in parentheses indicate percentage

Table 6 shows the infant and child mortality rate by household income of the Kabui Naga mothers. It is observed from the table that there is no consistency in the infant and child mortality rate in the three income groups. However, infant mortality shows a negative and significant correlation with household income (r= -0.129, p < 0.05). Child mortality also shows a significant correlation with household income (r= 0.196, p < 0.01).

Table-6: Infant and child mortality rate by monthly household income of the Kabui Naga

Income groups	No. of mothers	No. of live births	Infant and child Mortality		
			Below 1 year	1-14 years	Total
Low Income Group (LIG)	130	378	23 (6.08)	3 (0.79)	26 (6.87)
Middle Income Group(MIG)	66	253	5 (1.9)	3 (1.18)	8 (3.16)
High Income Group (HIG)	64	234	4 (1.7)	9 (3.84)	13 (5.55)
Coefficient of correlation (r)			-0.129*	0.196**	-0.003

Figures in parentheses indicate percentage; *p<0.05, **p< 0.01

Table 7 shows the infant and child mortality rate by type of house of the Kabui Naga mothers. Infant mortality shows no significant correlation with type of house (r= -0.078, p > 0.05). Child mortality also does not show any significant correlation with type of house (r= -0.036, p > 0.05).

Table-7: Infant and child mortality rate by types of house of the Kabui Naga

House types	No. of mothers	No. of live births	Infant and child Mortality		
			Below 1 year	1-14 years	Total
Kaccha	185	661	26 (3.93)	12 (1.81)	38 (5.74)
Semi-pucca	14	30	2 (6.66)	0 (0.00)	2 (6.66)
Pucca	61	174	4 (2.29)	3 (1.72)	7 (4.02)
Coefficient of correlation (r)			-0.078	-0.036	-0.079

Figures in parentheses indicate percentage

Table 8 shows the infant and child mortality rate by adoption and non-adoption of family planning methods. It is observed from the table that both infant and child mortality rate is higher among mothers who are not adopting any family planning methods (4.08% and 2.04% respectively) as compared to mothers who adopt it. Table also shows a positive correlation for both infant and child mortality with adoption of family planning method but it does not show any statistical significance (r= 0.055 and 0.074, p > 0.05).

Table-8: Infant and child mortality rate by adoption of the family planning method of the Kabui Naga

Family planning	No. of mothers	No. of live births	Infant and child Mortality		
			Below 1 year	1-14 years	Total
Non- adopters	191	636	26 (4.08)	13 (2.04)	39 (6.13)
Adopters	69	229	6 (2.62)	2 (0.87)	8 (3.49)
Coefficient of correlation (r)			0.055	0.074	0.079

Figures in parentheses indicate percentage

Discussion and Conclusion

Infant and child mortality rate differs from population to population and depends on a number of both demographic and socio-economic factors. The various demographic and socio-economic factors taken up in the present study includes

age of mother, mother's age at marriage, birth interval, mother's education, mother's occupation, household income, type of house and adoption of family planning method. The study shows that infant mortality rate is higher than child mortality rate among the Kabui Nagas. From all the selected demographic and socio-economic variables, age of mother, mother's education, and household income seems to greatly influence infant mortality while child mortality is highly influenced by age of mother, mother's education and household income. Age of mother is found to be an important demographic factor while mother's education and household income are found to be the two common socio-economic factors influencing both infant and child mortality. Mother's education plays an important role in reducing infant and child mortality as educated mothers are well exposed to better child rearing practices. Better income also promotes access to better health care which in turn lowers infant and child mortality. Education is one of the most important tools for lowering infant and child mortality as education leads to better awareness. With better education there is also higher income as well educated mothers are placed in a better job. Therefore, societies should give importance and priority to education which is the basis for the well-being of a society.

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Nutritional Health Status of Bhotia Tribal Children of Uttarakhand, India

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Introduction

Body mass Index (BMI) weight (in kilograms) divided by height in meters square (kg/m^2) (Cole 1991), also known as quetelet's index (Gadzik 2006) is one of the best indicator to assess the nutritional health status (WHO 1995). By using an index it can categorize (WHO Expert Consultation 2004) and see the status of thinness, normal and obesity grades. In present study an attempt has been made to use direct age and sex specific BMI thresholds (Khadilkar et al. 2012), linked to an adult Asian BMI at the age of 18 years, to see overall status of BMI of the Bhotia tribal children's. BMI cut-off points for thinness (Cole et al. 2007) grades 1, 2, 3 age and sex wise percentile curves passing through BMI of 16, 17, and 18.5 and for overweight and obesity percentile curves (Jiang et al. 2006) passing through 23 and 28 kg/m^2 at the age of 18 years have been directly used to see the body mass index of Bhotia children of Garhwal Himalayas. Normal range of BMI 18.5 to 23 kg/m^2, which fall in between this two index (thinness and obesity) have been extended to see the status of normal children (Cole et al. 2000) BMI. Bhotia's likes to call them by their generic name (Tolia n.d.) viz. Marccha, Tolccha and Jad, the term Bhotia

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which has been introduced by Britishers is being commonly used for the high altitude people, or the people resides in 'Bhot' area. Bhotia tribe is one of the oldest inhabitants (Dabral n.d.) of high altitude of Garhwal and Kumaun region of Central Himalayas (Negi 1995). It is hard to get nutritional food throughout the year at mountainous region. Hence, Bhotia's practiced to preserve seasonal crops, vegetables, fruits and meat for the lean season (Nautiyal *et al.* 2003a). Girl child in a family contributes on household work as well as other outdoor agricultural activities to support their families. They belong to mongoloid stocks (Brown 1987); earlier their main occupation was trade of goods between India and China but after Chinese invasions in the year 1962, this traditional trade activity has been stopped. Transhumant pastoralism is their main occupation (Nautiyal *et al.* 2003b) now and they have started agriculture, animal husbandry in their occupied area at high and middle altitude of the Central Himalaya (Garhwal and Kumaun Himalaya). Rice and millets is their staple food and salty butter tea or namkeen chai (Jya) (Purohit *et al.* 2002) also consumed by Bhotia's very frequently, wild herbs and medicinal plants (Maikhuri *et al.* 1998) also contribute in their diet. The global trend in underweight prevalence continues to decrease and it decreases by 10 percent in between 1990 to 2012, on other hand, overweight prevalence was second highest among Asians (UNICEF-WHO-The World Bank 2015) by 12 percent, which is insufficient to meet the Millennium Development Goal, 2015.

Materials and Methods

The cross sectional anthropometric study (McMurray 1996) for the PhD was undertaken at Chamoli and Uttarakashi Districts of Uttarakhand, India. This area is situated at the Indo-China international border (Atkinson 1884) distance of the study area is approximately 330 km and 220 km respectively from the state capital Dehradun. The place is remote and hilly terrain (Tolia n.d.) makes life more difficult for the Bhotia's in their occupied area. In present study mostly school and college going children (6–18 years) from Anganwadi centers, Shishu

mandir, primary schools, High schools and Inter-mediate college of the region, from Joshimath Block Niti, Malari, Mana, Bampa, Raini, Kosa and Gamsali, Dasoli block Chinka, Berahi, Ghingran, Negwad and Dulibagar and Uttarakashi block Dunda and Harsil villages has been studied and also made a visit to their houses for collection for household and other demographic, anthropometric or nutritional datas (Malina & Katzmarzyk 1999). A total number of 643 children (336 boys and 307 girls) aged 6 – 18 years were measured. Height and weight measurements were on each subject following the standard techniques (Weiner & Lourie 1981). Weight was measured using spring balance weighing machine (Libra; Made in India) to the nearest 0.5 kg. Height was measured using Martin anthropometric rod (Galaxy International; New Delhi, Made in India) to the nearest 0.1 cm. The BMI was computed following internationally accepted standard equation as weight in kg divided by square in height in meter, i.e. BMI = Weight(kg)/ Height (m^2). The data of the present study have been analyzed by using software MS-Excel and SPSS version 16. Distance curves of Body mass index plotted against age are depicted graphically. BMI status was evaluated by direct use of the new international graded definition of thinness (WHO 2004) in childhood and adolescence is based on WHO recommended cut off points (Hosseini, Carpenter & Mohammad 1999; Virani 2011; WHO 2000) of 16, 17, and 18.5, and for overweight (Dietz & Robinson 1998) and obesity age-sex-specific BMI cut-offs 23 and 28 kg/m^2 are linked to BMI percentile curves (Jiang et al. 2006) passing through at the age of 18 years (Khadilkar et al. 2012) as an adult Asian BMI. Normal range BMI (Waterlow *et al*. 1977) which is 18.5 to 23 kg/m^2, between these two indexes (Thinness and obesity) have been extended, to see the overall BMI status (WHO Multicentre Growth Reference Study Group 2006) and nutritional health status of Bhotia children.

Results

Bhotia children are apparently healthy and normal, There is a significant difference in height of Bhotia children across

Table-1: Mean and SD value of height, weight and BMI of the Bhotia children

Age	N	Mean value of Boys Height	S.D. of Boys Height	Mean value of Boys Weight	S.D. of Boys Weight	N	Mean value of Girls Height	S.D. of Girl Height	Mean value of Girls Weight	S.D. Girls Weight	BMI of Boys	BMI of Girls
6+	25	105.56	3.4	16.54	1.4	21	103.57	5.3	16.21	2.2	14.84	15.11
7+	22	110.90	2.4	17.86	1.4	22	110.35	2.3	18.50	1.4	14.52	15.19
8+	21	115.04	3.3	21.40	1.9	21	115.33	2.0	19.90	1.2	16.16	14.96
9+	20	123.11	2.8	23.45	1.6	21	122.40	4.4	22.83	2.5	15.47	15.24
10+	30	125.80	3.2	24.51	2.0	20	125.22	4.9	24.88	2.4	15.48	15.86
11+	28	128.39	2.3	27.74	1.7	29	131.02	5.9	27.34	3.4	16.83	15.92
12+	29	135.74	5.2	30.88	2.4	29	132.13	5.8	28.11	3.0	16.76	16.10
13+	30	141.17	4.8	35.15	2.3	27	142.91	3.1	37.74	3.6	17.63	18.48
14+	30	150.20	5.6	40.74	3.6	20	144.50	2.8	44.33	2.0	18.05	21.22
15+	28	156.21	5.4	46.83	2.4	25	145.98	1.6	45.52	1.7	19.19	21.35
16+	26	159.70	5.5	49.53	2.3	22	148.17	3.6	45.20	2.2	19.41	20.58
17+	26	160.45	5.1	51.63	2.7	20	151.81	3.5	46.91	1.7	20.05	20.35
18+	24	164.43	2.8	50.76	3.0	30	148.29	2.3	47.45	1.5	18.77	21.57

Figure-1: Distance curve of body weight and height of the Bhotia children

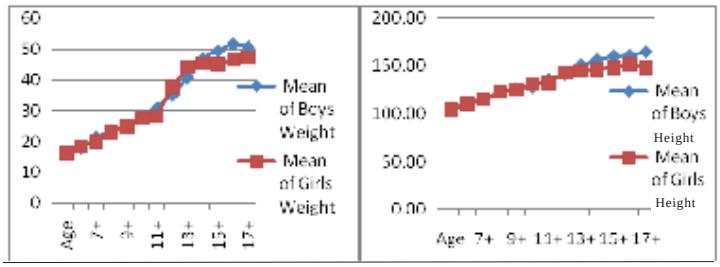
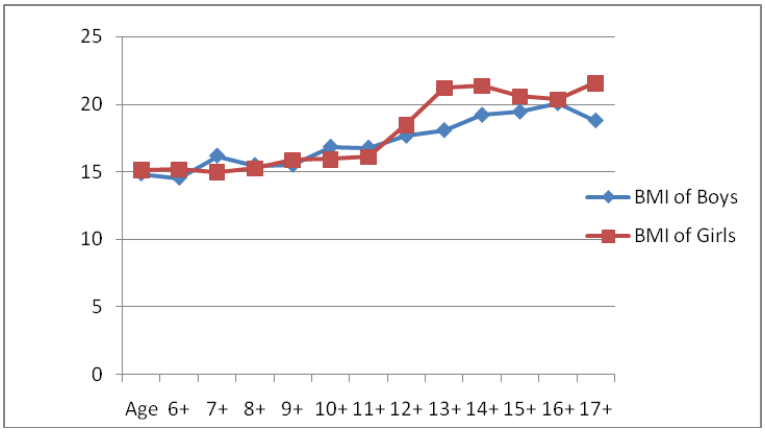


Figure-2: Distance curve of body mass index of the Bhotia children



the age groups (Khongsdier & Mukherjee 2003) ($p<0.05$, boys 5.21 and girls 4.12 cm). 20.6 percent children 6.84 percent boys and 13.03 percent girls are having thinness grade one, 0.3 percent boys been found grade two thinness and grade three thinness, direct use of age and sex specific BMI of Asian adult at the age of 18 years have shown that 88.69 percent boys and 75.24 percent girls are normal though 3.87 percent boys and 11.73 percent girls are overweight but no case of obesity have been found amongst either sex (boys or girls). There was a correlation between BMI of boys and girl (0.0903591) has been found.

