

## ORIGINAL RESEARCH

# Incidence of health related events among children aged less than five years

<sup>1</sup>Dr. Manuja LM, <sup>2</sup>Dr. Sanjay M, <sup>3</sup>Dr. Madhunandan, <sup>4</sup>Dr. Rakshitha HB

<sup>1</sup>Associate Professor, Department of Community Medicine, Sri Chamundeshwari Medical College Hospital and Research Institute, Channapatna, Karnataka, India

<sup>2</sup>Professor, <sup>4</sup>Associate Professor, Department of Pathology, Adichunchanagiri Institute of Medical Sciences, BG Nagara, Karnataka, India

<sup>3</sup>Assistant Professor, Department of Pediatrics, Adichunchanagiri Institute of Medical Sciences, BG Nagara, Karnataka, India

### Corresponding author

Dr. Rakshitha HB

Associate Professor, Department of Pathology, Adichunchanagiri Institute of Medical Sciences, BG Nagara, Karnataka, India

Email: [dr.rakshitha05@gmail.com](mailto:dr.rakshitha05@gmail.com)

Received: 22 July, 2023

Accepted: 25 August, 2023

### ABSTRACT

**Background:** Children under five years of age constitute approximately 10% of the country's total population. They are the most vulnerable section of the society and suffer high rates of mortality and morbidity. Prevention of diseases needs a thorough understanding of the illness that occurs during this period. Hence this study is a comprehensive approach to determine the incidence of common health related events among rural children aged less than five years. **Objectives:** To determine the incidence of health related events among children aged less than five years. **Methods:** This descriptive longitudinal study was conducted over a period of one year among randomly selected children in a village in Mandya district, Karnataka. House to house survey was conducted to collect basic data using pre tested, semi structured questionnaire. Each child then was followed up regularly every fortnight through 24 home visits and the guardian/parent was enquired in every visit to know the child health status in between two subsequent visits. **Results:** 110 under-fives (57 Males & 53 Females) were followed for a period of one year every fortnight. The annual incidence rate of health related events was 3.24 episodes /child /year. The leading causes of morbidity in decreasing order of incidence were acute respiratory infections, fever, acute diarrheal diseases, domestic accidents, others and skin infections. Episodes of illness were observed more among children less than 2 years and in females. **Conclusion:** The incidence of health related events was 3.24 episodes /child /year. The common cause for this incidence was acute respiratory infections. Children less than 2 years and female children are more prone for infections.

**Keywords:** Incidence, Health related events, Under five children, Rural

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

### BACKGROUND

The health of women and children has always been an important social goal of all societies globally. Children under five years of age constitute approximately 10% of the country's total population.<sup>1</sup> They are the most vulnerable section of the society and suffer high rates of mortality and morbidity. Majority of the deaths during this period are preventable through available interventions.<sup>2</sup>

Under-five deaths are concentrated in Sub-Saharan Africa and Southern Asia while the share in the rest of the world dropped from 32% in 1990 to 18% in 2013. About half of these deaths occur in only five countries: India, Nigeria, Pakistan, Democratic Republic of Congo and China. India (21%) and

Nigeria (13%) together account for more than a third of all under-five deaths.<sup>3</sup>

The under-five mortality rate is a key indicator of child well-being, including health and nutrition status.

<sup>3</sup> More than 70 % of under five deaths every year are attributable to six causes: diarrhea, malaria, neonatal infection, pneumonia, preterm delivery or lack of oxygen at birth.<sup>4</sup>

Acute respiratory infection is a leading cause of death in under five children in developing countries. Pneumonia is the most serious of these infections and when children develop signs of acute respiratory infection, appropriate health care should be sought immediately.<sup>5</sup>

Diarrhea is more prevalent in the developing world. It remains the second leading cause of death among

children under five globally. Nearly one in five child deaths, about 1.5 million each year is due to diarrhea. Together pneumonia and diarrhea are responsible for an estimated 40% of all child deaths around the world each year.<sup>6</sup>

In India, measles is a major cause of morbidity and a major contributor to child mortality. It affects children between 6 months and 3 years. It weakens children's immunity to other life-threatening diseases and conditions, including pneumonia, diarrhea and acute encephalitis, and remains one of the leading causes of vaccine preventable deaths among children.<sup>7</sup>

