

**Prevalence and factors associated with Acute respiratory
Infections in children under five in urban slums of Bangalore city,
Karnataka**

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CERTIFICATE

We hereby certify that the work embodied in this dissertation entitled " Prevalence and risk factors related to acute respiratory infections in children under five in urban slums of Bangalore city, Karnataka" is a bonafide record of original research work undertaken by Dr. N. Bhagyalakshmi, in partial fulfillment of the requirement for the award of the Masters of Public Health degree, under our guidance and supervision.

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DECLARATION

I hereby certify that the work embodied in this dissertation "Prevalence & factors associated with Acute Respiratory Infections in children under five in urban slums of Bangalore" is the result of original research and has not been submitted for any degree any other university or Institution.

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CONTENTS

	Page No.
CHAPTER I.	
Introduction	7
Background	8
Objectives	8
Rationale	8
Literature review	9-14
CHAPTER II	
Methodology	15
Study Design	15
Study Setting	15
Sample Size	15
Sample Selection Procedure	15
Data Collection Techniques & Tools	16
Operationalization of variables	16-17
Inclusion criteria	18
Exclusion criteria	18
Duration of the study	18
Data storage and Data analysis	18
CHAPTER III	
Results	19
Sample characteristics	19-31
CHAPTER IV	
Discussion and Conclusion	32-33
CHAPTER V	
Ethical Consideration	34
Limitations of the study	34
Recommendation	34
APPENDIX I-REFERENCES AND APPENDIX II-QUESTIONNAIRE	35-48

PREVALENCE AND FACTORS RELATED TO ACUTE RESPIRATORY INFECTIONS
IN CHILDREN UNDER FIVE IN URBAN SLUMS OF BANGALORE CITY,
KARNATAKA

ABSTRACT

BACKGROUND:-

Acute respiratory infections (ARI) are the most common cause of illnesses in children and a major cause of childhood mortality throughout the world¹¹. Globally, Acute respiratory infections account for 4 million deaths in children under five years of age with 10-20% of deaths in developing countries as compared to 1-2% in developed countries and in India it is 10-20%^{11,12}. In India, ARI is the major contributor to mortality children under five accounting for 20-30 percent of all childhood deaths¹⁸. ARI Prevalence in India is 6% and in Karnataka it is 2% (NFHS-2)^{19,26}. With this background the present study was conducted in urban slums of Bangalore to look into the prevalence of ARI & its associated factors among under five children.

DESIGN: It's a cross sectional study of children less than five years of age

RESULTS: The overall prevalence of ARI was 10.4%. Others have 2 times more risk of getting ARI than hindus, which is found to be significant (P=0.003, AOR 2.163; 95% CI 1.296-3.615). Families of > 4 members sharing child's room have 2 times more chance of getting ARI compared to families sharing < 4 members which is found to be significant (P=0.007, AOR 2.034; 95% CI 1.213-3.410) & those children breast fed for < 6mths are having 2.5 times more chance of getting ARI in comparison to breast feeding >6 mths (P=0.055, AOR 2.554; 95% CI 0.974-6.696). About the impact of presence of tobacco smoker in the family smokers have 2 times more chance of contracting ARI in comparison to non-smokers which is found to be significant (P=0.007, AOR 2.034; 95% CI 1.213-3.410). In families of > 2 children of < 5yrs age had 1.6 times chance of getting ARI in comparison to < 2 children (P=0.080, AOR 1.629; 95% CI .943-2.816).

CONCLUSION:- Study findings emphasize the need for community based measures to make the public aware of the problem of ARI, its associated factors and prevention in children under five years of age in urban slums of Bangalore city, Karnataka.

CHAPTER-1

INTRODUCTION:

Acute Respiratory Infections (ARI) is defined by World Health Organization (WHO), as a child suffering from cough with fast rapid breathing & chest wall in drawing or difficult breathing with or without fever for 2 weeks of duration⁹. Globally acute respiratory infections account for 4 million deaths in children under five years of age & are the most leading cause of illness in children under five¹⁰. ARI accounts for 10-20% of deaths in developing countries and the figures are similar in India (compared to 1-2% in developed countries)¹². In India, ARI is the major contributor to mortality children under five accounting for 20-30 percent of all childhood deaths¹⁸. Most cases occur in India with an estimated 43 million episodes every year^{5,6}. ARI Prevalence in India is 6% and in Karnataka it is 2 % (NFHS-3)^{19,26}. As per recent NFHS report 2006, ARI is the major contributor to all childhood deaths in India & ARI mortality and morbidity rate in India over all is 94.9 per 1000 live births^{20,25}. ARI mortality in India also shows wide regional differences of which Kerala has the lowest mortality rates in the country (18.8) and Madhya Pradesh has the highest (138)^{20,25}. The other figures are Maharashtra (58.1), TamilNadu(63.3), Orissa(104.4), Bihar(105.1), Rajasthan(114.9) and Uttar Pradesh(122.5) deaths per thousand live births^{19,20,25}. The comparative figures for Karnataka is 54.7 deaths per 1,000 live births^{19,20,25}. The mortality rates are also different between urban and rural areas, the rates for urban being(63) and rural(103.7)^{19,20,25}. Achieving the MDG with respect to child mortality will require urgent action to reduce childhood pneumonia deaths, which accounts for 19 percent (3 million) of all under five deaths^{20,25}. As per WHO report 2001, there are several risk factors associated to ARI and in both developed and developing countries, children of smokers exposed to passive smoking are more susceptible to ARI than those not exposed to cigarette smoking¹⁰. Also in many developing countries, in addition to an increase amount of tobacco smoke, many homes contain high levels of smoke from combustion of bio fuels such as wood, crop residues and usually without chimney and with poor ventilation²⁰. Study done by Smith et al analyzed that there are several important risk factors of ARI including poor nutrition, overcrowding, low birth weight and personal hygiene²¹. Victoria et al added a few other risk factors as predisposing to ARI like socio-economic condition particularly low income, parental low education, place of residence, demographic (age, birth spacing, gender), behavioral(including low birth weight, malnutrition and lack of breast feeding) and Environmental(overcrowding, biomass burning stoves)²². Boys are more likely to suffer than girls and infants are more vulnerable to suffer from ARI compared to toddler and child who may have the chance to build up some natural immunity²³. According to WHO, 2001 report as with diarrhea the determinants associated with ARI indicate that the conditions in slums like lack of basic services, overcrowding, unhygienic practices, poor nutrition and smoke from cooking bio fuels such as wood, cow dung, agricultural waste etc inside the homes of the urban poor pose grave danger to young children with under 5 being especially vulnerable to infections like diarrheal diseases (28%), ARI(20%),and measles(11%)¹⁰. As recent WHO report of 2009 on environmental effects on children found that, In poorest nations environmental risks arise from unclean water practices, poor sanitation and human waste disposal, poor hygiene practices, water, soil and air borne diseases, crowded homes and smoke from biomass cooking & heating fuels¹². As per recent data as revealed by NFHS-3 found that totally 71% of Indians households use solid fuels for their cooking of which 91% rural and 32% of urban population^{23,25}. The wide variations in prevalence and mortality between urban and rural areas is associated with factors non-availability of basic services like water supply & sanitation, accessibility to healthcare services due to remoteness of the