Discussion

The present cross-sectional (McMurray 1996) study was conducted in Uttarakhand, the northern province of India among the Bhotia tribal children. Aim of this study is to see age-sex specific BMI status of Bhotia children by using new graded definition of thinness and overweight, based on pooled international data for BMI linked to the WHO recommended adult cut off points (Cole et al. 2007) for Asian and Indian. India's children suffering from double burden diseases; on one hand under-nutrition is highly prevalent in our country and other hand obese or obesity knocking our doors in metropolitan cities or high income group families. Therefore, Asian and Indians are a high risk group for many chronic diseases (UNICEF-WHO-The World Bank 2015) including Protein Energy Malnutrition, hypertension, diabetes mellitus, cardiovascular disease, and nonalcoholic fatty liver disease (WHO Expert Consultation 2004) etc.

Table 2 shows that 6.84 percent boys and 13.03 percent girls are thin with their BMI, 0.3 percent boys belongs to thinness, grade two and grade three but among girls no case these grades has been found. Direct use of age and sex specific BMI threshold shows that 3.87 percent boys and 11.73 percent girls are overweight. Further, present study revealed that obesity is absent amongst both, boys and girls.

Table-2: Status of direct use of age and sex specific BMI of the Bhotia children

Cut-off points	Boys frequency	Percentage	Girls frequency	Percentage
Thinness grade 3	23	6.84	40	13.03
Thinness grade 2	01	0.30	0	-
Thinness grade 1	01	0.30	0	-
Normal	298	88.69	231	75.24
Overweight	13	3.87	36	11.73
Obesity	0	-	0	-
Total	336	100.0	307	100.0

Conclusion

Bhotia children are apparently healthy (Dutta & Pant 2003), 88.69 percent of the Bhotia boys are normal with their Body Mass Index. High prevalence of overweight (UNICEF-WHO-The World Bank 2015) is found among girls (11.73%). 75.24 percent girls are normal, no case of obesity was observed amongst the Bhotia children. Present Study indicates that girls have the tendency to put on weight at the later stage of life and becomes overweight whereas boys are thin but in due course of time they are found to be healthier and maintained a normal Body Mass Index.

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Statistical Analysis of Immunization Pattern among Children during the Infancy Period

Manash Pratim Barman and Rinku Saikia**

Introduction

Immunization is a way of protecting the human body against infectious diseases through vaccination. It is one of the most cost effective and efficient ways of protecting the health of children worldwide against some of the most lethal and debilitating diseases. It has revolutionized child health care throughout the world, preventing millions of deaths every year in addition to the reduction of risk of disability caused by infectious diseases and stands as the greatest public health achievement of the 20th century.

The immunization programme in India was launched with an aim to reduce mortality and morbidity in children due to vaccine preventable diseases (VPDs) under the flagship programme called Universal Immunization Programme (UIP) in 1985. The UIP aimed to attain universal immunization coverage in infants with three doses of DPT and OPV and one dose each of measles vaccine and BCG. The government of India has been working in collaboration with World Health

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Organization (WHO), United Nations Children's Fund (UNICEF) and other national and international organization to achieve the universal immunization of children.

Vaccination coverage surveys have been conducted in different parts of India providing valuable information about the status of childhood immunization in the country; it also acts as evaluative measures of Government efforts in this direction (Balraj *et al.* 1993; Datar *et al.* 2007; Murthy *et al.* 1993; **Patel & Nowalk 2010;** Phukan *et al.* 2008; **Ramakrishnan *et al.* 1999;** Sharma 2007). These studies measure the immunization coverage on the basis of proportion of children vaccinated at a certain age which is usually termed as up-to-data vaccination coverage (Bardenheier *et al.* 2004; Dayan *et al.* 2004; Kahane *et al.* 2000; Rosenthal *et al.* 2004; Santoli *et al.* 2004; Strine *et al.* 2002).

However, this up-to-date vaccination coverage measure determines the coverage at specific ages and does not allow the measurement of delay in age-appropriate vaccinations. In this measurement of immunization coverage, one children may be considered as fully immunize, even if one or more vaccine doses were administered later than the recommended period. Maximum immunity is not achieved if children have too early or delayed vaccination than the recommended age (Freeman & DeFriese 2003)**.** In the presence of delay vaccination, up-to-date vaccination is a biased estimator of the vaccination coverage of a population (Akmatov *et al*. 2008). A more reliable measure of immunization coverage is age-appropriate immunization where children receive immunization within recommended age intervals fully within time. Age appropriate immunization can be assessed by determining the age at vaccination for certain vaccine doses (Dombowski *et al.* 2002). For assessing the age-appropriate immunization the techniques of survival analysis which deals with time-to-event data can be used.

Considering these facts a scientific study is initiated to estimate the age-appropriate immunization coverage of Assam. For this purpose two districts viz., Dibrugarh and Sibsagar are

selected purposively considering the fact that both of them registered very high up-to-date immunization coverage in comparison to the other districts of Assam (International Institute for Population Sciences 2010). Data about immunization are collected from randomly selected children of these two districts. This paper depicts the results of the study.

Materials and Methods

Study Design

The design of the study was cross sectional and it was based on household investigation. Cohort of infants born during the two year period started from 1st January 2009 to 31st December 2010 were included in the study with a one year additional follow up period up to 31st December 2011 and no recruitment was made during the follow up period. As the sampling frame of the infants born during the recruitment period was unavailable, a multistage cluster sampling method popularly known 30 by 7 cluster method was used for selecting the study subjects in the study area i.e., Dibrugarh and Sibsagar districts. The 30 by 7 cluster sample method was developed by World Health Organization specially for studying the immunization coverage (World Health Organization 2005). In this sampling method, the population was divided into a complete set of non-overlapping subpopulations, usually defined by geographic or political boundaries, these subpopulations are called clusters (in this study a village or ward was considered as cluster). In the first stage of the sampling method, 30 of these clusters (villages/wards) were sampled with probability proportionate to the size (PPS) sampling method. In this study, 30 clusters were selected from each of the districts separately. In the second stage of sampling, seven subjects satisfying the inclusion criteria were selected within each cluster. Although the sampling unit was the individual subject, the sampling was conducted at the household level. The subjects were chosen by selecting a household and every eligible subject in the household was included in the sample. The households were selected by using circular systematic sampling. In this sampling method, at first all the households of a cluster having children satisfying the

inclusion criteria were listed. Then seven households were selected from the list by circular systemic procedure. The sample size for the 30 by 7 cluster sample was set at 210 (for each district separately) considering 50% coverage. Thus the total sample size for the study combining both the districts was set at 420. The data collection was conducted during the months of January and February 2012. The selection of the three year study period was chosen as a compromise between the need to obtain recent information and the need to reduce sampling variation. The immunization history of the study subjects were collected up to 31st December 2011. The subjects who had not vaccinated with different doses till 31st December 2011 were considered as censored while estimating the age appropriate coverage of the respective vaccines. The immunization history of the study subjects were collected from immunization cards.

Study Variables

For the study, the researchers selected four vaccines doses viz., BCG (**Bacillus - Calmette – Guerin), third dose of DPT (**Diptheria, Pertusis and Tetanus), third dose of OPV (Oral Polio Vaccine) and one dose of measles. This is because of the fact that a children is considered to be fully immunized when he/she has received one dose of BCG, three doses of DPT and OPV each and one dose of measles by the age of 12 months (National Child Health Resource Centre). The time schedule of vaccination approved by the Indian Medical Association for infants is considered in the present study. According to the schedule, the BCG vaccine that provides protection against Tuberculosis should be given at birth or up to 6th week after birth. The present study focuses on the coverage of BCG vaccination at two time points at birth and at 6th week of birth. The DPT and OPV vaccine has three doses I, II and III to be given at minimum age of 6 weeks, 10 week and 14 weeks respectively after birth. The present research work studies the age appropriate vaccination coverage of DPT and OPV dose III, the appropriate age of vaccination for these two doses is considered to be 14 weeks after birth. The recommended age for measles vaccination is 9 to 12 months. Thus for measles

vaccination, the age appropriate vaccination coverage is assessed at two points of time i.e., 9 months and 12 months. For studying the effect of different factors on timeliness of immunization, a children is considered as age-appropriately immunized if he/she has received one dose of BCG, three doses of DPT and OPV each and one dose of measles by the age of 12 months.

Statistical Modeling

Statistical techniques of survival analysis are developed to analyze time-to-event data. In the present study, vaccination of a particular dose may be considered as the event. Thus, here the data to analyse is the time to vaccination of a particular dose from birth (time-to-event). The Kaplan-Meier method (Kaplan and Meier 1958) is one of the widely used techniques of survival analysis. Here in this paper Kaplan-Meier method is applied to estimate the vaccination coverage which quantifies the proportion of infants immunized across specific age. The number of days of delay in vaccination is based on the maximum age at which the vaccine is recommended. For example, for DPT III dose, the first day of delay is defined as the first day after 14 weeks. The vaccination of different doses at different time point is summarized by plotting inverse Kaplan-Meier survival curve. For studying the effect of different factors on timeliness of immunization the Cox-proportional hazard model was fitted.

Results and Observations

The present study included 424 infants born in between 1st January 2009 and 31st December 2010 of Dibrugarh and Sibsagar districts of upper Assam. Along with the immunization history information about demographic, socio-economic and behavioural characteristics of the parents of the study subjects were also collected. The mean age of father and mother of the study subjects were 31.41 years (S.D. 5.64) and 26.07 years (S.D. 4.30) respectively. The mean age at marriage of father and mother were 26.41 years (S.D. 5.03) and 21.08 (S.D. 3.80) respectively. Majority of the sample observations belong to General caste (57.31%) followed by OBC (18.4%), ST (10.38%)

and SC (7.31%). About 7% of them belong to the Tea Garden Community. The demographic and behavioural characteristics of parents of the study subjects are presented in table 1.