Malaria is a major cause of death in Sub-Saharan Africa where it causes 25% of childhood mortality. It kills about 1 million children accounting for 80% of all deaths due to malaria. It also contributes indirectly to deaths from ARI, anemia, diarrhea and malnutrition.<sup>7</sup>

An accident can be defined as an unexpected, unplanned occurrence of an event which usually produces unintended injury, death or property damage. Accidents are an important health problem throughout the world and are a major cause for morbidity and mortality in children.<sup>8</sup>

Every year, thousands of children die or are permanently disabled as a result of accidental injuries. In many developing countries, injuries are one of the major causes of death in children in the age group of 1-5 years.<sup>9</sup>

Although there are studies done individually to determine incidence of acute respiratory infections, diarrheal diseases and domestic accidents among children aged less than five years, there is minimal literature on comprehensive studies to determine incidence of the health related events among children aged less than five years which can include wide range of diseases in them.

The care of children aged less than five years and prevention of diseases needs a complete understanding of the illness that occurs during this period. Hence this study is a comprehensive approach to determine the incidence of common health related events among rural children aged less than five years.

The findings of this study are expected to provide an improved understanding of the causes of morbidity among under five children in this rural area, which may in turn help to formulate plan to reduce child morbidity and mortality.

### **AIM AND OBJECTIVE**

To determine the incidence of health related events among children aged less than five years in a village in Mandya district of Karnataka.

### **METHODS**

The present study is a Descriptive Longitudinal study conducted over a period of one year in a village in Mandya district of Karnataka.

Study population included Children aged less than 5 years in the village. Sampling method adopted was Simple random sampling.

Study was conducted after obtaining ethical committee approval from the Institute.

### **INCLUSION CRITERIA**

1. Children aged less than five years in the village under rural field practice area of Mandya
2. Parents /guardians of the study participants who consented to participate in the study

### **EXCLUSION CRITERIA**

1. Children of the Parents/guardians of the children who refused to participate in the study.
2. Non-permanent residents of the Village.

### **SAMPLE SIZE**

110 Children under five years of age were included in the study. Sample size was calculated using the formula given by World Health Organisation for Incidence studies.

### **SIMPLE RANDOM SAMPLING OF CHILDREN**

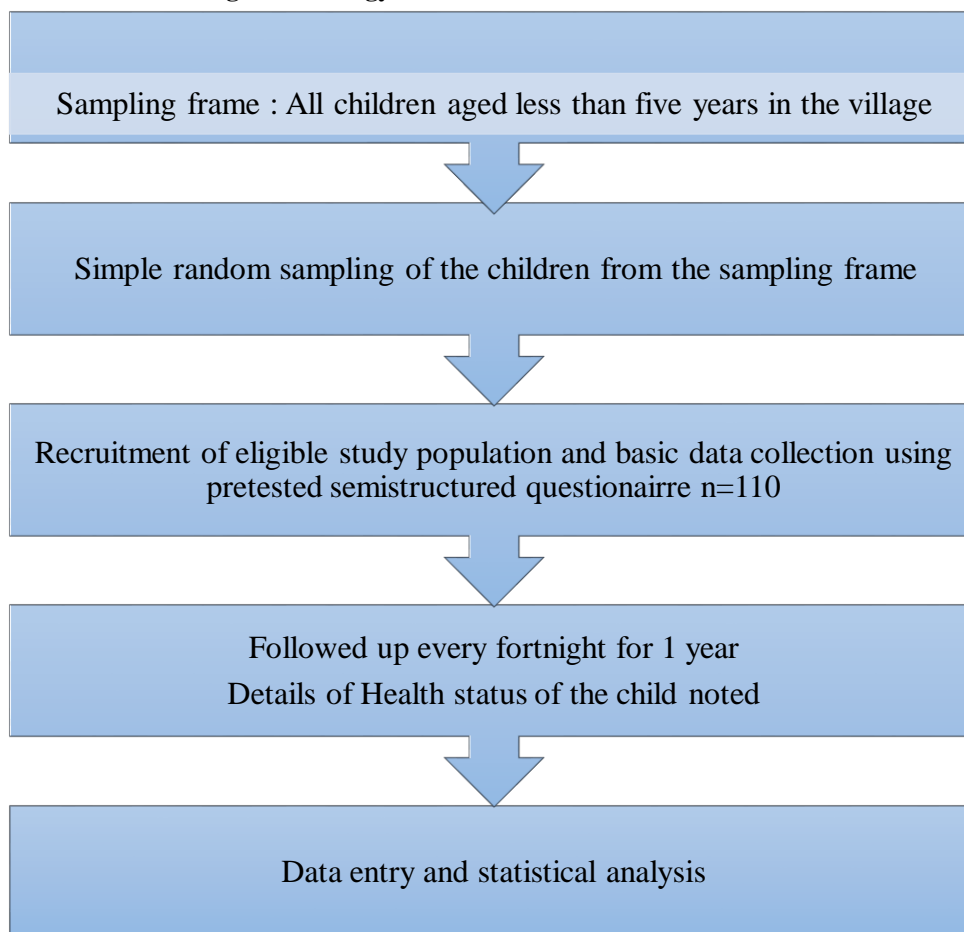
List of all Children in the village was prepared by house to house visit. There were 401 children aged less than five years. 110 Children were randomly selected from the list as study participants to avoid drop out, they were enrolled for the study after taking consent from the Guardian/parent.