location & discrimination etc^{20,21,22,23}. Even within urban, urban poorer health is more neglected again due to poor access & non-availability of a health care facility nearby, lack of tenure, threat of eviction, migration and lack of regular employment⁸.

BACK GROUND:

Acute respiratory infections (ARI) are the most common cause of a illnesses in children and a major cause of childhood mortality throughout the world¹¹. Although the spread of ARI is worldwide ,its impact is different between the developed and developing countries.ARI accounts for 10-20% of deaths in developing countries as compared to 1-2% in developed countries and in India it is 10-20%¹². As per WHO 2008 report the incidence of ARI especially pneumonia in children under five is estimated to be 156 million episodes each year worldwide of which 151 million episodes are in developing countries¹². Most cases occur in India (43million),China (21 million),Pakistan (10million),Bangladesh, Indonesia, Nigeria (6million each) Brazil & Ethiopia(4 million each),Philippines & Democratic Republic of Congo(3 million each) and Afghanistan, Egypt, Mexico, Sudan & Vietnam (2 million each)^{2,3}. Among children under five of age 3-5 million deaths annually have been attributed to ARI, of which 75 percent are due to pneumonia⁴. Across the world 1.9 million children died from Pneumonia in 2000, of which 70% of them were in Africa and Southeast Asia⁶. In India, ARI constitutes a major public health problem and is the major contributor to mortality and morbidity in children under five accounting for 20-30 percent of all childhood deaths⁸. As per NFHS-2, data ARI mortality rate and morbidity in India over all is 94.9 per 1000 live births, in Urban(63.1) and Rural(103.7) and vary greatly by states⁹. Kerala has one of the lowest rates in the country (18.8) and Madhya Pradesh has one of the highest with almost 138 deaths per thousand live births. Similarly in Karnataka (54.7), Maharashtra is (58.1), TamilNadu (63.3), Orissa (104.4), Bihar (105.1), Rajasthan (114.9) and Uttar Pradesh (122.5) deaths per thousand live births⁹.

OBJECTIVES:-

1. To estimate the prevalence of Acute Respiratory Infections (ARI) among children under five in the urban slums of Bengaluru city, Karnataka.
2. To study the factors associated with Acute Respiratory Infections(ARI) in children under five years

RATIONALE

There are limited studies on prevalence of ARI and its risk factors in Karnataka, especially in this urban poor slums setting of Bangalore. This study would give an overview of the problem and help to make decisions regarding policy and future planning especially in terms of health care provision to children under five years of age by providing baseline information.

1. Acute Respiratory infections (ARI) are a major public health problem especially among the poor and urban poor children is often neglected.
2. Knowledge about factors related to Acute Respiratory infections (ARI) in children among urban poor can contribute to interventions that can reduce the burden of disease.

LITERATURE REVIEW

A cohort study on morbidity and mortality in an urban slum in India was undertaken for three years from March 2002 to September 2006, of which 452 children from birth up to 3 years of age were recruited and followed up. The authors of the study analyzed that average morbidity rate was 11.26 episodes/child year. Respiratory infections caused 58.3% and diarrheal disease 18.4% of illness. Respiratory illness resulted in 48, 67.5 and 50 days of illness and there were 3.6, 1.64 and 1.16 diarrheal episodes per child in the 3 years, respectively. There were five deaths in the cohort in the 3 years of follow-up. Of the 77 drop outs 44 were contacted for mortality data. The conclusion was that morbidity in the area was high, compared to other studies. The mortality is low and is attributed to the facilitated access to care²⁷.