Table-1: Profile of the parents of the study subjects

Characteristics	**Father**		**Mother**	
Age (in years)	**N**	**%**	**N**	**%**
Less than 20 years	2	0.47	17	4.01
20 to 30 years	165	38.92	331	78.07
30 to 40 years	210	49.53	74	17.45
40 & above	47	11.08	2	0.47
Education				
Up to Primary Level	39	9.20	40	9.43
Class V to X	212	50.00	223	52.59
HS	125	29.48	118	27.83
College & above	48	11.32	43	10.14
Occupation				
Service	96	22.64	28	6.60
Cultivator	19	4.48	8	1.89
Business	221	52.12	23	5.42
Daily Wage	62	14.62	332	78.30
Skill labour	24	5.66	31	7.31
Other	2	0.47	2	0.47
Alcohol Consumption				
No	229	54.01	386	91.04
Yes	195	45.99	38	8.96

Up-to-date vaccination coverage: The up-to-date vaccination coverage with respect to the doses of vaccination under study was estimated and is presented in table 2. A very high vaccination coverage could be observed from the results presented in table 2. Though, none of these estimates of vaccination coverage could reflect whether the vaccines were administered in recommended age or not.

Table-2: Up-to-date vaccination coverage of different doses

Vaccine	**Coverage Percentage**	**95% Confidence Interval**
BCG	94.58	90.37 - 97.08
DPT III	87.26	81.84 - 91.30
OPV III	86.32	80.78 - 90.50
Measles	82.31	76.36 - 87.06

Age appropriate vaccination coverage:

BCG Vaccine: The appropriate age of BCG vaccine is at birth or 6 weeks after birth. Thus, the age appropriate vaccination coverage was estimated at two time points i.e., at birth and at 6 weeks after birth. The result showed that BCG vaccination coverage at birth was only 4.25% (S.E. 0.98) while after 6 week of birth it was 84.85% (S.E. 1.74). The probability of BCG vaccination with respect to age in week is presented in figure 1.

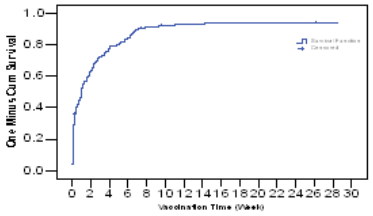

Figure-1: BCG vaccination coverage w.r.t. age

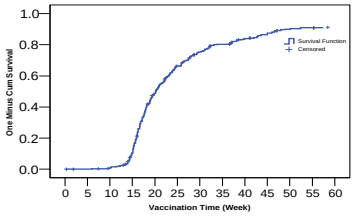

Figure-2: DPT III vaccination w.r.t to age

DPT III vaccine: The recommended age for the third dose of DPT vaccination is 14 weeks after birth. One minus survival function estimated that the age-appropriate DPT III dose vaccination coverage at 14 week of life was only 5.01% (S.E. 1.07). Up-to-date vaccination coverage (table 2) showed that every 87 child out of 100 was vaccinated with the third dose of DPT, but only 5% out of these 87 children was vaccinated with appropriate age. The figure 2 depicts the DPT III vaccination coverage pattern at different ages.

OPV vaccination: The recommended age of vaccination for OPV III dose is 14 weeks of life after birth. The inverse Kaplan-Meier function estimated that the age appropriate vaccination coverage for OPV dose III was only 5.01% (1.07). This presented a similar picture of age-appropriate vaccination coverage for OPV III dose like DPT III dose. The inverse Kaplan-Meier survival curve showing the vaccination coverage of OPV dose III at different ages (in week) after birth are presented in figure 3.

Table-3: Results of Cox proportional hazard model

	B	SE	Wald	Df	P-value	Hazard Ratio	95.0% CI for Exp(B)	
							Lower	Upper
Age of Father	0.01	0.01	0.49	1.00	0.48	1.01	0.98	1.04
Age of Mother	-0.02	0.02	1.82	1.00	0.18	0.98	0.95	1.01
Sex of the child								
Female (Reference)								
Male	0.39	0.19	4.28	1.00	0.04	1.47	1.02	2.13
Caste								
TGL (Reference)								
General	0.47	0.21	5.01	1.00	0.03	1.60	1.06	2.43
OBC	0.72	0.25	8.53	1.00	0.00	2.05	1.27	3.31
ST/SC	0.62	0.24	6.85	1.00	0.01	1.86	1.17	2.97
Fathers' education								
Illiterate (Reference)								
Primary	0.39	0.17	5.10	1.00	0.03	1.48	1.05	2.07
Up to HSLC	0.59	0.23	6.43	1.00	0.02	1.80	1.14	2.84
College & above	0.72	0.20	13.26	1.00	0.00	2.06	1.40	3.04
Mothers' Education								
Illiterate (Reference)								
Primary	0.56	0.21	6.78	1.00	0.02	1.75	1.15	2.64
Up to HSLC	0.67	0.20	11.33	1.00	0.01	1.95	1.32	2.90
College & above	0.77	0.14	28.40	1.00	0.00	2.15	1.62	2.85
Fathers' Occupation								
Service (Reference)								
Business	-0.03	0.15	0.04	1.00	0.84	0.97	0.73	1.29
Cultivator	-0.27	0.28	0.91	1.00	0.34	0.77	0.44	1.32
Labour & others	-0.38	0.18	4.59	1.00	0.03	0.69	0.49	0.97
Mother Occupation								
Service	0.39	0.21	3.49	1.00	0.06	1.47	0.98	2.21
Housewife	0.53	0.24	4.87	1.00	0.03	1.69	1.06	2.70
labour (Reference)								
Socio-economic status								
Lower (Reference)								
Middle	0.45	0.19	5.71	1.00	0.05	1.57	1.08	2.27
Higher	0.83	0.23	12.94	1.00	0.00	2.30	1.46	3.63
Type of House								
Joint (Reference)								
Nuclear	0.07	0.08	0.76	1.00	0.38	1.07	0.92	1.24

Measles vaccination: The minimum recommended age for measles vaccine is 9 months after birth and it can be given up to age of 12 months (1 year). The inverse Kaplan-Meier survival function was fitted to estimate the age appropriate measles vaccination coverage at 9 and 12 months of age. The age appropriate measles vaccination coverage at 9 and 12 month of age was estimated to be 10.04% (S.E. 1.53) and 86.49% (S.E. 1.81) respectively. The age wise vaccination pattern of measles vaccine is presented in figure 4.

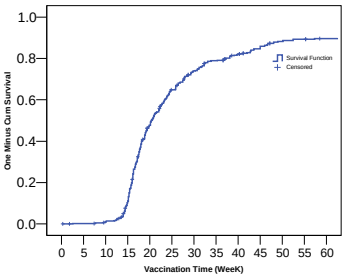

Figure-3: OPV III vaccination coverage w.r.t age

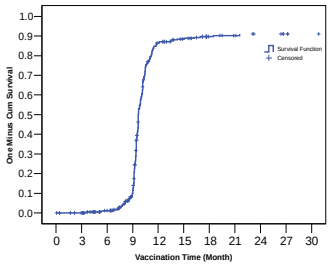

Figure-4: Measles vaccination coverage w.r.t. age

Cox proportional hazard model:

For fitting the Cox proportional hazard model a child is considered age-appropriately immunized if he/she received one dose of BCG, three doses of DPT and OPV each and one dose of measles by the age of 12 months (National Child Health Resource Centre). Those cases were considered as censored where a child failed to receive the doses age appropriately within 12 months after birth. The different co-variates considered in the Cox model were age of father and mother, caste, religion, occupation and education of parents, socio-economic status of the household, type of family, alcohol abuse by father. The result of the fitted Cox proportional hazard model showing the effects of different factors on age-appropriate immunization is presented in table 3. It is observed that age of father and mother does not have any significant impact on the timeliness of vaccination of infant. Male infants are experiencing higher age-appropriate immunization than female counterpart. In comparison to female infants, age-appropriate immunization is 1.47 (95% C.I. 1.02-2.13) times higher for male counterpart. The results show a caste wise variation in the timeliness of vaccination. In comparison to infants of tea garden labour community, general, OBC and ST/SC counterpart are experiencing significantly high rates viz. 1.6 (95% C.I. 1.06-2.43), 2.05 (95% C.I. 1.27-3.31) and 1.86 (95% C.I. 1.17-2.97) respectively of age-appropriate immunization coverage. Fathers' and mothers' education play a significant

rule in increasing the age-appropriate immunization coverage. Both with the increase of fathers' and mothers' education, the chances of age-appropriate immunization coverage increases significantly. The age-appropriate immunization among infants with respect to fathers' occupation- service, business and cultivator are not significantly different. But infants whose father is a labour is experiencing a significantly low opportunity of age-appropriate immunization. Occupational status of mother has also statistically significant influence on age-appropriate immunization of her infants. Socio-economic status of the family has significant influence on the timely immunization of infants. Infants belonging to families of middle and higher socio-economic status have registered 1.57 times (95% C.I. 1.08-2.27) and 2.30 times (95% C.I. 1.46-3.63) respectively more chances of age-appropriate immunization than infants belonging to lower socio-economic status families, both of which are statistically significant. The difference between age-appropriate immunization of infants of nuclear and joint families is not statistically significant.

Discussion

The up-to-date vaccination coverage in the districts of Dibrugarh and Sibsagar of the vaccines under study was found to be quiet high. The coverage of BCG vaccine was 94.58% (95% C.I. 90.37 to 97.08), the third dose of DPT and OPV were 87.26 % (95% C.I. 81.84 to 91.30) and 86.32% (95% C.I. 80.78 to 90.50) respectively. The measles vaccine also registered a high coverage of 82.31% (95% C.I. 76.36 to 87.06). This up-to-date immunization coverage was higher than other parts of the state of Assam and was also consistent with the results reported by District Level Household Survey (DLHS)-III survey (International Institute for Population Sciences 2010).

The age-appropriate immunization coverage obtained by using inverse Kaplan-Meier survival function illustrated a different picture of immunization coverage in the study area. Though, about 95 out of 100 infants received BCG vaccine, but only about 4% of them received the vaccine at appropriate age; while 84.85% infants received the BCG vaccine up to age 6

weeks. This situation was even more abysmal in case of third dose of DPT and OPV vaccine. The appropriate age for administration of DPT and OPV vaccine is 14 weeks from birth. Although, about 87% and 86% of the children received the two doses; only about 5% of the children received the DPT and OPV vaccine on the recommended time. The situation was similar in case of measles vaccination also. Only 10% of the children received the measles vaccine in the recommended age of 9 months after birth. About 86% children received the vaccine up to one year of life. Studies (Corsi et al. 2009; Datar et al. 2007) conducted on the basis of National Family Health Survey data showed that, in India, Polio and Non-polio age appropriate vaccination coverage were 48.3% and 34.5% respectively for rural area and 63.2% and 57.6% respectively for urban area. The study also showed that the age appropriate immunization coverage of male children was higher than female counterpart which is consistent with the results of the present study. The results of the present study reveal that the educational and socio-economic status of parents has significant impact on timeliness of child vaccination. Studies conducted in the past also showed similar results (Babirye *et al.* 2012; Moïsi *et al*. 2010).

One of the useful strategies for improving immunization coverage rate is to measure vaccination coverage at community level (Development of Standards for Paediatric Immunization Practices 1993; Shefer *et al.* 1999). However, the prime aim of the government immunization policy is to achieve the highest levels of protection against vaccine preventable diseases at a young age together with high immunization coverage rates. Thus the study of age appropriate immunization provides valuable information about the timeliness of vaccine administration even in populations with very high up-to-date immunization coverage, which has been reflected in the present study. Studies conducted in the past revealed the importance of timeliness of vaccination; it can play a crucial rule in child's health and even in their survival (Grant *et al*. 2003; Heininger & Zuberbuhler 2006; Kolos *et al.* 2007). Delayed vaccination is a strong risk factor for disease in children especially for

Haemophilus influenzae type b invasive disease (Grant *et al.* 2003; Kolos *et al.* 2007). Timely administration of BCG vaccine reduces the risk of death to a great extent and thereby increases the survival (Breiman *et al.* 2004).

