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Research Article

MORTALITY PATTERN OF UNDER-FIVE CHILDREN – A HOSPITAL-BASED CROSS-SECTIONAL STUDY IN A TERTIARY CARE HOSPITAL OF INDIA

RACHITA SARANGI[1]*, LIPILEKHA PATTNAIK[2], SAROJ KUMAR SATPATHY[3], MAHESH CHANDRA SAHU[4]

[1]Department of Paediatrics, IMS and SUM Hospital, Siksha 'O' Anusandhan University, Bhubaneswar, Odisha, India. [2]Department of Community Medicine, IMS and SUM Hospital, Siksha 'O' Anusandhan University, Bhubaneswar, Odisha, India. [3]Department of Paediatrics, SCB Medical College, Cuttack, Odisha, India. [4]Postdoctoral Fellow, Directorate of Medical Research, IMS and SUM Hospital, Siksha 'O' Anusandhan University, Bhubaneswar, Odisha, India. Email: rachitapaedia@gmail.com

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ABSTRACT

Objective: Under-five mortality is a major public health challenge particularly in developing countries like India. The study was undertaken a hospital-based cross-sectional study to see the pattern of childhood mortality in a tertiary care hospital of Eastern India.

Methods: This study was a hospital-based cross-sectional study on under-five children, carried out in the Department of Pediatrics in a tertiary care hospital from January 2013 to December 2014. All the children admitted to the inpatient Department of Pediatrics from 1 month to 5 years were included in the study group and those who died were further explored.

Results: Maximum number of death occurred due to central nervous system infection (25.5%) followed by acute respiratory tract infections (19.5%) and complicated malaria (17.2%). Death occurred due to measles and its complication was 1.1% during the study. The percentage of death was higher among rural children (65.2%), children belonged to joint families (63.3%), backward classes (82.8%), low education, and the 1st order birth (49.1%).

Conclusion: Specific efforts to combat under-five mortality are needed. In order of priority, the promotion of female education, gender equity, family planning, and addressing the vast socioeconomic differentials in Odisha is important steps to improving under-five survival.

Keywords: Under-five death, Child mortality, Central nervous system infection.

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INTRODUCTION

Childhood mortality is a major health burden to the society and a prominent public health issue. In one series on child survival published in Lancet, under-five mortality was described as public health disaster [1]. In response to the burden of childhood mortality in sub-Saharan African countries, United Nations and World Health Organization (WHO) has incorporated reduction of childhood mortality by two-third by the year 2015 as one of its millennium development goals. In 2014, the under-five mortality rate (U5MR) was reported as 66/1000 live births although this represents 50% decrease on the U5MR reported in 1990 [2].

Under-five children constitute 20% of India's population, which makes every unit change in mortality to reflect great effect in the population [3]. Identifying determinants of under-five mortality are essential for formulating appropriate health programs and policies. In a bid to address this problem and health inequities, India has adopted and implemented to a certain extent a number of major global initiatives that are aimed at improving health outcomes in children.

Previous studies have shown that various factors influence child health and survival including place of residence, age and education of mothers, place of delivery, birth order, sex of child, religion of parents, household headship, and socioeconomic status. Existing literature has documented mixed effect of factors such as place of delivery, birth order, and sex of children [4] on under-five mortality. For instance, abundance of evidence suggests that women who deliver at health facilities have a lower chance of child death as compared to those who deliver at home due to the use of skilled delivery practices [4]. The contribution of social factors as determinants of health outcome has gained considerable interest as a method to explain the existence of health inequalities among individuals and population. This is because while medical care is important, there is a growing body of evidence that it is not enough to overcome adverse health outcomes [5]. Some studies have demonstrated a link between inequitable and delay access to health-care services and poor health outcomes following childhood illnesses [6]. The factors identified to be associated with these delays or difficulties in accessing health services include low socioeconomic status, non-recognition of danger signs in an ill child, cultural beliefs and practices, often leading to self-care, use of home remedies, and consultation with patent medicine sellers and traditional healers [7].

To accelerate the decline in under-five mortality rate, specific proven interventions would have to target important causes of child death. Since no single factor can account for the high child mortality, in developing these interventions, there is the need to understand the multiplicity of factors that determine child mortality, especially in resource poor settings.