### **METHOD OF DATA COLLECTION**

In the beginning, mothers/guardians of enrolled children were interviewed using proforma and information regarding child's name, age, sex, birth weight, immunization status, past history, birth history including antenatal & postnatal details, feeding practices etc. were taken. General Physical examination and systemic examination was done and recorded in proforma. The weight and height/ length of the child was measured and recorded. All mothers/guardians were informed regarding follow up visits and told to keep all the clinical records (including doctor's prescriptions and discharge card for verification) if the child is sick and has received treatment.

Each child then was followed up every fortnight through home visits and the guardian/parent were interviewed in every visit to know child health status in the past fifteen days. In case a child had a health related event, the details were noted down in a pre-designed and pre-tested proforma for that child.

Details with regard to number of episode of illness, duration, cause of the event if known, treatment seeking behaviour, was recorded with a detailed clinical examination of the child. (Flowchart 1)

**Flow chart 1: Flow chart describing methodology****STATISTICS**

Data was entered into Microsoft excel sheet and analyzed using SPSS (statistical package for social sciences) version 15. Descriptive statistics like percentages, mean, standard deviation, standard error were used. Episodes were taken as continuous variables. To compare mean episodes among different group of variable, following tests were used. For less than 2 groups, Independent sample 't' test was used to compare mean if the variables had normal distribution whereas for variables with not normal distribution Mann Whitney U test was used. For more than 2 groups, One Way ANOVA was used to compare mean if the variables had normal distribution whereas for variables with not normal distribution Kruskal

Wallis test was used. The statistical significance was evaluated at 95% confidence level ( $p < 0.05$ ).

**RESULTS**

A total of 110 children aged less than five years were followed up for a period of one year and parents of respective children were interviewed for the current study.