Conclusion

What have been revealed from this empirical investigation can be concluded as follows:

Achieving high child immunization coverage in a population does not imply highest protection from vaccine preventable diseases. Just like the Dibrugarh and Sibsagar districts both of which have registered high immunization among children but quite poor in age-appropriate immunization coverage, a population with high immunization coverage may lack in age-appropriate immunization. The timeliness of vaccination coverage is influenced by different factors such as parents' education, caste, socio-economic status, sex of the child etc. It is up to the concerning authorities to boost up the timeliness of vaccination coverage together with up-to-date coverage and eventually there requires a need for providing highest possible protection against the vaccine preventable diseases. Thus the findings suggest necessity of enhancement of awareness programmes in the context of immunization coverage particularly timeliness of vaccination.

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Effects of Demographic Characteristics on Child Health: A Study among the Thadou-Kuki of Senapati District, Manipur

Hoineilam Kipgen and Banrida Theresa Langstieh**

Introduction

Maternal and Child Health has been the epicentre of international cooperationin health since the early eighteenth century (Ehiri 2009). The health of the mother and child constitute one of the most serious health problems affecting the community, particularly in the developing countries (Banerjee 2003).

According to the UNCF Report 2014, substantial global progress has been made in reducing child deaths. During the last 25 years, the number of under-five deaths worldwide has declined from 12.7 per million in 1990 to 6.3 million in 2013. While that translates into around 17,000 fewer children dying every day in 2013 than in 1990, it still implies the deaths of about 17,000 children under age five every day in 2013. About half of under-five deaths occur in only five countries namely India, Nigeria, Pakistan, Democratic Republic of the Congo and China. India at 21% and Nigeria at 13% together accounted for more than a third of all under-five deaths.

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In similar trend the global neonatal mortality rate was reported to have declined by 40% from 33 deaths per 1,000 live births in 1990 to 20 in 2013. Around two-thirds of neonatal deaths occur in just 10 countries, with India accounting for more than a quarter and Nigeria for about a tenth (UNICEF 2008). As a nation, India holds the highest recorded neonatal deaths at one million each year with 65.4% of all births occurring mostly at home and 75.3% of births in rural areas occur at home (IIPS 2007). It may be noted that despite the great importance of the subject, no information is available regarding the details of the causes of deaths (Freeman et al. 2005; IIPS 2001).

However, earlier studies have often stated that young age at marriage, frequent child-bearing, unplanned motherhood and abortions result in poor nutritional status of Indian women and poor survival rates of their children (Prakash *et al.* 2011; Subramanian *et al.* 2009).

Among the demographic and household characteristics, mothers age and age at marriage appeared to be a significant differential of infant, child and under-five mortality. The age at marriage is an important factor for infant and child mortality (Hossain 2008; Khongsai 2012).

Thus in the present study we would like to examine the effects of demographic characteristics on child health as a case-study from among the Thadou-Kuki of Senapati District, Manipur. This is also with reference to an isolated tribal population in Northeast India where the access to health care, medicines and the much needed assistance during childbirth is negligent and the road to development still a distant reach. Adaptation and adjustment of the tribal way of life to the *'nature-nurture'* complex is very much reflected on the maternal care decision rules and care taking environments on fitness costs (such as neonatal mortality) and benefits (viability in catch-up growth in ages 5 years and above) reflected in natural small-scale societies or populations.

Materials and Method

The present study was conducted among 551 households of the Thadou-Kukis of Tuilang-hom Block in Senapati district, Manipur. The anthropological fieldwork and demographic data collection was conducted on eight (8) villages namely, Chalwa, Gelnel, Tujang Vaichong, Kotlen, Songpijang, Selsi, Joupi, and Phoikon during the period of January 2013 –February 2014.With the help of a structured schedule, data was collected and recorded by interviewing the 560 ever-married womenaged 15 – 49 years.

Nature of **demographic parameters**, as suggested by WHO (1967), Mahadevan (1986) and NFHS-3 (2005-2006) was used in the present study, that includes:-

1) Individual household records like name of informant, date and place at which record is taken, clan, tribe, religion, total number of family members, age, sex, marital status, birth order, place of birth, place of residence, occupation, education, income and expenditure of household, etc.
2) Fertility records which include pregnancy history of each married woman, present age of the mother, age at menarche, age at marriage, age at each conception, total number of live births, birth order, birth interval, name, age, sex, marital status of each offspring and birth interval.
3) Mortality records like number of dead children, sex, date of birth, age at death, causes of death, number of reproductive wastage (spontaneous or induced abortion and still births) etc.
4) Maternal and Child Health records including breastfeeding practices, immunisation of expectant mother and child, child rearing, health and sanitation, childbirth delivery, assistance, medical history, family planning, etc.

Statistical analysis

Data entry and compilation of the demographic data was done on Ms-Excel data sheets and SPSS with further

computations of the basic descriptive statistics of mean, standard error of mean, standard deviation, etc.

Results and Discussion

Table 1 shows the distribution of the married women participants in the present study. This include the mothers in the child bearing years in age groups of 15-49 years which have been categorised into five year age groups namely, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44 and 45-49 years respectively. Overall the total number of mothers was 560 with maximum representation of more than one hundred participants in the age groups of 25-39 year old respectively. It may also be noted from table 1 that the age-specific fertility increases with advancing age of the mother indicating that by the time the mother attains the age of 49 years the mean number of children per mother was reported at 4.88. In other words, the mean number of children per womanamong the Thadou-Kuki in the present study was found to be 3.46 per mother.

Table-1: Distribution of mothers by age group and age-specific fertility among the Thadou-Kuki

Age groups (years)	No. of mothers	No. of live-births	Age specific fertility
15-19	10	6	0.60
20-24	67	89	1.28
25-29	122	283	2.18
30-34	112	386	3.27
35-39	106	455	3.95
40-44	91	430	4.29
45-49	52	290	4.88
Total	**560**	**1939**	**3.46**

Table 2 shows that the mean age (± S.E.) at menarche, marriage and menopause among the women in the reproductive age group of 15-49 years was compared among the Thadou-Kuki with available data on other populations from Manipur. These include Khongsai-Kuki from the southern part of Senapati District, Anal population from Chandel district, Ithing population which is a Meitei ethnonyme residing in the vicinity of the Loktak Lake in Bishnupur district and Mao Naga belonging to the same district of Senapati. It is observed that the findings of the previous studies on populations from Manipur did not deviate much with reference to mean age at

menarche but showed noted lower mean age at marriage among the Ithing fisher folks at 19.19 ± 0.23 years. Mean age at menopause was recorded at 48.69 years among the Mao Naga group which is significantly lower in the present study at 41 ± 1.89 years among the Thadou-Kuki.

Table-2: Comparison of the mean age at menarche, marriage and menopause among the Thadou-Kuki and other populations of Manipur

Population	Mean ± S.E.			Reference
	Age at menarche (years)	Age at marriage (years)	Age at menopause (years)	
Thadou-Kuki	14.92 ± 0.07	20.95 ± 0.29	41 ± 1.89	Present study
Khongsai-Kuki	14.53 ± 0.21	20.36 ± 0.17	NA	Khongsai 2012
Anal	14.94 ± 0.14	22.4	50.1	Khiloni 2009
Ithing	14.03 ± 0.12	19.19 ± 0.23	41.94 ± 0.99	Devi et al. 2007
Mao	14.59 ± 1.04	22.7	48.69	Maheo 2004

Table 3 shows that mean age at first child birth seems to be an immediate follow-up with the mean age at marriage in the present study showing that early age of marriage, which is in a majority of cases are consummate by love resulting in an early age at first childbirth at 20.32 ± 0.29 years. As the Thadou-Kuki resides in the northern part of Senapati district, which is still considered to be a rural location the reported mean age at first childbirth seems to be the lowest compared to the rural Khongsai-Kuki and rural Lois (a Meitei group) from Sekmai region of Manipur. However, in both the Khongsai-Kuki and Lois groups residing in urban location seems to have had a slightly higher mean age at first childbirth accompanied by a delayed age at marriage observed among them.

Table-3: Mean age at first child birth among the Thadou-Kuki and other populations of Manipur

Population	Mean age at first child birth Mean ± S.E. years		Reference
	Rural	Urban	
Thadou-Kuki	20.32 ± 0.29	....	Present study
Khongsai-Kuki	21.58 ± 0.17	23.69 ± 0.31	Khongsai 2012
Lois	22.85 ± 0.21	23.60 ± 0.27	Chanu 2008

Table 4 shows the completed fertility of the Thadou-Kuki. Only those women who are age 45 years and above and lived

continuously in wedlock till attainment of 45 years of age, have been taken into consideration to find out the completed fertility size. There are 52 such mothers, who have had 317 pregnancies and 290 live-births. The mean number of live-births per mother is 5.58 ± 0.35 indicating that the completed fertility size in the study population is relatively high in women above 45 years. The table further shows that, the mean number of surviving offspring per mother is 4.87 ± 0.31.

Table-4: Completed fertility among the Thadou-Kuki women

No. of women aged 45+ years	No. of live-births			Mean number (± S.E. in years)	
	No. of living	No. of deaths	Total	Live-births	Surviving offspring
52	253	37	290	5.58 ± 0.35	4.87 ± 0.31

Table 5 shows the child-woman ratio also known as the fertility ratio among the Thadou-Kuki in the present study. This is another measure of fertility in which all children aged 0 to 4 years and all women aged 15-49 years, irrespective of their marital status have been taken into consideration. It is found that there are 451 children who are aged 0 to 4 years, whereas there are 560 women who are aged 15 to 49 years. The child woman ratio or fertility ratioin this present study seems to be relatively high at 80.54.

Table-5: Child-woman (fertility ratio) of the Thadou-Kuki

No. of children age 0-4 years	No. of women age 15-49 years.	Fertility ratio per 100 women
451	560	80.54

Table 6 shows the frequency of reproductive wastage in the present study. It may be noted that out of the total of 560 Thadou-Kuki mothers the reported total number of conceptions was 2165. Reproductive wastage is considered when abortions (which include both the spontaneous and induced abortions)

and stillbirths are both taken into account. In the present study, it was found that the total number of abortion was 128 contributing 5.91% of reproductive wastage. Notably was the fact that there were 18 women (0.83) who confirmed to have had induced abortions terminated at Kangpokpi CHC and 110 (5.08%) cases of spontaneous natural abortions. The total number of stillbirths was 69 occurring at 3.19% in the present study. The table further shows that in total, the reproductive wastage was at 9.09% and the average number of reproductive wastage per mother is 0.35.

Table-6: Reproductive wastage among the Thadou-Kuki mothers

Total no. of mothers	Total no. of conceptions	Reproductive wastages						Total (a+b)	Average no. of reproductive wastage per mother
		(a) Abortion			(b) Stillbirths				
560	2165	Sp.	In.	Total	M	F	T	197	0.35
		110	18	128	35	34	69		
%		5.08	0.83	5.91	1.62	1.57	3.19	9.09	

Table 7 shows the child mortality or recorded deaths among children below 14 years of age. Child mortality has further been classified into 4 subgroups namely, Neo-natal (0-7 days), Infant (**>** 1 years), Toddler (1-4 years) and Juvenile (5-14 years) deaths. Out of the total number of 1939 live-births, the recorded number of deaths in male children was 976 (50.34%) and 963 (49.66%) in female children respectively. The total number of child deaths is 221 at 11.04% which shows to be slightly higher among male children at 123 (6.34%) than 98 (5.05%) among female children. Child mortality is found to be highest among the Neo-natal (0-7 days) period at 5.83% and lowest at the Juvenile (5-14 years) period at 0.93%. It further shows that child mortality decrease with increase in age group in the studied population.