Another study conducted recently in June 2008 in the urban area of municipality, city of Rio Grande, South Brazil. This study aimed to measure the prevalence and identify the principal risk factors associated with acute lower respiratory illness in children under five years of age. The overall prevalence was 23.9% (95 % CI:21.1-26.9) and the following variables were significantly associated with acute lower respiratory illness. Maternal schooling, parental schooling, family income, crowding (persons/room and persons/bedroom), maternal smoking during pregnancy, number of smokers in the household, unfavorable environmental score, mother's history of asthma, history of acute respiratory infection, hospitalization due to pneumonia and prior episodes of wheezing. The authors conclude that children with a personal history of respiratory illness constitute a high risk group and there is an evident need to reduce socio-economic risks like household crowding especially child room sharing, child malnutrition as well as environmental risks like maternal smoking in order to reduce both number and severity of cases of acute lower respiratory infection. Maternal age at the time of time of child's birth showed an inverse association with ARI, with a protective effect for maternal age of thirty years or more showing that older mothers tend to care better for their children's health by Acute Respiratory Infections Unit, Center for Virus Research, Kenya Medical Research Institute Nairobi, Kenya²⁸.

A cross sectional study conducted by Acute Respiratory Infections Unit, Center for Virus Research, Kenya Medical Research Institute Nairobi, Kenya aiming at which Viruses have been established to be causes of ARIs, in developing countries especially Africa. Study was carried out from April – July 2008, to establish which virus isolates and what age cluster in children with ARIs are affected. Throat swabs were collected from patients (children under five) with clinical ARI and inoculated to various cell lines to isolate and identify viruses. A total of 388 children age range = 0- 59 months were recruited. Of these 210 (54.1 %) were males and 178 (45.9%) were females. There were 177 viruses isolated adenovirus (27; 7%), para-influenza (25; 6.4%), influenza (20; 5.2%) respiratory syncytial virus (19; 4.9%) and unidentified viruses (86; 22.2%). Majority of viruses were isolated from patients with LRTI (110; 28.4%) while URTI had 67 (17.3%) isolates. The age cluster 1- 12 months followed by 13- 24 months had majority of viral isolates. Thus this study indicates that viruses are associated with ARIs in children 1- 2 years of age and therefore a longitudinal study with sensitive virus detection methods is required²⁹.

Study on relationship between acute respiratory infection and malnutrition in children under five years of age, by AL Cunha in 2000. Data from population based survey conducted in the north east of Brazil, were used to examine the association between acute respiratory infection (ARI) and malnutrition in children under five years of age. The sample consisted of 4718 children. AURI and ALRI prevalence was 14.9 % and 8.5 % respectively.

Malnutrition was highly prevalent in the sample (> 90%). AURI prevalence was highest among children with acute malnutrition, while ALRI prevalence was highest among children with either acute or chronic malnutrition, even after controlling potential confounders. Malnutrition may be a consequence of repeated viral infections, common in young children. However, other factors such as adequate nutrition and early weaning may also contribute in reduction of acute lower respiratory tract infection in children under five. Current and past malnutrition were associated with acute lower respiratory infection (ALRI), even after adjusting the potential confounders (odds ratio: 2.03; 95% CI: 1.20- 2.43). Decreasing malnutrition along with timely and proper treatment of ARI may improve children health in developing countries. The authors also concluded that prevention of malnutrition and timely detection and adequate treatment of malnourished children in addition to breast feeding decreases ARI cases³⁰.

A study conducted by Denial E Roth, et al in May 2008 in Department of International Health, Johns Hopkins University analyzed that Inadequate nutrition and acute lower respiratory infection (ALRI) are overlapping and interrelated health problems affecting children in developing countries. Based on a critical review of randomized trials of the effect of nutritional interventions on ALRI morbidity and mortality, they concluded that: (1) zinc supplementation in zinc-deficient populations prevents about one-quarter of episodes of ALRI, which may translate into a modest reduction in ALRI mortality; (2) breastfeeding promotion reduces ALRI morbidity; (3) iron supplementation alone does not reduce ALRI incidence; and (4) vitamin A supplementation beyond the neonatal period does not reduce ALRI incidence or mortality. There was insufficient evidence regarding other potentially beneficial nutritional interventions. Finally they concluded that , a reduction in the burden of ALRI can be expected from the continued promotion of breastfeeding and scale-up of zinc supplementation or fortification strategies in target populations³¹.

In the study conducted by Mardya Lopez, et al presented the evidence of a protective effect of breast-feeding against acute respiratory infections and diarrhea, which reduced the incidence, percentage of days ill and duration of individual episodes in breast-fed infants. Causal inferences between breast feeding practices and the risk of ARI and diarrhea cannot be made with their design, because ethical limitations did not permit the random assignment of breast- or formula-feeding to infants. However, the consistency of their results with those of others, the effect of breast-feeding intensity, and the dose-response effect of breast-feeding on the incidence and prevalence of ARI and diarrhea, strongly suggests that such a relationship is plausible³².

Randomized trials of zinc supplementation in young children in developing countries were identified by a systematic literature review. Trials included in the meta- analysis met specific criteria, including participants less than 5 years of age, daily/ weekly zinc and control supplementation for greater than 3 months, active household surveillance for respiratory morbidity and use of a case definition that included as least one sign of lower respiratory tract illness. ALRI case definitions were classified on the basis of specificity/ severity. Ten trials were eligible for inclusion (n = 49 450 children randomized). Zinc reduced the incidence of ALRI defined by specific clinical criteria [IRR 0.65, 95% confidence interval (CI) 0.52- 0.82], but had no effect on lower –specificity ALRI case definitions based on caregiver report (IRR 1.01, 95% CI 0.91- 1.12) or World Health Organization ‘non –severe pneumonia’ (0.96, 95% CI 0.86- 1.08) by meta- regression, the effect of zinc was associated with ALRI case definition, but not with mean baseline age, geographic location, nutritional status or zinc dose³³.