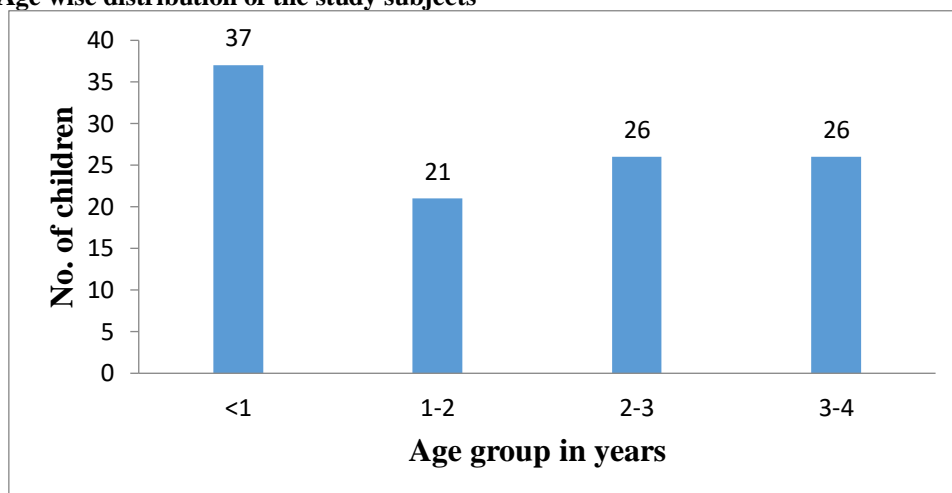
**AGE AND SEX**

Among the total 110 study subjects, 51.8% (57) were male children and 48.2% (53) were female children. Majority of the children were infants, followed by children in the age group of 2-3 years and 3-4 years who comprised 23.6% (26)(Table 1) (Figure 1 & 2).

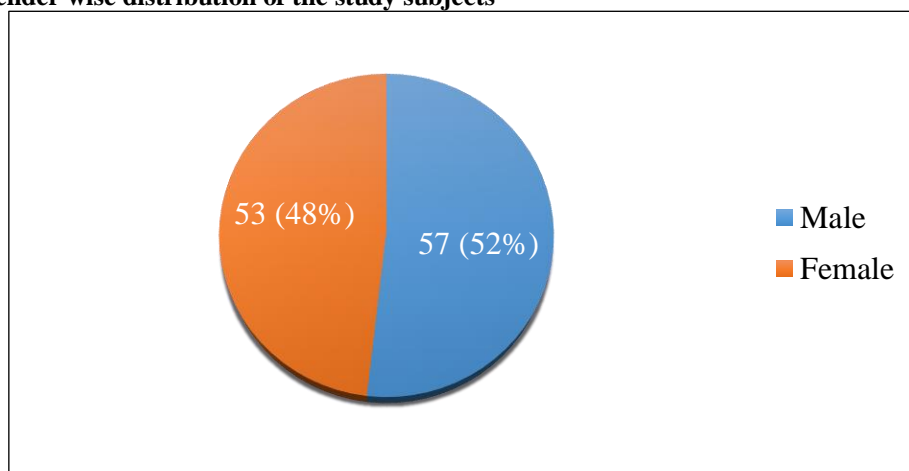
**Table 1: Age and sex wise distribution of the study subjects**

Age Group (in years)	Male (%)	Female (%)	Total (%)
<1	19 (51.4)	18 (48.6)	37 (33.6)
1-2	13 (61.9)	8 (38.1)	21 (19.1)
2-3	12 (46.2)	14 (53.8)	26 (23.6)
3-4	13 (50.0)	13 (50.0)	26 (23.6)
Total	57 (51.8)	53 (48.2)	110 (100)

**Figure 1: Age wise distribution of the study subjects**



**Figure 2: Gender wise distribution of the study subjects**



**INCIDENCE OF HEALTH RELATED EVENTS AMONG UNDER FIVE CHILDREN**

A total of 110 under five children were included in the study and followed up for a period of 1 year (12 months) every fortnight. 2 children could not be followed up completely for all the months as 1 child died of meningitis and 1 child’s parents had shifted out of the village (Table 2).

**Table 2: Distribution of study subjects by duration of follow up**

	Duration of follow up (in months)			Total
	12	9	5	
Number of children	108	1	1	110

A total of 354 incidents of acute morbidities were reported among study subjects during this 1-year study period. Incidence rates hence can be calculated as follows:

Incidence rate of Health related events among children aged less than five years over a period of 1 year:

= No. of incidents of morbidity/episodes of illness over a period of 1 year × 12

Child months of exposure

=  $354/1310 \times 12$   
= 3.24 Episodes per child per year

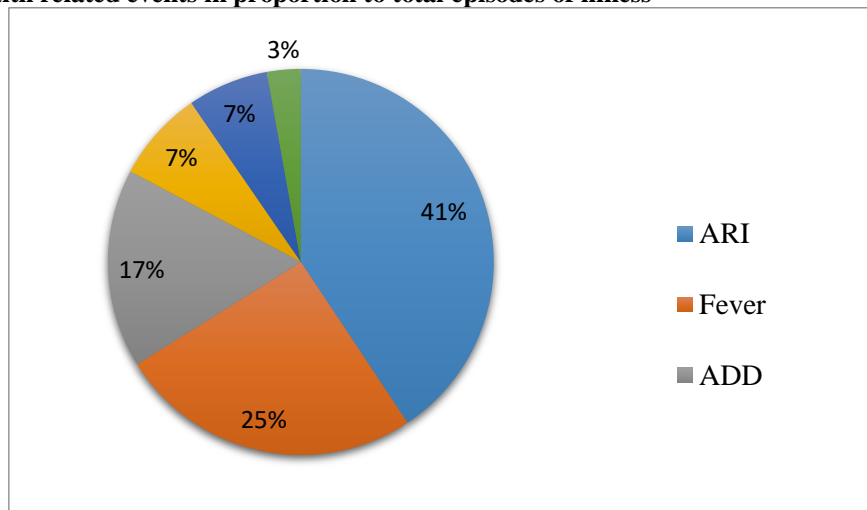
It is observed that, Incidence of Health related events among children aged less than five years was 3.24 episodes per child year. Majority were ARI episodes (144) followed by Fever, ADD, Domestic accidents, Others, and skin infections (Table 3) (Figure 3).

**Table 3: Incidence of Each Health related events among the study subjects**

Health related events	Total episodes	Episodes/child year	Mean episode (SD)
Acute Respiratory Infection (ARI)	144	1.31	1.31 (1.25)
Fever	90	0.82	0.82 (0.83)
Acute Diarrhoeal Diseases (ADD)	59	0.54	0.54 (0.74)

Domestic accidents	27	0.24	0.25 (0.43)
Skin infections	10	0.09	0.09 (0.32)
Others	24	0.21	0.22 (0.44)
<b>Total</b>	<b>354</b>	<b>3.24</b>	<b>3.22 (1.88)</b>

**Figure 3: Health related events in proportion to total episodes of illness**



Domestic accidents included falls, cuts and lacerations, animal bites, burns, and poisoning. Others included Eye infections, worm infestation, ear infections, chicken pox, and seizures etc.

#### **DISTRIBUTION OF STUDY POPULATION BY FREQUENCY OF OCCURRENCE OF HEALTH RELATED EVENTS**

Frequency of occurrence of acute morbidities among children aged less than five years over a period of 1 year follow up ranged from none to nine times.

Only 1 (0.9%) did not report any episode of illness and nearly 18.2% of them had reported an episode of illness only once during the 1-year study period. The study population had a median frequency of 3 episode of incident morbidity with an inter quartile range of 2 to 4 episodes and a mean frequency of 3.22 episode of with a standard deviation of 1.88 (Table 4).

**Table 4: Distribution of study population by frequency of occurrence of Health related events (HRE)**

Frequency of HRE	Population	Percentage
Nil	1	0.9
Once	20	18.2
Twice	24	21.8
Thrice	26	23.6
Four times	14	12.7
Five times	8	7.3
Six times	11	10.0
Seven times	3	2.7
Eight times	2	1.8
Nine times	1	0.9
Total	110	100

#### **RELATION OF AGE AND GENDER WITH THE INCIDENCE OF ACUTE MORBIDITIES AMONG CHILDREN**

##### **GENDER**

It is observed that, mean episodes of ARI was more among male children than female children. However, this difference was not statistically significant. Mean episodes of fever was more among female children than male children and this difference was statistically significant (Table 5).

**Table 5: Mean episodes of health related events (HRE) among Male and female children**

HRE	Male (57)	Female (53)	U score*	P value
ARI	1.37+1.34	1.24+1.14	1447.5	0.69

Fever	0.67+0.79	0.98+0.84	1181.5	0.03
ADD	0.56+0.84	0.50+0.60	1462.5	0.74
Domestic accidents	0.31+0.47	0.17+0.38	1290.0	0.07
Skin related	0.05+0.22	0.13+0.39	1417.5	0.24
Others	0.19+0.44	0.24+0.43	1411.5	0.40
Total episodes	3.16+2.10	3.28+1.63	1361.0	0.36

\* Mann Whitney U score

**AGE GROUP**

The mean episodes of all events was more among age group 1-2 years followed by infants. However, this difference was not statistically significant. Mean episodes of fever was more among age group 1-2 years followed by 3-4 years and this difference was not statistically significant. As Age increases, mean episodes of ARI has shown declining trend (Table 6).