Table 8 shows thechild mortality and related causes of child deaths among the present studied population of Thadou-Kuki. The table further shows the comparison between the total number of live-births that is an incident count occurring with particular recordings of death prevalence in those specific age

Table-7: Child mortality among the Thadou-Kuki mothers

Total no. of mothers	Total no. of live-births			Child Mortality Rate												Total child deaths		
				Neo-natal (0 – 7 days)			Infant (< 1 year)			Toddler (1 – 4 years)			Juvenile (5 - 14 years)					
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
560	976	963	1939	61	52	113	30	19	49	21	20	41	11	7	18	123	98	221
%	50.34	49.66	100.0	3.15	2.68	5.83	1.55	0.98	2.53	1.08	1.03	2.11	0.57	0.36	0.93	6.34	5.05	11.40

Table-8: Child mortality and related causes of child deaths among the Thadou-Kuki

Age / Days	No. of Children	M	F	Causes of Death
0 – 7 days	113	61	52	Don't know/not known, lack of care during delivery, *kausie*, premature delivery, gynae problem, hard work, etc.
8 – 28 days	3	1	2	Don't know, *kausie*
29 days - 1year	45	28	17	Cold diarrhoea, not known, lack of care, *kausie*, abnormal, fever, etc
1 – 4 year	41	21	20	Cold diarrhoea, Not known, malaria, *kausie*, fever, jaundice, heartcase, etc.
5-14 year	18	11	7	Not known, diarrhoea, typhoid, fever, drown in water, Naga Kuki conflicts, multiple tooth eruption, etc.
Total	**220**	**122**	**98**	

groups namely – neonatal (less than 1 week after birth); less than 1 month after birth, below 1 year, 4 years and 14 years respectively.

From figure 1 it is interesting to note the contrasting effects of mortality and survival rate is observed in higher neonatal mortality rates which in other words mean higher child deaths during the first week after delivery (7.14%) as compared to higher live-birth incidence (62.86%) and lower death (1.07%) occurrence for children in the higher age groups of 5-14 years. The nature and causes of child deaths in the present study for children below 14 years of age is shown in table 7 & 8.

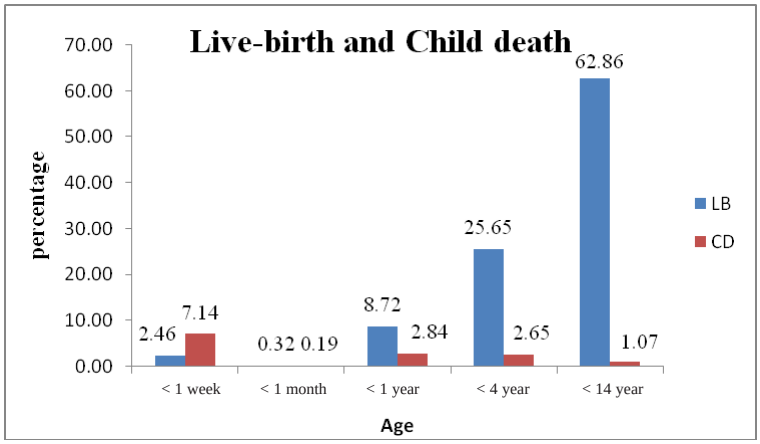

Fig-1: Showing the total number of live-birth in comparison with total number of child deaths among the Thadou-Kuki

From further categorization of the causes into a medically reported symptom versus a non-medical cause is listed in table 9. It is found that non-medical causes were highly reported (67.27%) in Not known/Don't know cases mostly lined to a cultural belief in unnatural causes of death. Among the Thadou-Kuki and their cognate ethnic Chin-Kuki groups too, a belief in the existence of an evil or malevolent spirit is pervasive. The evil spirit is known as *'Kausie'* in local parlance (Haokip, 2011). Noticeably among the Thadou-Kuki the belief in *'Kausie'*seems to be universally occurring especially in children below the

age of 4 years. Medical causes relating to symptoms of diarrhoea, typhoid, malarial fever, jaundice, and other medically known causes was reported at 32.73%.

Table-9: Nature and causes of deaths reported among the Thadou-Kuki

Nature and Causes of child deaths				
Age Group	**Medical**	**Non-Medical**	**Total**	**%**
0-7 days (%)	10 (8.85)	103 (91.15)	113	5.83
Less than 1 month (%)	…	3 (100)	3	1.36
Below 1year (%)	22 (48.89)	23 (51.11)	45	2.53
1-4 years (%)	29 (69.05)	13 (30.95)	42	2.11
5-14 years (%)	11 (64.71)	6 (35.29)	17	0.93
Total (%)	72 (32.73)	148 (67.27)	220	11.40

Medical causes: Pre-mature delivery, Gynae problems, Diarrhoea, Cough, Cold, Fever, Tuberculosis, Chest pain, Heart problems Jaundice, Malaria, Vomiting, Typhoid, Multiple tooth eruption, Liver problem, etc.

Non-Medical causes: Not known, *Kausie*, lack of care, hard work, displacement during Naga-Kuki conflict, etc.

Other factors contributing to higher child mortality rate or child deaths could be due to fact that most child deliveries accounting 87.23% is at home and 12.77% in hospital. As the location of the study area is in rural setting it was reported that the number of trained nurse (14.70%) is relatively lower and most of the assistance during childbirth has taken place with the help of untrained dais (83.56%) as shown in Table 10a. Also the activity of the expectant mother shown in Table 10b seems to be having higher responses among mothers who

Table-10a: Place of delivery and assistance during child birth

	Place of delivery (n=517)		**Assistance during child-birth (n=517)**		
	Home	**Hospital**	**Dais**	**Nurse**	**Relatives**
Number	451	66	432	76	9
(%)	87.23	12.77	83.56	14.70	1.74

Table-10b: Activity related to agriculture of the expectant mother

Activity of expectant mother (n =523) prior to delivery until 3rd trimester		
	Yes	**No**
Number	371	152
(%)	70.94	29.06

worked until the late stage of their pregnancy with 70.94% reported cases of enduring hard agricultural work and cultivation of crops as compared to those mothers with lesser sedentary activities.

Summary and Conclusion

From the present study we found that the maternal and child health of the Thadou-Kuki of Senapati District Manipur had similar trend the global neonatal mortality rate. Early childhood mortality in India is at an alarming rate in infant (57 per 1000) and under five year child mortality (74 per 1000) with reference to NFHS-3 findings of 2005-2006. In comparison to the Manipur state infant child mortality (30 per 1000) report the present study among the Thadou-Kuki showed almost a doubled high infant mortality (84 per 1000) when compared to the overall state data. More evidences of having home delivery (87%) during childbirth in comparison to hospital or health centre (13%) deliveries were reportedly high in this studied population. Neonatal deaths was reportedly high (5.83%) followed by infant and child mortality. Regarding the details of the causes of deaths fieldwork information revealed that there were more cases of non-medical causes relating to superstitious beliefs and practices (*Kausie*), lack of care, hard work and displacement of the population due to Naga-Kuki ethnic conflicts to be a cause to be reckon with.

Similar to earlier reported studies that young age at marriage, frequent child-bearing, unplanned motherhood, abortions, assistance at childbirth are also factors to be concerned in this natural tribal population resulting in poor survival rates particularly in newborn infants. The age at

marriage is an important factor for infant mortality added also to the importance of care taking environments.

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Effects of Demographic Characteristics on Infant and Child Mortality among the Idu Mishmis of Arunachal Pradesh

Rakhi Rani Das[1] and Deepanjana Dutta Das[2]

Introduction

The majority of the developing countries of the world have given highest priority for reducing child mortality (less than five years). India has also taken special care for reducing infant and child mortality because child is the important asset of a country. Child mortality is a powerful indicator to determine overall health situation of a country. Demographic and household factors have strong influence on infant and child mortality. The infant death represents the loss not only of one person, but of the many descendants who could be traced to him had he lived. The age at which age-specific mortality is most likely to occur is an indicator of how well a society is adopting to its environment and how successful its cultural and economic practices are. Infant mortality is used as an indicator of general health status of a population. Infant mortality rates may be taken as a reliable and sensitive index of the total health and condition of a community or a country

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to establish the standard of health; and for health planning the study of infant mortality is essential. Late fertility and several factors are responsible for infant as well as childhood mortality. Age at marriage, age at first conception, status of woman, maternal nutrition, duration of breast feeding and birth interval etc. are some of the important determinants of mortality rate. Besides, there are many other factors or determinants of mortality which are yet to be identified. The purpose of this study was to find out the demographic factors responsible for infant and child mortality among the Idu Mishmis of Lower Dibang Valley District of Arunachal Pradesh. The Idu-Mishmi is an important community of Arunachal Pradesh. They are also known as 'Chulikata' or 'Cropped-hair' for their distinctive hairstyle. Agriculture is the main occupation of the people. Their family is of patriarchal type. Father is the head of the family and he holds the superior position to maintain the family. Their families are based on monogamous and polygamous marriages. The families of the villagers are mostly nuclear in type. In religion, Idu Mishimi believes in indigenous goddess named as 'Nani Intaya'. Traditionally they believe in animism.

Material and Methods

The study is entirely based on empirical data. The field study was conducted in the fourteen villages of the Lower Dibang Valley district of Arunachal Pradesh during the period of 2011 to 2013. The information regarding fertility and mortality have been collected by administering interview schedule from 700 ever-married Idu Mishmi women for in-depth knowledge. The study subjects have been selected by using simple random sampling techniques until the required sample size is fulfilled. In this paper the data have been analyzed by using Microsoft excel and Statistical Package for Social Sciences (SPSS). The data have been analyzed statistically according to the table with the help of chi-square test and co-relation.

Results and Discussion

Data on mortality show that out of 700 respondents, 213 (30.43%) have experienced different forms of mortality. It is observed that 186 (26.57%) women have experienced infant

mortality, 68 (9.71%) have experienced child mortality and 23 (3.29%) have juvenile mortality. But here the main emphasis is given on infant and child mortality.

Table 1 reflects the mortality scenario with respect to different age group of women. It is clear from the table that infant mortality and child mortality tend to increase with the age of the mothers. Higher age groups of women have higher number of mortality. And the p-value shows that it is highly significant in case of infant mortality (p=0.000) and child mortality (p=0.000). Thus it indicates that maternal age has significant effect on mortality of the children.

Table-1: Age of women and mortality pattern

Age Group (in years)	No. (%)	No. of live birth (%)	Mortality pattern	
			Infant (0-1 year) (%)	Child (1.1 - 5 years) (%)
15-30	184(26.29)	293(11.09)	8(2.73)	1(0.34)
31-44	293(41.86)	1098(41.56)	110(10.02)	33(3.01)
45+	223(31.86)	1251(47.35)	172(13.75)	47(3.76)
x^2	-	488.578	100.838	31.051
p-value	-	0.000	0.000	0.000

The infant mortality and child mortality according to the mother's educational levels, presented in Table 2 shows that both types of mortality decreases with the increasing level of education. The effect of education on infant and child mortality is found to be highly significant. Thus, the data indicate that mother's education has significantly negative effect on infant and child mortality.