A critical review was conducted of the quantitative literature linking indoor air pollution from household use of biomass fuels with acute respiratory infections in young children, less than two years in less developed countries by Kirk smith et al in 2000. Medline and other electronic data base and also necessary literature review was done by the authors and found that biomass in the form of wood, crop residues, and animal dung is used in more than two fifths of the world's households as the principal fuel. In the case of indoor air pollution in households using biomass fuels, the risks seem to be fairly strong, presumably because of the high daily concentrations of pollutants found in such settings and the large amount of time young children spend with their mothers doing household cooking. Finally they concluded that, the large vulnerable populations at risk. Hence, there is an urgent need to conduct randomized trials to increase confidence in the cause-effect relationship, to quantify the risk more precisely, to determine the degree of reduction in exposure required to significantly improve health, and to establish the effectiveness of interventions³⁴.

In a case control study carried out by Mishra et al in 2003 in Zimbabwe using the fourth Zimbabwe Demographic and Health survey (ZDHS) to examine the relationship between acute respiratory infections and indoor air pollution. They found that 66% of children lived in homes in which highly pollutant fuels (wood, dung, agriculture waste) were used and that there was a significant correlation between the use of these fuels and the Incidence of ARI (OR: 2.20: IC 95% 1.19- 4.19) with respect to those who lived in homes which cleaner fuels like LPG/ Kerosene were used³⁵.

Another study aimed to investigate the indoor air quality (IAQ) in selected households in one of the urban slums i.e. the Nizamuddin slums in Delhi, the capital city of India. The study includes investigation and assessments on associated health effects on the occupants living in inefficiently designed houses having poor ventilation. The monitoring of indoor air pollutants e.g. the respirable suspended particulate matter (RSPM), the carbon dioxide (CO₂), the carbon monoxide (CO), the sulphur dioxide (SO₂) and the nitrogen dioxide (NO₂) for all three seasons i.e. summer (April- June 2004), rainy (July – September 2004) and winter (December 2004- February 2005) have been conducted. In addition, the spirometry tests on the occupants, particularly the womenfolk and children have been performed to determine the incidence of acute respiratory infections (ARI). Questionnaire survey has also been conducted in the households during the study period to investigate the sick building syndrome (SBS). The study reveals that maximum concentration of indoor air pollutions in households during winters (December 2004- February 2005) were associated with aggravated respiratory problems like cough, phlegm, wheezing, and breathlessness among occupants particularly the women and child occupants. Besides, decrement in lung function indices (i.e. FVC and / or FEV₁) due to increased concentrations of RSPM and CO₂ indoors during winter period has also been observed in the women respondents. The study concludes that women and children indoors are most vulnerable to respiratory problems compared to other sexes. A high sick building syndrome (SBS) score is observed in these 'urban poor' households because of inadequate ventilation³⁶.

The study conducted to find association between environmental tobacco smoking (ETS) and childhood pneumonia among children in central Vietnam. The prevalence of ETS was 70.4% and the period prevalence of hospitalized pneumonia was 2.6%. The authors analyzed that ETS exposure was independently associated with hospitalized pneumonia. The prevalence of tobacco smoking was high among male adults compared with females (51.5% vs. 1.5% respectively). They estimated that 28.8% of childhood pneumonia in that community of Vietnam was attributable to environmental smoke. Finally, they concluded that children in Vietnam are exposed to substantial levels of tobacco smoke, which results in

44,000 excess hospitalizations due to pneumonia among children under 5 years age every year³⁷.

A study has been conducted in Delhi slums to look into the prevalence of ARI in the total population by giving special emphasis to under five children. The symptoms considered for ARI are cough, difficulty in breathing, sore throat, running nose, fever & ear pain. Recall period used for interview was 1 month. The symptomatic prevalence of ARI in under five yrs children was around 4.5 percent for a period of 1 month. The study documented that the prevalence of ARI declines with age. Factor analysis revealed that crowding, economic status & sanitary conditions are important associates of prevalence of ARI. The study suggested that occurrence of ARI could be reduced by improving living and sanitary conditions and pointed out the need to improve the economic status of people³⁸.

A community based longitudinal study conducted in Matlab, a rural area in Bangladesh to investigate acute respiratory infections among children under five. A cohort of 696 children under five years of age was followed for one year. Trained field worker visited the study children every fourth day. Data on symptoms suggesting ARI, such as fever, cough, and nasal discharge were collected for the preceding three days by recall. To determine type and severity of ARI the field workers conducted physical examination (temperature), rate of respiration, chest wall in drawing of children reporting cough and or fever. The overall incidence of ARI was 5.5 episodes per child year observed; the prevalence was 35.4 per hundred days observed most of the episode (96percent) more upper respiratory infected (URI). The incidence of acute lower infection (ALRI) was 0.23 per child per year. The incidence of URI were highest in 18-23 months old children, followed by infants 6-11 months old. The highest incidence of ALRI was observed in 0-5 month old infants followed by 12-17 month old children. About 46% of URI and 65% of ALRI episode tested for 15 days or more. The incidence rates of URI were higher during the monsoon and pre-winter periods, and that of ALRI at the end of the monsoon and during the end of pre-winter periods. Socio-demographic variables were not associated with the incidence of URI or ALRI. The study documents ARI to be a major cause of morbidity among rural Bangladeshi children³⁹.