**Table 6: Mean episodes of health related events (HRE) among different age group in years**

HRE	0-1 (37)	1-2 (21)	2-3 (26)	3-4 (26)	$\chi^2*$	P value
ARI	1.49+1.30	1.39+1.77	+0.99	1.07+0.84	1.26	0.73
Fever	0.70+0.81	1.09+0.70	+0.75	0.96+0.95	6.41	0.09
ADD	0.89+0.93	0.57+0.67	+0.42	0.30+0.47	12.46	0.006
Domestic accidents	0.16+0.37	0.28+0.46	+0.48	0.23+0.42	2.99	0.39
Skin related	0.10+0.31	0.04+0.21	+0.27	0.11+0.43	0.65	0.88
Others	0.21+0.41	0.23+0.53	+0.45	0.15+0.36	1.03	0.79
Total episodes	3.56+1.84	3.61+2.49	+1.70	2.84+1.40	3.74	0.29

\* KruskalWaliisy<sup>2</sup> value

**DISCUSSION**

Of the total 110 study subjects, 51.8% (57) were males and 48.2% (53) were female children (Table 1 & Figure 2). Majority, 33.6% (37) of the Children were infants, followed by children in the age group of 2-3 years and 3-4 years who comprised 23.6% (26) (Figure 1).

The sex ratio of the study subjects was 929 females per 1000 males, similar to Child sex ratio of Karnataka which is 919 females per 1000 males.<sup>10</sup>

**INCIDENCE RATE OF HEALTH RELATED EVENTS**

In the current study, a total of 354 incidents of acute morbidities were reported among study subjects during this 1-year study period. Hence Incidence rate of Health related events among children aged less than five years over a period of 1 year is 3.24 Episodes per child per year (Table 2 & 3, Figure 3).

Only 1(0.9%) did not report any episode of illness and nearly 18.2% of them had reported an episode of illness only once during the 1year study period. The study population had a median frequency of 3 episode of incident morbidity with an inter quartile range of 2 to 4 episodes and a mean frequency of 3.22 episode of with a standard deviation of 1.88 (Table 4).

Incidence of acute morbidity was more among female children compared to male children in our study, but this difference was not statistically significant (Table 5). When age group was considered, incidence of acute morbidities was more among the children less than two years. However, this difference was not statistically significant (Table 6).

A prospective study conducted by S Gupta et al among under five children in a rural area of Jammu reported that the annual incidence rate of morbidity was 4.6 episodes/child/year. The episodes of illness were observed more during infancy and episodes decreased as age progressed. The analysis by sex showed that females suffered more number of episodes of illness.<sup>11</sup>This finding is almost similar to our finding of mean episodes.

A longitudinal study of morbidity which was carried out among children under five years of age in a semi-urban area of Pondicherry by Venkatesh et al revealed that a child had 4.85 episodes of illness annually on an average.<sup>12</sup>

Sarkar et al in their study conducted in semi-urban slums located in the western outskirts of Vellore, Tamil Nadu between September 2008 to April 2011 recorded a total of 3,932 episodes of illness during the follow-up period of two years from birth, resulting in an incidence of 12.5 episodes of illness/child-year, with more illness during infancy than in the second year of life. Respiratory, mostly upper respiratory infections and gastrointestinal illnesses were most common.<sup>13</sup> Here they had followed up only infants and children less than 2 years hence there could be increased episodes of illness compared to current study.

According to study conducted by Beryl P. Gladstone et al on burden of illness in the first 3 years of life in an Indian slum from March 2002 to September 2006, the average morbidity rate was 11.26 episodes/child-year and the number of illness episodes/child year in the first, second and third year was 12.00, 11.27 and 10.52 respectively.<sup>14</sup>Here again the possible reasons

for increase in mean episodes of illness could be due to the geographic area- slum and study population was less than 3 years in their study.

### CAUSES OF ACUTE MORBIDITIES IN ORDER OF COMMON OCCURRENCE

In our study, the leading causes of acute morbidity includes in decreasing order of occurrence were acute respiratory infections(40.6%), fever(25.4%), acute diarrhoeal diseases(16.6%), domestic accidents(7.6%), others(6.7%) and skin infections(2.8%) (Table 3).