Table-2: Education of women and mortality pattern

Education of women	No. (%)	No. of live birth (%)	Mortality pattern	
			Infant (0-1 year) (%)	Child (1.1 - 5 years) (%)
Illiterate	258(36.86)	1325(50.15)	180(13.58)	53(4.0)
Primary-H.S.	369(52.71)	1187(44.93)	108(9.10)	27(2.27)
Higher Secondary and above	73(10.43)	130(4.92)	2(1.54)	1(0.77)
x^2	-	226.029	71.872	30.041
p-value	-	0.000	0.000	0.000

It is clear from the Table 3 that infant and child mortality i.e. 138(14.48%) and 51 (5.35%) respectively is high among those women whose husbands are illiterate. It decreases with the increasing level of education of male. Therefore, education of male plays highly significant role in infant and child mortality.

Table-3: Education of husband and mortality pattern

Education of husband	No. (%)	No. of live birth (%)	Mortality pattern	
			Infant (0-1 year) (%)	Child (1.1 - 5 years) (%)
Illiterate	172(24.57)	953(36.07)	138(14.48)	51(5.35)
Primary-H.S.	383(54.7)	1357(51.36)	145(10.69)	27(1.99)
Higher Secondary and above	145(20.71)	332(12.57)	7(2.11)	3(0.90)
x^2		217.098	82.786	51.318
p-value		0.000	0.000	0.000

Table 4 shows that infant and child mortality is high among those women i.e. 227 (12.23%), 58 (3.13%) and 30 (12.5%), 13(5.42%) respectively whose primary occupation is agriculture and business. It is also seen that all infant and child mortality i.e. 4 (1.63%) and 58 (3.13%) respectively are low among women whose primary occupation is service. The table reveals that there is significant relationship between infant mortality, child mortality and education of women.

Table-4: Occupation of women and mortality pattern

Occupation of women	No. (%)	No. of live birth (%)	Mortality pattern	
			Infant (0-1 year) (%)	Child (1.1 - 5 years) (%)
House wife	100(14.29)	299(11.32)	29(9.70)	8(2.68)
Agriculture	427(61.00)	1856(70.25)	227(12.23)	58(3.13)
Employee	107(15.29)	245(9.27)	4(1.63)	2(0.82)
Business	64(9.14)	240(9.08)	30(12.5)	13(5.42)
Student	2(0.29)	2(0.08)	-	-
x^2	-	161.747	69.918	35.145
p-value	-	0.000	0.000	0.004

Table 5 shows that infant and child mortality i.e. 228 (13.54%) and 62 (3.68%) respectively are high among those women whose husbands' primary occupation is agriculture. And it is lower among those women whose husbands' primary occupation is service. But statistically occupation of husband has highly significant effect on infant mortality, whereas the relationship between occupation of husband and child mortality is not statistically significant.

Table-5: Occupation of husband and mortality pattern

Occupation of Husband	No. (%)	No. of live birth (%)	Mortality pattern	
			Infant (0-1 year) (%)	Child (1.1 - 5 years) (%)
Dependent	1(0.14)	1(0.04)	-	-
Wage-earner	2(0.29)	2(0.08)	-	-
Agriculture	383(54.71)	1684(63.74)	228(13.54)	62(3.68)
Employee	171(24.43)	458(17.34)	33(7.21)	9(1.97)
Business	143(20.43)	497(18.81)	29(5.84)	10(2.01)
x^2	-	119.595	64.629	12.033
p-value	-	0.000	0.000	0.742

From the Table 6, it is clear that both infant and child mortality i.e. 13.59% (131) and 9.56% (156) respectively are high among those women who got married at the age group of 9-17 years. Whereas, those women who got married at the age group of 31-36 years have the minimum infant mortality rate with no child mortality. It is seen from the table that there is significant relationship between infant mortality and age at marriage. But statistically there is no significant relationship between child mortality and age at marriage.

Table-6: Age at marriage and mortality pattern

Age at marriage of women	No. (%)	No. of live birth (%)	Mortality pattern	
			Infant (0-1 year) (%)	Child (1.1 - 5 years) (%)
9-17	203(29.0)	964(36.49)	131(13.59)	31(3.22)
18-29	477(68.14)	1632(61.77)	156(9.56)	50(3.06)
30-36	20(2.86)	46(1.74)	3(6.52)	-
x^2	-	91.042	42.573	9.501
p-value	-	0.000	0.000	0.302

Table 7 shows the type of treatment and its effect on mortality. All the mortality rates viz. infant mortality (14.05%) and child mortality (4.39%) are found to be high among those women who utilize the indigenous method of treatment. But, however, infant mortality rate i.e.3.06% is lower among those women who utilize both types of treatment viz. indigenous and modern medical method. It is seen from the table that the type of treatment (both indigenous and modern medical methods) utilized by women during their pregnancy has significant effect on the mortality viz. infant and child mortality.

Table-7: Type of treatment and mortality pattern

Type of treatment	No. (%)	No. of Live birth (%)	Mortality pattern	
			Infant (0-1 year) (%)	Child (1.1 - 5 years) (%)
No Treatment	105(15.0)	455(17.22)	52(11.43)	16(3.52)
Indigenous	257(36.71)	1345(50.91)	189(14.05)	59(4.39)
Medical	161(230	417(15.78)	36(8.63)	2(0.48)
Both	177(25.29)	425(16.09)	13(3.06)	4(0.94)
x^2	-	277.349	125.536	52.112
p-value	-	0.000	0.000	0.000

Table 8 shows the percentage distribution of all children by breast feeding status and its relationship with mortality. Maximum number of children has been found to be breast fed (94.40%) where as only 5.60% of children were never breast fed. The table also shows that 62.84% of children who were never breast fed died before the age of one year. This shows that there is a relationship between breast feeding of the children and infant mortality.

Table-8: Relationship between breastfeeding and mortality pattern

Breastfeeding	Live birth		Infant mortality		Child mortality	
	No.	%	No.	%	No.	%
Yes	2494	94.40	197	7.90	77	3.09
No	148	5.60	93	62.84	4	2.70

Conclusion

Therefore, from the analysis of the study we can probably draw the following conclusions.

1. The present study reveals that maternal age plays a significant role in regulating the mortality.
2. The mortality is significantly associated negatively with the level of education of couples. This shows that level of education improves the knowledge of health care practices. Educated parents provide nourishing diet to their children, give them the best available medical care during illness and immunize them against diseases through control devices.
3. Occupation of the couples also shows a significant relationship with the level of mortality. It is high among those women who themselves belong to occupation of agriculture or their husbands are farmers. Mortality and standard of living are mutually dependent. Therefore, as the level of occupational status improves the mortality of children decreases.
4. Age at marriage of women has significant effect on infant mortality. Those women who get married in the younger age also become pregnant in the young age. Due to this women who get married in the younger age experience more number of mortality.
5. Type of treatment utilized during pregnancy also has significant relationship with the mortality of children. Medical care can check the spread of diseases and immunize the pregnant woman along with her fetus in the womb which makes her children strong to fight against diseases.
6. Most of the children die before one year of age who are never breast fed.

Thus, the study suggests that age of women, age at marriage of women, education and occupation of parents and breast-feeding of women should be improved in the Idu Mishmi society for reducing infant and child mortality among them.

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Nutritional Status of the Hajong Children (0-5 years) of Tinsukia District, Assam

Boby Dutta ~~Saikia~~

Introduction

According to the definition of World Health Organization (WHO), nutrition is the intake of food, considered in relation to the body's dietary needs. Good nutrition - an adequate, well balanced diet combined with regular physical activity- is a foundation of good health. Poor nutrition can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduced productivity. Children are considered as the backbone of a nation upon whom the future development of a nation rests. Therefore, their proper care and nourishment is regarded as priority for sustained development at the individual, community and national levels. The Convention on the Rights of the Child (CRC) states that every child has the right to life and the state has an obligation to ensure child's survival and his wholesome development.

At present, India is the country having largest child population in the world. But their health status shows a pathetic picture and it is more to the children of underprivileged sections of the society. Child malnutrition rates in India are

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extraordinarily high. However, a modest decline (of about 11%) from a rate of 52.7% to 47% was happened during the 6-year period (1992-93 to 1998-99), and it makes wide variations in child malnutrition across the states. At the same time, all the surveys report of NFHS provide information that under nutrition rates are higher in ST and SC as compared to OBC and others (Nutritional Status of Tribal Population). In the North East states, Assam has the highest number of malnourished children and 76.7% anaemic infants (Status of Children in India, some findings from NFHS-3). The Key Findings on child nutrition, NFHS-3, India reports that in Assam 36% children under age 5 years are underweight, which takes into account both chronic and acute under nutrition. Children below the age of 6 years are the worst sufferers due to ill-health, hunger etc. and under-nutritional condition contribute to high morbidity and mortality among the children. In fact, malnutrition is a multi faceted problem acting singly or in combination with other complex factors like poverty, illiteracy, health care, infrastructure, ignorance on nutrition and health education etc. Integrated Child Development Services (ICDS), a global and specific effort is being made for improving child's health among children with more emphases on socio-economically backward people. Although, child malnutrition remains a significant problem in India there is general agreement that the health and nutrition of tribal people in India is very poor. Widespread poverty, illiteracy, ignorance about health and nutrition, a hostile environment, traditional beliefs and healing practices, absence of health infrastructure etc. are the factors contributing to the deplorable health condition among tribal groups.

In this paper an attempt is made

1. To assess the nutritional status of the Hajong (ST) children of Tinsukia district
2. To see the influence of socio-cultural and economic factors on child nutritional status
3. To see the impact of ICDS programme on child's health.

The People

The Hajong is a numerically small, endogamous, patrilineal tribe of the great Bodo - Kachari group of Assam having a rich cultural heritage. But, their socio-economic condition is significantly deplorable. They are also found in Garo Hills of Meghalaya, West Bengal, and Bangladesh. In Assam, several small Hajong villages are dotted in the districts of Barpeta, Bongaigaon, Darang, Dibrugarh, Dhemaji, Dhubri, Goalpara, Kamrup, Kokrajhar, Lakhimpur, Nagaon, Nalbari, Sonitpur, Tinsukia, and in the two autonomous Hill districts of Dima Hasao and Karbi Anglong. Maximum concentration of the tribe is found in Goalpara and Nagaon districts. The Hajong population of India is estimated to be around 2,00,000 (Ali 2012). Agriculture is their main occupation and rice is the staple food taken with locally produced vegetables. Curry of fish and meat form their part of meal. Dry fish items are favourite among them and considered as medicine for malaria. Usually, the Hajongs are polytheist and are devout followers of Hinduism. But, later on some of them were influenced by Vaishnavism. As such, there are two broad sections among them viz. the *Sakta* or the *Byabasari* and the Vaishnavite or the *Paramarthi* or the *Khatal*. The *Saktas* perform the religious rituals in the traditional way by making sacrificial worship with the help of *Deoshi* or *Nongtaang*. On the other hand, the Vaishnavites abstain from animal sacrifice in rituals and engage an *Adhikari* (a priest from the Vaishnavite community) to perform their religious and social functions. The Hajongs worship their traditional deities in two ways. One category of deities is worshipped for the well being of the society and prayers for the safe survival of the villagers. The other category is disease-curing deities worship when necessity arises. Besides, they are in belief of some malevolent spirit like *Moila Deo, Hoila Deo, Gongcho Deo, Bon Deo, Hudum Deo Chuk Dhapa* etc. and worship those in need. Their traditional deities i.e. the *Bastu,* a group of deities is worshipped in the month of *Magh* (January-February) or in *Bohag* (April-May) at the community level. For the family wellbeing every family worship goddesses *Manasha*

or *Padma* by sacrificing duck in the month of *Saun* (15th July to 16th August).