A study was conducted on prevalence and correlates on acute respiratory infections of children less than two years of age on Riyadh city and their socio demographic and anthropometric correlates. Data was collected via a structure pilot tested modified questionnaire filled in by the trained research assistants who interviewed mother's regarding acute respiratory infections during the past two weeks in their children aged less than two years. The authors found prevalence of acute respiratory infection in children was 24%, mostly in children whose mothers are less educated, aged 35 years or more, married at the age of 25 years or more and whose relative take care of their children while working outside the home. The children affected were mostly 7- 12 months of age, lighter in weight, not vaccinated, with no follow up cards and not weighed during the last four months. About 3 quarters of the mothers consulted somebody about acute respiratory infections, mostly at modern health facilities particularly government primary health care centers. Tachypnea and diarrhea were the most important symptoms urging mothers to seek medical advice. The authors concluded that intervention strategies to control acute respiratory infections in children less than two years of age should target working mothers, less educated mothers, malnourished, unvaccinated children and encourage periodic follow up visits for children⁴⁰.

A case control study was done was under taken to identify various modifiable risk factors for acute lower respiratory tract infections (ALRI) in children aged 1 month to 5

years. Taking 104 ALRI cases fulfilling WHO Criteria for pneumonia, in the age group of 1 month to 5 years (subject's mothers) were interrogated for potential modifiable risk factors with a predesigned Performa. 104 healthy control children in the same age group were also interrogated. The authors found that the significant socio demographic risk factors were parental illiteracy, low socioeconomic status, overcrowding and partial immunization (p value < 0.05 in all). Significant nutritional risk factors were administration of prelacteal feeds, early weaning, anaemia and malnutrition (p value < 0.05 in all). Significant environmental risk factors were use of kerosene lamps, biomass fuel pollution and lack of ventilation (p value < 0.05 in all) on logistic regression analysis, partial immunization, overcrowding and malnutrition were found to a significant risk factors. The conclusion was that the present study had identified various socio-demographic, nutritional and environmental modifiable risk factors for ALRI which can be tackled by effective education of the community and appropriate initiatives taken by the government⁴¹.

A retrospective cross-sectional survey was undertaken in Kibera Lindi Village, Nairobi, Kenya in child under five years of age. The main objective of the study was to determine the prevalence and associated risk factors of acute respiratory infections in children under 5 years of age. The authors investigated whether, housing, overcrowding, smoke emissions and immunization status play a role in acquisition of acute resp. Infection children, in Nairobi, Kenya. Most of the people living in this area are of the low socio-economic status in which the study population consisted of all children under 5 years of age in the village. The quota sampling size of 300 children's data was collected using an interview schedule. The prevalence of ARI in that area was 69.7% and in addition to the risk factors of ARI studied were, mud walled houses (RR= 1.13), houses without windows (RR= 1.14), Overcrowding (RR= 1.24), cooking fuel (firewood RR=1.42, Kerosene RR= 1.18), Cooking near the bed (RR= 1.35). Finally the study revealed that ARI and prevalent in Kibera Lindi village and that smoke emissions, overcrowding, housing played a role in its acquisition. Conclusion was that it was not clear whether the children's immunization status had a role in acquisition of ARI⁴².

A community-based birth cohort study with twice-weekly surveillance was undertaken in Vellore district of South India. The aim of the study was to establish incidence rates, clinic referrals, hospitalizations, mortality rates and baseline determinants of morbidity among infants in an Indian slum. 452 newborns were recruited over 18 months, followed through infancy. Infants experienced 12 episodes (95% confidence interval (CI) 11 to 13) of illness, spending about one fifth of their infancy with an illness. Respiratory and gastrointestinal symptoms were most common with incidence rates (95% CI) of 7.4 (6.9 to 7.9) and 3.6 (3.3 to 3.9) episodes per child per year. Factors independently associated with a higher incidence of respiratory and gastrointestinal illness were age (3 - 5 months), male sex, cold/ wet season and household involved in beedi work. The rate (95% CI) of hospitalization, mainly for respiratory and gastrointestinal illness, was 0.28 (0.22 to 0.35) per child-year. The final conclusion was that morbidity burden due to respiratory and gastrointestinal illness is high in a South Indian Urban slum, with children ill for approximately one fifth of infancy, mainly with respiratory and gastrointestinal illnesses. The risk factors identified were younger age, male sex, cold/ wet season and household involvement in beedi work⁴³.

An initial cross sectional survey was carried out by a house-to house survey to determine the prevalence of sickness in children under five years of age. The study was undertaken in a fisherman village, Veerampattinam, in Pondicherry Union Territory. The study was carried out from March 2004 to June 2004. All children between 2 and 59 months of age were enrolled by house-to house visit and the entire population was screened without

any sampling. Sickness was defined as any child between 2 and 59 months, with fever (lasting at least 2 days) or acute respiratory infection or earache or diarrhea (2 episodes of watery loose stools for at least 1 day). After an initial door-to-door survey, an age-matched child without sickness in the past 2 weeks was selected for each case and the health seeking behavior was obtained for the current sickness for cases and previous sickness for controls. A pre-tested interview schedule was used to obtain the required information after getting informed consent from the respondent, mothers were always preferred for interview, out of 441 children, 406 were contacted for sickness screening by enquiring the mother. The results were analyzed as about 14% of the children were sick in the study period, which included acute respiratory infections (5.6%), acute diarrhea (4.7%), and fever (3.7%). The discriminant analysis for various predictor variable when private care versus government care had been compared. It showed that sex of the child (canonical coefficient- 0.290), birth order of the child (-0.322), number of children in the family (-0.032), maternal literacy (0.102) were not significantly associated with health seeking behaviour with private care. Parents who were below poverty line availed private health care in a significant level (0.548). Father's occupation as fisherman influenced the most (1.00)⁴⁴.