METHODS

This study was a hospital-based cross-sectional study on under-five children, carried out in the Department of Pediatrics in a tertiary care hospital from January 2013 to December 2014. All the children admitted to the inpatient Department of Pediatrics who were more than 1 month and <5 years included in the study group and those who died during treatment at hospital were considered as cases.

All the information about the diseased child such as age, sex, weight, order of birth, caste, immunizations, and nutritional status according to IAP grading [8] were recorded. Sociodemographic data such as residence, age and education of mothers, and type of family were documented. Detailed medical history including period of illness,

Table 1: Age- and sex-wise distribution of under-five admission and mortality

Age-/sex-wise mortality profile among hospitalized children (> 1 month to 5 years)				
Parameters (age in year/sex)	**Death (267) (no/%)**	**Survival (no/%) (2879)**	**Total (no/%) (3146)**	**Statistical significance**
>1 month to 1	116 (12.6)	802 (87.4)	918 (29.2)	χ^2=28.228, df=2, p<0.001
>1 year to 3	83 (6.6)	1165 (93.4)	1248 (39.7)	
>3 years to 5	68 (6.9)	912 (93.1)	980 (31.1)	
Male	160 (7.7)	1910 (92.3)	2070 (65.8)	χ^2=4.47, df=1, p<0.05
Female	107 (9.9)	969 (90.1)	1076 (34.2)	

duration of pre-hospitalized treatment, level of pre-hospitalized treatment, and severity of illness as per Yale observational scale [9] was recorded on the day of admission.

RESULTS

There were a total of 3164 admissions into the pediatric ward of the hospital during the study. Among total admission majority belonged to 1-3 years age group, i.e., 39.7%, male children admission was 2070 (65.8%) and female children admission was 1076 (34.2%) with male and female admission ratio 1.9:1. Among the admissions, 267 deaths were recorded.

Table 1 shows that among the 3164 hospitalized children (1 month - 5 years), death occurs in 267 children (8.5%). Among total admission majority belonged to 1-3 years age group, i.e., 39.7%, but there was significant higher number of death during infancy (116) compared to higher age group (p>0.001). Male children admission 2070 (65.8%) was more than the female 1076 (34.2%) with male and female admission ratio 1.9:1; but the risk of female death was higher than the male children (p=0.05).

Table 2 shows that the percentage of death was higher among rural children (65.2%) than their urban counterpart (34.8%). Distribution of death according to type of family indicated that highest risk of mortality observed in children belonged to joint extended families (48.7%) and least death in children belonged to joint families (14.6%). Basing on caste, the mortality rate in under-five children was significantly lower in general caste (17.2%) than backward classes (82.8%). Under-five deaths found to be significantly higher in the 1st order birth (49.1%) as compared to all other groups. The minimum risk of mortality when the age of mother more than 35 years (0.7%) and educational status of mother are high (9.7%).

Table 3 shows that the risk of mortality was significantly high among partially and not immunized children (67.4%) than the immunized group (32.6%). The under-five death was lower among the children having normal nutritional status (33.3%) compared to those having some degree of malnutrition (66.7%). Majority of death occurred in children those who admitted after 7 days of illness (42.3%) than the other groups. Likewise, death among the groups those who received a prolonged treatment (more than 3 days), and late referral was higher (68.9%) compared to those who presented to hospital earlier (31.1%). According to Yale scoring system, death among the children having more severe illness (9.3%) outnumbers the counterpart (6.7%). Fig. 1 shows that a maximum number of death occurred due to central nervous system infection (25.5%) followed by acute respiratory tract infections (ARI) (19.5%) and complicated malaria (17.2%). Least death occurred due to measles and its complication (1.1%) during the study.