Incidence of acute respiratory infections, fever, acute diarrhoeal diseases, domestic accidents, others and skin infections was 1.31, 0.82, 0.54, 0.25, 0.22 and 0.09 episodes per child per year respectively (Table 4).

According to the study conducted by Gupta S et al, the leading causes of morbidity in decreasing order of incidence among under five children were - acute respiratory infections, diarrheal diseases, skin infections and fever. This is similar to our study findings with respect to increase in morbidity due to ARI and fever.<sup>11</sup>

The commonest morbidity seen in study conducted by Sreedevi B in a rural field practice area of Guntur was Respiratory Tract Infections followed by Diarrhoea.<sup>15</sup> Shinde M et al in their study on morbidity profile of preschool children in Madhya Pradesh has reported that the principal causes of morbidity in children under five years of age were respiratory infections, fever, diarrheal diseases, measles, worm infestation, skin infections, eye infection and ear infection. The respiratory infections accounted for 46.25%, with episode of 1.77 per child while fever is the next commonest symptom with 34.25% sickness load with 1.3 episodes followed with diarrhea (30.25%) with 2.33 episodes per child.<sup>16</sup>

Venkatesh et al has also reported that respiratory illness and diarrhoea together accounted for 64.9% of all morbidity among children in their study.<sup>12</sup>

Diarrhea and Acute Respiratory Infection contributed to the major mortality burden among children aged less than five years in prospective study conducted by Siddhi Hirve and Bela Ganatra.<sup>17</sup>

Nitin J et al has also reported in their study conducted in Belgaum district of Karnataka that commonest morbidities during infancy were respiratory tract infection (62.4%), diarrhoea (42.8%) and skin diseases (21.6%).<sup>18</sup>

In a study conducted by Gupta KB et al in Punjab among children aged less than five years, the main causes of morbidity in descending order were skin infections, respiratory infections, diarrheal diseases, fevers of miscellaneous origin, eye infections and ear discharge.<sup>19</sup>

ARI was the commonest disease (83.6%) of the children followed by diarrhoea (34.9%), caries (16.9%), dysentery (6.7%), scabies (6.7%), worm infestation (5.9%), conjunctivitis (5.9%), measles

(3.8%), pneumonia (1.8%) in the study done by HN Singh et al in rural area of Manipur.<sup>20</sup>

The possible reasons for this varying number of episodes in different studies could be due to differing geographic, climatic conditions and preventive measures taken in particular area.

### LIMITATIONS

In our study we have studied only about the incidence of health related events, extended study about the association of these health related events with other factors like socioeconomic factors, literacy status of parents, type of families, breast feeding practices etc. has not been done.

### CONCLUSION

In the present study 51.8% (57) were males and 48.2% (53) were female children. Majority, 33.6% (37) of the Children were infants, followed by children in the age group of 2-3 years and 3-4 years who comprised 23.6% (26).

The incidence of health related events among under five children was 3.24 episode /child year. Incidence of acute morbidity was more among female children compared to male children. Mean episodes of all health related events was more among age group 1-2 years followed by infants. The common cause for this incidence was acute respiratory infections followed by fever, acute diarrheal diseases, domestic accidents, skin infections and others.

### CONFLICTS OF INTEREST

Authors declare no conflicts of interest.