A community based longitudinal study was conducted in Malpe, a coastal village of Udupi district, Karnataka state, to investigate acute respiratory infections (ARI) in children. A cohort of 91 children under 3 years of age were followed up for 1 year, leading to 2047 fortnightly observation. On an average every child had 11.3 months of follow up. The overall incidence of ARI was 6.42 episodes per child per year. On an average each episode lasted for 5.06 days. Mean duration of ARI during one year was 32.5 days per child. Most of the ARI episodes in children (91.3%) were of simple Cough & Cold (no pneumonia). However, 8.2% developed pneumonia and only 0.51% had severe pneumonia. Incidence of ARI was almost same in male and female children. There was no significant difference in incidence among various age groups. But the incidence of pneumonia was significantly higher among infants ($p < 0.00002$). Children of poor housing with smoke producing conditions suffered more frequently ($p, 002$)⁴⁵.

CHAPTER II

METHODOLOGY

2.1 Study Design

This study is largely a descriptive study done by community based cross sectional survey.

2.2 Study Area

The area of study is Urban, Poor slums of Bangalore city. It has a population of 9,52,911-lakhs as per April 2008 report of Bruhath Bangalore Maha Nagara Palika (BBMP), of which nearly forty percent live in slums. It was chosen for the study as it has the highest urban poor population among all districts of Karnataka. It has 327 slums which are predominantly Urban poor slums with 9-10% of children less than 5 years of age.

2.3 Study population and Study frame.

The study population comprise of children < 5 years of age reporting symptoms of acute respiratory infection in the two weeks preceding the survey. These children belong to the 100 slums of Bangalore city. The list of such slums was obtained from the Census data of 2001 of Bangalore Maha Nagara palika.

2.4 Sample size estimation

The sample size was estimated using epiinfo version 17, the prevalence was taken to be 2% as reported the NFHS – 2 for Karnataka for the period of 2006 – 2007 & assuming worst acceptable limit of 1% and 95% confidence interval, sample size obtained was 750.

2.5 Sample selection procedures:-

1.The sample was selected using a two stage process. The first stage used as stratified random sampling with uniform stratum size. The slums in Bangalore city are distributed within three zones. From each of these zones each of which constitutes a stratum, 5 slums were randomly selected.

2.For the second stage, a cluster sampling procedure was used to select a 50 cluster size sample from each of the slums, wherein 50 children were included in the study from each of the slums to yield the required sample of 750 children. The investigator identified a central household within the slum and visited every household next to it until 50 children are included in the study. In case the slum population is not sufficient to yield 50 eligible children whose mothers consent to participate in the study, the slum immediately next to the one identified (geographically) were included in the study and children and mothers recruited in the same manner until the required cluster of 50 participating children are included from that selected slum.

2.6 Data Collection tools and technique

Data was collected using structural interview schedule by set of questions. These questions were formulated by keeping the outcome variable and all predictor variables in mind that could be incorporated in the study design. The questions were prepared in English and back translated to Kannada language for the training of field investigators and to the study area. The interview schedule was administered in the Kannada language best understood by the study participants.

2.7 Operationalizational of variables

Out come variable ARI/Acute Respiratory Infection Definition :-Children who suffered from cough accompanied by short and rapid breathing or difficulty in breathing with or without fever at any point of time during the last two weeks prior to my study will be defined as having suffering from an acute respiratory infection.

Predictor variables Definitions:-

Age : The age of subjects was recorded in completed months as on date of.

Educational status of the parents : Number of years was recorded based on educational status, the group was divided as illiterate and literates.

Occupational status of the parents : Based on working status of the parents they were divided in to

daily wages and others.

Socio economic status (SES) : A subject assesses of SES was done purely on observation on physical, environmental and assets. Subjects are classified in to lower, middle and upper socio economic group. Data was collected on house hold type and assets like radio, TV, two wheeler, fridge, telephone etc, and also type of kitchen

Type of houses : Housing was assessed based on following criteria

Pucca : Roof, wall and floor are cemented.

Semi pucca : Wall and floor are cemented, roof is attached or made of corrugated metal sheet.

Kutchha : Roof, wall and floor are not cemented.

Cooking fuel : Mainly these categories were recorded – wood, kerosene, electricity and gas. It was grouped in to two groups wood and kerosene group (chances of indoor smoke)

Tobacco smoker in the family : Presence of any cigarette or beedi smoker in the house hold of the child.

Sleep room sharing : Is defined as the number of persons sharing the subjects bedroom excluding the subject.

Mothers age at delivery : is defined as the age of the mother is completed years at the time of the delivery of the subject.

Kitchen not attached to the house : Means that d kitchen is outside the main building of the house.

Kitchen with chimney : Means the kitchen has a smoke outlet for the passage of cooking smoke.

Birth order : is defined as the order in which the subject is born to the mother, only live births are taken in to consideration.

Number of under fives in the house holds : Means the number of children aged 60 months or less at the time of interview in the house hold of the child including the subject.

Nuclear family : Is defined as a family in which father mother and children live but if anybody else is living with them it is not defined as a joint family.

Immunization status and vitamin A supplementation : Data on immunization was collected by seeing the immunization card of the child, if card is not available as reported by the care taker / mother.

Immunized for age / vitamin A doses for d age : Means whether or not the child has been given all d doses which are supposed to be given by that age. It is classified in to 3 groups for analysis. Fully immunized means all doses for age are given and partially immunized means not all doses are given and not immunized means no doses are given so far. The first dose of vitamin A is given in the ninth month so children are not considered for analysis.

Breast feeding duration : was recorded in completed months n only those children who have stopped breast feeding were taken for analyses.

Treatment practices for ARI : Includes the healthcare seeking behavior factors affecting that, delay in seeking care and its reasons,system of medicine followed and health facilities used for the current ARI episode in the last two weeks.