Table 2: Sociodemographic parameters of under-five mortality

Parameter	Death (n=267) No. (%)
Residence	
Urban	93 (34.8)
Rural	174 (65.2)
Type of family	
Nuclear	98 (36.7)
Joint	169 (63.3)
Caste	
General	46 (17.2)
Backward	55 (20.6)
Scheduled caste	98 (36.7)
Scheduled tribe	68 (25.5)
Order of birth	
1st Order	131 (49.1)
2nd Order	74 (27.7)
3rd Order	50 (18.7)
4th Order and above	12 (4.5)
Mother's age	
<20 years	155 (58.1)
20-35 years	110 (41.2)
>35 years	2 (0.7)
Mother's education	
Primary	128 (48.0)
Secondary	113 (42.3)
Above secondary	26 (9.7)

Table 3: Clinical parameters and under-five mortality

Parameter	Death (n=267) No. (%)
Immunization status	
Not and partially immunized	180 (67.4)
Fully immunized	87 (32.6)
Nutritional status	
Normal	89 (33.3)
Malnutrition	178 (66.7)
Period of illness	
<3 days	64 (24.0)
3-7 days	90 (33.7)
>7 days	113 (42.3)
Duration of pre-hospitalization	
No treatment	31 (11.6)
<3 days	52 (19.5)
3-7 days	138 (51.7)
>7 days	46 (17.2)
Level of pre-hospitalization treatment	
No treatment	31 (11.6)
Treatment from unqualified person	99 (37.1)
Homeopathy/ayurvedic	24 (9.0)
PHC/CHC	18 (6.7)
SDH/DHH	19 (7.1)
Private clinic	76 (28.5)
Severity of sickness (Yale scoring)	
<10 (less severe)	18 (6.7)
>10 (more severe)	249 (93.3)

DISCUSSION

The highest number of mortality was seen in children below 1 year (1 month - 1 year) which is consistent with all literature and study available [10]. This may be due to this immature immune system or subtle manifestation of disease leading to late presentation to hospital. Male admission (65.8%) was higher than the female admission (34.2%) which may be because of social stigma and early health-seeking behavior tends to favor boys. The mortality rate in female (9.9%)

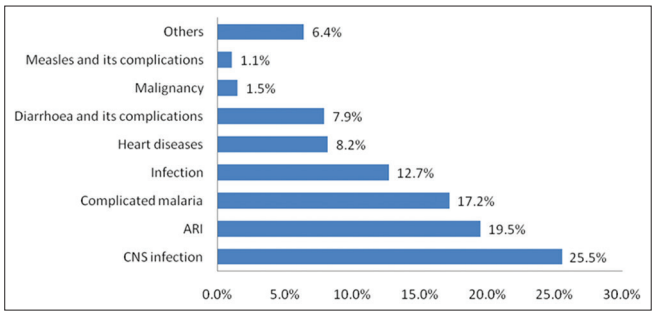

Fig. 1: Causes of death in the under-five children

was higher than the male mortality (7.7%) which contradicts the international finding [11]. This apparent discrepancy may be explained by the unfortunate gender bias in the locality in leading to the late referral.

The study showed that the variables such as mother age, level of education, order of birth, and family pattern were significantly associated with under-five deaths in these largely rural settings. Another study from developing country [12] indicates that the mother having completed primary level of education has 33-42% less risk of early childhood mortality compared with uneducated mother. In addition, where the mother had higher education, there is less risk of mortality (82.84%) than the uneducated counterparts. Maternal age has been found to have an inverse relationship with under-five mortality similar to other studies [13,14], as the risk of mortality is the lowest among the children when mother age >35 years. The advantage related to less mortality may be because of improved maternal experience in child rearing which prevailed over the drawback of advance maternal age.

The risk of mortality increases with delayed presentation, late referral, treatment from unqualified person, and severity of illness. This may be due to unavailability of suitable medical access, poor transportation, or referral system in this part of country.

In our study, the most common factor behind the cause of death is CNS infection (25.5%), ARI (19.5%), malaria (17.2%), and severe infection (12.7%). Although the WHO (2008) reported that in developing countries diarrhea (19%), ARI (13%), measles (10%), and prematurity (10%) were considered as the cause of under-five children [15], the percentage of diarrheal death and its complications was less (7.9%) in our study, this might reflect a trend in the fall of diarrheal death in country.

CONCLUSION

The causes of high under-five mortality in resource poor settings are complex and merit concerted efforts to clarify their implications to improve child survival. On the basis of these findings, we suggest that specific efforts with focus on under-five mortality decline need to target the individual needs and welfare of women. In order of priority, the promotion of female education, gender equity, family planning, and addressing the vast socioeconomic differentials in Odisha is important social steps to improving under-five survival.

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