### REFERENCES

1. Government of India. Population composition. New Delhi: Ministry of Home Affairs; 2011. [cited October 5, 2014]. Available from: [www.censusindia.gov.in/vital\\_statistics/SRS\\_Report9Chap%202%20-%202011.pdf](http://www.censusindia.gov.in/vital_statistics/SRS_Report9Chap%202%20-%202011.pdf)
2. Bhalwar R. Maternal and Child Health. Text book of Public Health and Community Medicine. 1<sup>st</sup> ed. Pune: Department of Community Medicine, Armed Forces Medical College, Pune in collaboration with WHO India office; 2009. p 811.
3. United Nations Children's Fund. Levels & Trends in Child Mortality Report 2014. New York: UNICEF; 2014. [cited October 2, 2014]. Available from: [www.unicef.org/.../Levels\\_and\\_Trends\\_in\\_Child\\_Mortality\\_2014.pdf](http://www.unicef.org/.../Levels_and_Trends_in_Child_Mortality_2014.pdf)
4. United Nations Children's Fund. Millennium development goals. New York: UNICEF. [cited September 19, 2014]. Available from: <http://www.unicef.org/mdg/index.html>
5. United Nations Children's Fund. Acute respiratory infection. New York: UNICEF [cited September 26, 2014]. Available from: [http://www.unicef.org/specialsession/about/sgrep/ordf/08\\_AcuteRespiratoryInfection\\_D7341Insert\\_English.pdf](http://www.unicef.org/specialsession/about/sgrep/ordf/08_AcuteRespiratoryInfection_D7341Insert_English.pdf)
6. United Nations Children's Fund. Diarrhoea-Why children are still dying and what can be done. New York: UNICEF; 2009 [cited September 29, 2014].

- Available from:  
[http://www.unicef.org/health/files/Final\\_Diarrhoea\\_Report\\_October\\_2009\\_final.pdf](http://www.unicef.org/health/files/Final_Diarrhoea_Report_October_2009_final.pdf)
7. Rajvir B. Care of Under five children. Text book of Public Health and Community Medicine. 1<sup>st</sup> ed. Pune: Department of Community Medicine, Armed Forces Medical College; 2009. p 849-56.
  8. Gupta KR, Gupta R. Home Related Accidents during Infancy. JK Science [serial on the Internet]. 2004 Jun [cited October 15, 2010]; 6(2):[about 3 p.]. Available from:  
<http://www.jkscience.org/archive/volume62/home>.
  9. Nath A, Naik V. Accidents in Children Less than Five Years of Age Belonging to Rural Community in Belgaum District. Indian J Community Med. [serial on the internet]. 2007 Apr [cited October 4, 2010]; 32(2):[about 1 p.]. Available from:  
<http://www.ijcm.org.in/article>
  10. Karnataka population census data 2011 [cited October 4, 2014]. Available from:  
<http://www.census2011.co.in/census/state/karnataka.html>
  11. Sanjana G, Jamwal DS, Dinesh K, Gupta SK. Morbidity among Under Five Children in a Rural Area of Jammu. JK Science. 2012;2:85-8.
  12. Venkatesh S, Bansal RD. A longitudinal study of morbidity among under five children in a semi-urban area. Ind J Community Med. 1986;11(1):11-20.
  13. Sarkar R, Sivarathinaswamy P, Thangaraj B, Sindhu K, Ajjampur S, Muliyl J et al. Burden of childhood diseases and malnutrition in a semi-urban slum in southern India. BMC Public Health 2013;13:87-101.
  14. Gladstone BP, Das AR, Rehman AM, Jaffar S, Estes MK, Muliyl J et al. Burden of illness in the first 3 years of life in an Indian slum. J Trop Pediatr. 2010;56(4):221-26.
  15. Sreedevi B, Nageswara R. A Longitudinal Study On Feeding Practices and Morbidity Patterns of Infants in A Rural Field Practice Area Of Thadikonda, Guntur (Dt), Ap. IOSR-JNHS 2015;4(1):36-39.
  16. Shinde M, Joshi A, Trivedi A. Morbidity profile of preschool children in rural area of central Madhya Pradesh. Int J Community Med Public Health 2015;2(3):298-301.
  17. Hirve S, Ganatra B. A prospective cohort study on the survival experience of under five children in rural western India. Indian J Pediatr. 1997;34:995-1001.
  18. Nitin J, Vijaya AN, Niranjana SM, Bhaskaran U, Mahesh M, Shashidhar MK. Factors Associated with Morbidities Among Infants in Three Sub Centre Areas of Belgaum District of South India- A Longitudinal Study. Indian J Community Med. 2013;38(3):168-74.
  19. Gupta KB, Walia BNS. A Longitudinal Study of Morbidity in Children In A Rural Area Of Punjab. Indian Journal of Pediatrics 1980;47:297-301.
  20. Singh NH, Devi SH, Singh MY. Study on morbidity among under-five children of a rural area of Manipur, Thanga: A cross-sectional study. Journal of Evolution of Medical and Dental Sciences 2013;16(2):2643-47.