Materials and Methods

For the present study, two homogenously inhabited Hajong villages viz. Kuhiarbari and Katha Adarsha of Tinsukia District of Assam have been considered. Both the study villages are rehabilitated village founded in 1965 and 1969 respectively. The two rivers viz. Tirap and Burhi Dehing keep the villages in isolation from the rest of Margherita. The total numbers of households in Kuhiarbari and Kotha Adarsha villages are 137 and 95 respectively. The total population of Kuhiarbari village is 799 (Male: 378; Female: 421) and that of Kotha Adarsha village is 542 (Male: 272; Female: 270). Out of the total 234 households of the two villages, 111 families have a total 144 children (up to 5 years of age). The educational status of the Hajongs of the study villages is significantly poor. An average 29% individual is illiterate and among the literate, majority of the individuals read up to primary level only. Being a farming community the family economy of the population mainly rests on agriculture, but the land possessing status of the families is not sufficient. Majority of the families 111(47.84%) have possessed land up to 1.32 acres only, while 17 (7.33%) families are land less.

Standard anthropological methods like survey schedule, interview, non-participant observation were used for primary or firsthand data collection. Data was collected during 2011 - 2012. To assess the nutritional status of the children Weight-for-age (both short-and long-term) indicator is applied. The families having children up to 5 years of age were investigated and the mothers of children of the respective age group were intensively interviewed regarding their educational status, child rare and care practices, benefits of supplementary food to their children, immunization and growth monitoring availed under ICDS programme etc.

Results and discussion

Considering the age group of 0-5 years of age, the total 144 Hajong children (Male- 61; Female- 83) have been found in

Kuhiarbari and Katha Adarsha village whose nutritional status is assessed.

Table 1 depicts that out of 144 children, 94 (65.28%) are normal, but 50 (34.72%) children are malnourished (underweight), of which 27 (18.75%) are moderately (less weight) and 23 (15.97%) are severely (too less weight) malnourished. In fact, under nutrition cases have been found more among the female children than their counterpart.

Table-1: Nutritional Status of Children (0-5 years) by sex

Category	Normal nourished		Moderate malnourished		Severe malnourished		Total	
	No.	%	No.	%	No.	%	No.	%
Boy	41	28.47	11	7.64	9	6.25	61	42.36
Girl	53	36.81	16	11.11	14	9.72	83	57.64
Total	94	65.28	27	18.75	23	15.97	144	100.0

Mother-education is considered as the most determinant factor for health care practices. Thus, an attempt has been made to perceive its influence on child's nutrition. The data (Table 2) shows that majority of the normal children 55 (38.19%) are of literate mothers. On the other hand, malnourished children of illiterate mothers are more than that of literate mothers. The number of moderate and severely malnourished children of illiterate mothers are 15 (10.42%) and 16 (11.11%) respectively, while for literate mothers it is 12 (8.33%) and 7 (4.86%) respectively.

Table-2: Mother-Education and Nutritional Status of Children

Educational status of Mother	Nutritional status of children						Total	
	Normal nourished		Moderate malnourished		Severe malnourished			
	No.	%	No.	%	No.	%	No.	%
Literate	55	38.19	12	8.33	7	4.86	74	51.39
Illiterate	39	27.08	15	10.42	16	11.11	70	48.61
Total	94	65.27	27	18.75	23	15.97	144	100.0

Family size is another important factor which has profound influence on child growth. In a large family with limited income,

children do not get proper nutrition. As a consequence, the growth is delayed or stunted (Basu Roy 2003). Table 3 demonstrates that malnourished children are mainly found in moderate (5-7 members) and large (8-10 members) sized family. The highest 9 (6.25%) severely malnourished children belong to medium sized family and it is followed by 8 (5.56%) children of large sized family. However, 6 (4.17%) moderately and 4 (2.78%) severely malnourished children of small sized (- 4 members) family have also been observed in the community, and from the intensive investigation it was found that these families were either landless or possessed less than 0.33 acre of land only. Same number of moderately as well as severely malnourished children i.e. 2 (1.39%) have been found in very large sized (10+ members) family.

Table-3: Family size and Nutritional Status of Children

Family Size	Nutritional status of children						Total	
	Normal nourished		Moderate malnourished		Severe malnourished			
	No.	%	No.	%	No.	%	No.	%
Small (- 4 members)	18	12.5	6	4.17	4	2.78	28	19.44
Medium (5-7 members)	43	29.86	17	11.80	9	6.25	69	47.92
Large (8-10 members)	18	12.5	2	1.39	8	5.56	28	19.44
Very large (10 + members)	15	10.42	2	1.39	2	1.39	19	13.19
Total	94	65.28	27	18.75	23	15.97	144	100.0

Antenatal and postnatal cares are the two important aspects closely related to child's growth and development as well as mother's health. But the intensive field investigation is in evident that ignorance, lack of awareness, prevailing fallacy on extra growth of foetus, shyness, objection from elderly kin members etc. keep the womenfolk away from following antenatal care. Similarly after delivery, the mother of a new born does not receive sufficient physical rest as the pollution period is observed only for 5-7 days. Again, due to poor economic condition of the family nursing mothers are not provided sufficient amount of nutritious food. While, there are food taboos on taking cow's milk, honey, banana spedix, papaya, cat fishes, butter been, pumpkin, leafy vegetables etc. during pregnancy and after delivery, that have definite effect on maternal as well as child nutrition.

It is noteworthy that like other tribal groups, the Hajongs are also tradition bound and believe in the presence of malevolent and benevolent powers. They are in beliefs that the supernatural powers cause sickness to individual or community and children are more subjected to that. They prefer/follow magico-religious-spiritual means of treatment.

After independence, India has undertaken various activities towards the nation's human resource development. Consequently, to lay the foundation for the health development of children, the Integrated Child Development Services (ICDS) was launched on 2nd October, 1975. The ICDS is India's response to the challenge of breaking the vicious cycle of malnutrition, impaired development, morbidity and mortality in young children. The scheme however gives especial emphasis on socio-economically backward sections of the society. To achieve the objectives, the ICDS provides a package of six services at the Anganwadi centre (AWC) through the grass root level honorary worker called Anganwadi worker (AWW). The study villages are under the coverage of ICDS project, but the Anganwadi centre is not located in Katha Adarsha village.

The Supplementary Nutrition (500 calories and 12-15 grams of protein to the children below 6 years and 800 calories and 20-25 grams of protein to under-nourished children) is one of the important components of the package of six services, and by providing supplementary food it aims at improving the health and nutritional status of children. In the study area, it has been found (Table 4) that a large number of children i.e. 63 (43.75%) remain far from receiving the service while the benefited children have received supplementary food for less than 200 days instead of 300 days in a year. On the other hand, due to the absence of AWC in Katha Adarsha village, poor communication between the AWW and the villagers, lack of

Table-4: Supplementary Nutrition service to the children

Supplementary nutrition availed		Supplementary nutrition not availed		Total	
No.	%	No.	%	No.	%
81	56.25	63	43.75	144	100.0

knowledge of the villagers as well as mothers about the ICDS project the children of the village could not be able to receive the benefit of the service.

Child Immunization is an important aspect and it protects children from six vaccine preventable diseases which are the major causes of child morbidity, mortality, disability and malnutrition. Child immunization is an another important component of ICDS programme, where the Anganwadi workers are obliged to arrange the immunization camp once in a month and assists the health functionaries (ANM/MO).

From Table 5 it has been observed that out of 144 children, 19 (13.19%) children have been never immunized, while 24 (16.67%) children have the experience of any shot of immunization. However, majority of the children i.e. 101 (70.14%) have been continuing the course.

Table-5: Child Immunization receive under ICDS Programme

Never immunized		Discontinued immunization		Immunization continued		Total	
No.	%	No.	%	No.	%	No.	%
19	13.19	24	16.67	101	70.14	144	100.0

It is noteworthy that both the villages under study do not have any health infrastructure in and around the villages. Moreover, immunization camps are not organised regularly during rainy season as the health functionaries do not come to the villages when water volume of the rivers increase and become risky to cross. The intensive investigation is evident that mothers with no education or low level of education often forgot or neglected to immunize their children timely. On the other hand, the people of Katha Adarsha village were not informed about immunization programme in time while the parents were also not conscious or did not keep interest on it. The field investigation also disclosed that some of the parents especially the father and the grandparents made objection to child immunization as they thought that vaccination often caused critical condition or even death to their children.

For growth monitoring and nutrition surveillance of the children, the Anganwadi workers are oriented to take child's weight. After detecting the malnourished children, there is provision of giving special amount of supplementary feeding and referral service under ICDS programme. However, the children have not been regularly weighed rather majority of them never weighed. As a result, neither nutritional status of the children has been assessed nor special amount of supplementary food and referral service provided to the needy children.

The investigation on customary practices of child care among the Hajong reveals that the Hajongs do not have any custom of introducing complementary food to the child. Moreover, exclusive breast feeding follows for prolong time (for about 7-8 months of the child). Usually six months onward plain rice, pulses, biscuit etc. only are fed. The children are provided less varieties of food items and not specially cooked for them only. In addition, due to poor economic condition as well as lack of knowledge the parents do not supply the extra nutritious food or drinks to their children.

Conclusion

From the above discussion it can be concluded that the nutritional status of the Hajong children is not pleasing. The percentage of Hajong malnourished children (34.72%) is almost equal to the child under weight percentage of Assam i.e. 36. Many factors have been identified as the proximate reasons for disappointing child nutritional status of the community. Due to isolated location, and absence of basic health infrastructure in the villages the people by and large are not interested towards modern medical treatment. On the other hand, lack of education, ignorance, spiritual beliefs and use of magico-religious treatment, prevailing fallacy on extra growth of the foetus on taking antenatal care or extra nutritional food during pregnancy, food taboos to the expectant and nursing mother etc. stand as obstacles in child care processes at different stages. Moreover, mother illiteracy, large sized family, introduction of complementary food in late, inappropriate

feeding practices, inclusion of limited food items, inadequate quantity of food, etc. also adversely affect the child's nutritional status. While, the lack of effective implementation of the ICDS services, awareness of the people, communication gap between Anganwadi functionaries and the villagers, absence of Anganwadi centre in the village etc. the project have not been able to fulfil its objective of reducing child malnutrition among the Hajong community into large extent.

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Impact of Flood on Child Health: A Case Study in Dhakuakhana Sub-Division of Lakhimpur District, Assam

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Introduction

Flood is a natural havoc, it comes everywhere at anytime. It comes in every year as a festival which causes woes rather than joy. Assam is one of the worst sufferers of flood due to River Brahmaputra and its tributaries. Flood has a great impact on human life in the sense that due to flood the people losses their several things like their livestock, property, and their communication system like, roads, railway, and their entire socio-economic life. The flood hazards affect all aspects of the land, lives, and livelihoods of communities living in the region to a significant degree. Both floods and flash floods leave people homeless and displaced, destroy crops, damage public property, and damage development infrastructure. Victims who become destitute suffer from trauma and shock. Thousands of hectares of fertile land in hundreds of villages with crops, settlements, and infrastructure have been lost to the river due to frequent shifting in the river course and erosion of river banks. Sand casting has proved to be one of the worst hazards because it results in degradation of thousands of acres of farm land and

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wetlands due to deposition of debris, mainly coarse sand particles, by flood waters. The indigenous communities living in these areas have developed mechanisms over time that have become ingrained in their lifestyles and traditions – for example, housing, agriculture, livestock rearing, food storage, and weather and flood predictions – and these help them to cope with and adapt to the immediate and long-term impacts of such hazards. Not only these, flood has also great impact on child health. Children develop, worry or fear, insecurity, anxiety etc., as well as some kind of diseases are also found due to flood. Not only this but also it has great impact on their socio- cultural life.