Health Care Seeking for ARI : is defined as the professional medical care sought in the last two weeks for the current ARI episode.

Self Medication: Consumption of drugs for treating ARI without doctor's prescription.

Home treatment for ARI: Giving traditional remedies made at home for treating ARI .

Belief that usual for children: The mother's belief that the ARI symptoms are usual for small children, nothing to worry about that and no need for seeking health care.

Delay in health care seeking: is defined as the postponement of care seeking even three or more days after finding the symptoms of ARI.

Treatment Cost of ARI : is the sum of money spent on doctors consultation fee and the money spent for purchasing drugs for the current ARI episode in the last two weeks.

2.8 Inclusion Criteria:-All children who have not completed five years (upto four years 364 days) as on date of interview schedule of study were included in the study

Exclusion Criteria:-Children whose families had not been residing in the community for the past three months prior to the survey period & children of families who were visiting their relatives were excluded from the study.

Variables Definitions : The data on all the variables was collected interviewing mothers/care takers of the children below 5 years with a pre- structured and pre tested questionnaire.

2.9 Training

Since the data was collected by the field investigators (ASHA workers), it was important to train them appropriately. A training module was developed which incorporating their roles, responsibility, the study topic and its relevance, privacy and confidentiality, familiarizing with the data collection tools and so on. Mock interview schedules were done after familiarizing with the symptoms of acute respiratory infection, using the relevant tools, clarifications and feedback. After mock interview only those investigators who in mind that administered the interview schedule satisfactorily were employed for collecting data.

2.10 Duration of the Study

First the investigators went to the selected slums, numbered each house and short listed the children in the required age group for the purpose of screening. Then they were screened and further data was collected from the Mothers who reported ARI symptoms. Both these processes went on simultaneously during July 1st to September 15th 2010. The data collected over a week was handed over to the principal investigator at the end of every week and any clarifications on these were dealt with the following week. The detailed interview with mothers or care takers of Children < 5 years took about 20-30 minutes. The investigators difficulties due to heavy rains and the terrain. Some of the roads of the slums were unapproachable and the investigators had to walk a lot to reach the households of the same.

2.11 Data Storage and analysis

The ASHA Workers in the selected slums were the data collectors for the study. A two day training was conducted by the PI of the study for these workers and a mock interview schedule used to implement the data collection training for the workers. Supervision and scrutiny of the filled in questionnaires was done on a daily rotation basis to ensure quality in data collection. The data was entered in Micro soft excel format after preparing a data code book and analysis carried out using SPSS16.

TRANSFORMATION OF DATA

In the study socio economic status was calculated based on the standard living index (SLI) as seen in NFHS II. SLI was calculated on the basis of income, possession of goods, the type of house, type of fuel used , separate kitchen used by the respondents. Based on the scores SES were divided into “Low”, “Medium” and “High” categories.

CHAPTER IV

RESULTS

Prevalence of ARI by illness

Out of 750 children screened for symptoms of acute respiratory infections during two weeks preceding the survey, symptoms were reported in 78 children below 5yrs of age ie,10.4% of the children and judging by the symptoms reported that nearly 40% had milder of the disease that is fever and cold.

ARI CODED	Frequency	Percentage(%)	cumulative
Yes	78	10.4	10.4
NO	672	89.6	100.0
Total	750	100.0	

UNIVARIATE ANALYSIS

The demographic and maternal characteristics included in the Univariate analysis are age, sex, religion, type of house, location of house in slums and in relation to main road, occupation and education status of parents, lasts months income, family size, children under five years, social economic status, family members sharing childs room, smokers in family, Kitchen in separate room, time spent in kitchen along with child.

4.1 Sample Characteristics :

The sample population consisted of 750 subjects of under 5 years age group out of this 399 (53.3%) children were males and 351 (46.7%) were females. (M : F = 1:0.91)

Sample Characteristics by Age

Table 4.1.1

Variable Name	Frequency (%)
<i>Age (Children)</i>	
= 2 years	559 (74.6)
> 2 years	191 (26.4)

Table 4.1.1 shows the percentage of samples in two age groups of = 2 years (74.6%) and > 2 years (26.4%)

Sample Characteristics by Sex

Table 4.1.2

Variable Name	Frequency (%)
<i>Sex</i>	
Male	399 (53.3)
Female	351 (46.7)

Table 4.1.2 shows the percentage of samples of sex groups of male (53.3%) and Female (46.7%).

Sample Characteristics of Religion

Table 4.1.3

Variable Name	Frequency (%)
<i>Religion</i>	
Hindu	445 (59.4)
Others	305 (40.6)

Table 4.1.3 shows the percentage of samples in two religious groups of which Hindus (59.4%) and Others (40.6%)

Sample Characteristics of Type of House

Table 4.1.4

Variable Name	Frequency (%)
<i>Type of House</i>	
Kutchha	139 (18.5)
Semi-pucca	466 (62.1)
Pucca	145 (19.4)

Table 4.1.4 shows that 18.5 % of samples lived in Kutchha houses, 62.1 % lived in Semi pucca houses and 19.4 % lived in pucca houses.

Sample Characteristics of Location of Slums

Table 4.1.5

Variable Name	Frequency (%)
<i>Location of Slums</i>	
Within the slums	691 (92.1)
Out skirts of slums	59 (7.9)

Table 4.1.5 shows the percentage of location of slums of 92.1% households living within the slums and 7.9% households living in out skirts of the slums

Sample Characteristics of Location in relation to Main Road

Table 4.1.6

Variable Name	Frequency (%)
<i>Location in relation to main road</i>	
Next to Main Road	424 (56.5)
Not Next to Main road	326 (43.5)

Table 4.1.6 shows the percentage of households of location in relation Next to main road is 56.5% and Not Next to main road is 43.5%

Sample Characteristics of Occupation status of the Mother

Table 4.1.7

Variable Name	Frequency (%)
<i>Occupation status of the Mothers</i>	
Daily wages	392 (52.3)
Others	358 (47.7)

Table 4.1.7 shows the percentage of Occupation status of mothers of which 52.3% are doing daily wages work and 47.7 % are doing other works.