Children's health is the nation's wealth. As WHO defined, children represent the future, and ensuring their healthy growth and development ought to be a prime concern of all societies. Newborns are particularly vulnerable and children are to malnutrition and infectious diseases, many of which can be effectively prevented or treated.

"Children health is the extent to which individual children or group of children are able or enable to, a) develop and realize their potential, b) satisfy their needs, and c) develop the capacities that allow them to interact successfully with their biological, physical, and social environment". This broader definition of children's health acknowledges the influences of the biological, behavioural, social, and physical environments on health trajectories (Kuo *et al.* 2012). Children face numerous social challenges in the context of families, schools, and communities that significantly affect their well being and health because of flood.

Aim and Objective of the study

Here in this paper a humble attempt has been made to examine the impact of flood on child health and also try to understand their socio-economic conditions due to flood in the flood affected areas of Dhakuakhana sub-division of Lakhimpur District, Assam.

Materials and methods

Three of the most prevalent and useful purposes of social research involves exploration, description, and/or explanation of some topic or event of interest. There is virtually no limit to what can be studied in the social sciences. However in order to reach valid and reliable conclusions, it is of the utmost to first develop an appropriate strategy for answering the question at hand.

Data for the present study were collected mainly from two sources, primary and secondary. So the primary data are collected through household survey schedule, observation, interview (unstructured), collecting concrete cases and informal discussion, etc. Basing on the specific nature of data, some relevant persons and sources were also be contacted. The secondary data are collected from official as well as from other sources including published books, journals etc.

Micro field

Dhakuakhana is a place in the district of North Lakhimpur of Assam, comprising large number of villages and some small growing towns. For my research work I have selected three villages from the Dhakuakhana sub divission, namely Matmora village, Bahpora (No.1) village, and Bahpora (No.2) village. These villages are selected from the Dhakuakhana sub-division on the basis of their long history of water induced stresses and the vulnerability and adaptability of the communities to water induced hazards such as floods, flash floods, river bank erosion and land degradation caused by sand deposition.

The population consists of various communities; the Matmora village is entirely populated by the Mishing community, a major ethnic tribe of Assam. Bahpora (No.1) village is a non tribal village with a population of Koibortta (a traditional fish trading community with scheduled caste status), and Bahpora (No.2) village is entirely populated by the Ahom community.

The Mishing people of Matmora village observed both Hinduism as well as their traditional religious practices, the

other caste groups in Bahpora (No.1), and Bahpora (No.2) villages, are Hindus only. The Koibortta community in Bahpora (No.1) belongs to the Mayamoria Voishnavite sect, a branch of the Neo-Vaishnavite religion propounded by Anirudha Dev, an eighteen century religious reformer. Most of the people are followers of the Srimanta Sankar Dev Sangha, a religious sect that follows the socio-cultural and religious practices propounded by the 15th century saint and reformer Srimanta Sankar Deva.

Impact of Flood on Child Health in the Study Villages

Flood may bring health hazards to the people of flood affected areas. The health hazards that due to drinking of polluted water and adverse climatic conditions, there is shortage of hygiene facilities for which diarrhoea, skin diseases occur. Similarly, due to flood, damage to the crops causes shortage of items leading to starvation and malnutrition, transmission of diseases due to displacement of population, accidents drowning in water due to increase of current of flood water, psychological trauma etc., are due to flood.

All the study villages, namely, Matmora village, Bahpora (No.1) village, Bahpora (No.2) village, faced similar type of health problem due to flood. In the study villages maximum villager's mud plastered houses made up of bamboo, wood, reeds generally give way easily when comes in contact with flood water. After being affected by flood water this houses either fall down or become useless. Such houses have no capacity for resistance against inundation. Similarly, during the flood time when the child found some situations like, the sudden onset of dark clouds bolts of lightning, thunder, and rain they developed the feelings of worry or fear. Children also experience the horror of seeing severely injured people or dead bodies. Further, due to flood children developed some common emotional reactions like increased feelings of insecurity, unfairness, anxiety, fear, anger, sadness, despair, worry about the future and dread of a flood reoccurring. They also develop the believing myths or folklore as to the cause of the flood. The children also faced disturbances in sleep or

appetite and also develop some symptoms, such as stomach aches or headaches. Similarly, they are concerned regarding the safety of family members, friends, and love ones and also some school based problems like, decreased motivation and a decline in school performance. Further, adolescents respond differently than younger children in a flood that they withdraw socially, become angry or irritable, behave in risky ways, have conflict with authority etc. Similarly, displacement is an important factor for emotional reaction of children exposed to flood. The table (4) shows that the total number of displaced families from the Matmora Village is 27 families who were displaced from their original home in 2012 flood. These 27 family's children were not mentally prepared to adjust in new place or new environment. So they developed some emotional reactions like, anger, unhappy, friendship problem etc. The displaced people would have lost everything and needs to be provided with proper food, shelter and financial support.

During the flood time when children go outside from their home for schools, playing etc., it becomes very dangerous for them because flood water covered surrounding of their home and overflows above the roads. The roads are broken down into several pieces due to flood current and in that situation the people of that area used one kind of transporting system that is locally known as *haku* (a piece or pieces of long poles of bamboo or timber laid across a stream for crossing the same) which is made by themselves but if the children slip or fall down from the *haku* at the time of crossing as a result they may be highly injured or even die. Further, flooded homes and buildings also pose other significant health hazards after floodwaters recede. For example, electrical power systems including fallen power lines can become hazardous for a child. Regardless of one's ability to swim, swiftly moving shallow water can be deadly, and also shallow standing water can be dangerous for small children.

Floodwaters contain disease causing bacteria, dirt, oil, human and animal wastes, and farm and industrial chemicals. Foods kept inside cardboards, plastic bags, jars, bottles, and

paper packaging are equally subject to disposal if contaminated by floodwaters. Even though the packages do not appear to be wet, they may be unhygienic with mild contamination and deteriorate rapidly. The dead animals if not removed in time further pollute the atmosphere. In the study villages, during the high floods of 1998, 2012, 2014, the number of children affected by dysentery, cough, fever, malaria, gastritis, and headache etc., is very high. The higher incidence of the diseases during the period of high floods is due to the reason that villagers take water from ponds, Brahmaputra river which generally become contaminated with various germs of diseases during floods. Similarly, unclean drinking and washing water and sanitation, coupled with lack of adequate sewage treatment, can lead to disease outbreak of life-threatening cholera, typhoid, dysentery and some forms of hepatitis. Prolonged rainfall and floods provide new breeding grounds like, wet areas and stagnant pools for mosquitoes and can lead to an increase in the number of mosquito-borne diseases such as malaria and dengue. The people of the study area practice indigenous knowledge system for curing such type of diseases. If they do not get any positive result then they go to the nearest health centre that is Matmora villagers go to the Matmora Health Centre and both Bahpora villagers go to the Bahpora Health Centre for the same. These health centres are closed during the flood time because flood water covers the whole area. So, a helpless or danger situation is faced by the victim families.

Some other socio-cultural or socio-economic challenges also faced by the children due to flood. Such as the flood worsen attainment, earnings, health. Even floods have damaged the school buildings. Therefore, the children are out of schools and are falling behind in their studies. Children out of school face social, economical and emotional issues. No education,

Table-1: Distribution of Population by Sex

Sl.No.	Name of the Village	Male	%	Female	%	Total	%
1	Bahpora(No.1) Village	268	19.10	238	16.93	506	36.03
2	Bahpora(No.2) Village	250	17.78	223	15.86	473	33.64
3	Matmora Village	212	15.08	215	15.30	427	30.4
4	Total	730	51.92	676	48.08	1406	100.0

bad health and poverty etc., as a result change their emotional behaviour. After floodwaters recede children are not interested to study but they are happy with playing, catching fish etc. The children are also deprived of their essential education from their parents because most of the family members are illiterate 213(15.15%) (Table 2) and some of them are literate but they have no enough time for their children because they are landless labour, some of them that is adult female are busy with animal husbandry (pig, goat, duck, fowl etc.), cooking, weaving, preparing *apong* (rice beer) etc. and adult male members are busy as a daily wage earner (Matmora Village, 90 (21.1%) (Table. 3) but most of the people of Bahpora No(1) and Bahpora No(2) villagers are cultivator 104 (20.55%) and 93 (19.66%).

Table-2: Distribution of population by Sex and Education

Education	Bahpora(No.1) Village				Bahpora(No.2) Village				Matmora Village				Total	%
	M	%	F	%	M	%	F	%	M	%	F	%		
Too Young to Study	25	1.78	27	1.92	14	1.00	17	1.21	26	1.85	17	1.21	126	8.96
Illiterate	23	1.63	52	3.70	10	0.71	24	1.71	44	3.13	60	4.27	213	15.15
Up to L.P.	39	2.77	30	2.13	45	3.20	31	2.20	40	2.84	48	3.19	233	16.57
Up to M.E.	22	1.56	17	1.21	18	1.28	19	1.35	11	0.78	20	1.42	107	7.6
Up to class X	45	3.20	21	1.50	50	3.56	48	3.14	47	3.34	38	2.70	249	17.7
HSLC	33	2.35	28	2.00	45	3.20	38	2.70	18	1.28	15	1.07	177	12.6
H.S.	43	3.06	32	2.28	42	2.99	36	2.56	20	1.42	11	0.78	184	13.1
Graduate	33	2.35	29	2.06	22	1.56	9	0.64	5	0.35	6	0.42	104	7.4
Post Graduate	4	0.28	2	0.14	4	0.28	1	0.07	1	0.07			12	0.85
Other	1	0.07											1	0.07
Total	268	19.06	238	16.93	250	17.78	223	15.86	212	15.08	215	15.30	1406	100

Care from the family members to their children is very important. In case of Matmora Village, the family members are unable to provide nutritious food for their children because they are landless labour, their whole land is taken by Brahmaputra River. They only think of how they earned for one day meal. Other two villages that are Bahpora (No.1) and Bahpora (No.2), most of the families are agriculture based. But they don't get enough crops due to sand deposition in their paddy field because of flood. Another important thing is that most of the village boys and girls, marriage took place earlier and become younger parent of their child. That people have no idea about the family planning. Therefore, in most of

the household of the study villages, it is found that there are about 3-8 children in a family. Their economy is not so good, so, parent could not provide proper care to their children.

Table-3: Distribution of population according to occupation

Occupation	Matmora	%	Bahpora No.1	%	Bahpora No.2	%
Agriculture			104	7.40	93	6.61
Business	4	0.28	8	0.57	16	1.14
Service	9	0.64	40	2.84	37	2.63
Daily wage earner	90	6.40	4	0.28	2	0.14

Table-4: Distribution of Displaced People of Matmora Village by Sex

Total no. of family	Male	%	Female	%	Total	%
27	61	49.20	63	50.80	124	100.0

Conclusion

Children are those who react differently to a flood situation and its aftermath depending on their age, development level, and prior experiences, some will withdraw, while others will have angry outbursts and others will become agitated or irritable. Parent should be sensitive to each child's coping style. The following are typical reaction that children exhibit following a flood disasters.

Therefore, to address these problems we need a set of public policy responses to flood affected areas to resolve issues of education and unemployment of the parents. Greater short-term government expenditures are necessary to mitigate the devastating flood's impact to parents and their children, and for cost-effective longer-term strategies to reduce poverty. Failure to do so will not only hurt the flood affected people and their future but also the future of an entire generation.

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