Sample Characteristics of Occupation status of Father

Table 4.1.8

Variable Name	Frequency (%)
<i>Occupation status of Father</i>	
Daily wages	590 (78.7)
Others	160 (21.3)

Table 4.1.8 shows the percentage of occupation status of fathers of which 78.7 % are doing daily wages work and 21.3% are doing other works.

Sample Characteristics of Education Status of Mother

Table 4.1.9

Variable Name	Frequency (%)
<i>Education status of Mother</i>	
Illiterate	616 (82.1)
Literate	134 (17.9)

Table 4.1.9 shows the percentage of education status of Mothers of which 82.1% are Illiterate and 17.9% are literate.

Sample Characteristics of Education Status of Father

Table 4.1.10

Variable Name	Frequency (%)
<i>Education status of Father</i>	
Illiterate	573 (76.4)
Literate	177 (23.6)

Table 4.1.10 shows the percentage of Education Status of Fathers of which 76.4 % are Illiterate and 23.6 % are literate.

Sample Characteristics of Last Month's Income

Table 4.1.11

Variable Name	Frequency (%)
<i>Last Month's Income</i>	
= 3000	608 (81.1)
3000 – 6000	128 (17.1)
> 6000	14 (1.8)

Table 4.1.11 shows the samples of percentage of Last Month's Income of which 81.1 % are = 3000, 17.1 % are in between 3000 – 6000 and 1.8% are > 6000.

Sample Characteristics of Family Size

Table 4.1.12

Variable Name	Frequency (%)
<i>Family Size</i>	
= 4 members	351 (46.7)
> 4 members	399 (53.3)

Table 4.1.12 shows that 46.7 % of samples were from = 4 members and 53.3% were from > 4 members of Family Size.

Sample Characteristics of Children < 5 years

Table 4.1.13

Variable Name	Frequency (%)
<i>Children < 5 years</i>	
= 2 children	371 (49.5)
> 2 children	292 (39.0)
Others	87 (11.5)

Table 4.1.13 shows that 49.5% of samples are of = 2 children, 39.0% are of > 2 children and 11.5% are others.

Sample Characteristics of Socioeconomic Status

Table 4.1.14

Variable Name	Frequency (%)
<i>Socioeconomic status</i>	
Low SES	395 (52.7)
Medium SES	352 (47.0)
High SES	3 (0.3)

Table 4.1.14 shows that 52.7% of samples were from Low SES, 47.0% of samples were from Medium SES and 0.3% were from High SES.

Sample Characteristics of Family members sharing child's room

Table 4.1.15

Variable Name	Frequency (%)
<i>Family members sharing child's room</i>	
= 4 Members	573 (76.4)
> 4 Members	220 (29.2)

Table 4.1.15 shows that 76.4% of samples were = 4 Family members sharing child's room and 29.2% of samples were > 4 Family members.

Sample Characteristics of Smokers in Family

Table 4.1.16

Variable Name	Frequency (%)
<i>Smokers in Family</i>	
Smokers	524 (69.9)
Non Smokers	226 (30.1)

Table 4.1.16 shows that 69.9% of samples were Smokers in Family and 30.1% were non smokers.

Sample Characteristics of Kitchen in Separate room

Table 4.1.17

Variable Name	Frequency (%)
<i>Kitchen in Separate room</i>	
Had separate Kitchen	473 (62.4)
Did not have	277 (37.6)

Table 4.1.17 shows that 62.4 % of samples had separate room for kitchen and 37.6% did not have separate room for kitchen.

Sample Characteristics of Location of Kitchen

Table 4.1.18

Variable Name	Frequency (%)
<i>Location of Kitchen</i>	
Inside	653 (87.8)
Out side	97 (12.2)

Table 4.1.18 shows that 87.8% of samples had Kitchen Inside the house and 12.2% had Kitchen Outside the house.

Sample Characteristics of Time spent in Kitchen along with Child

Table 4.1.19

Variable Name	Frequency (%)
<i>Time spent in Kitchen along with Child</i>	
= 2 hours	638 (85.2)
> 2 hours	114 (14.8)

Table 4.1.19 shows that 85.2% of samples were spending = 2 hours and 14.8% were spending > 2 hours of time along with the child.

BIVARIATE ANALYSIS RESULTS

Bivariate analysis was done in the cross tabulation in order to find out whether the relationship exists between ARI and other potential confounding factors such as age of child, sex of the child, no. of children < five years in the family, birth order, religion, residence in relation to with in the slums and also in relation to main road, occupation and education status of parents, late age of mother, breast feeding practices, immunization status, exposure to smoke in the kitchen and passive smoking due to smoker in family. The variables which are found to be significant are shown in the tables.

Table 5.1.1

Prevalence according to children under 5 years of age

Variable name	Acute respiratory infection		Total (%)	p – value
	Yes	No		
<i>Children < 5 years</i>				
= 2 children	30 (8.1)	341 (91.9)	371	
> 2 children	48 (12.7)	331 (87.3)	379	0.040

Table 5.1.1 shows that the prevalence was more in children more than 2 children in family compare to = 2 children in family

Table 5.1.2

Prevalence according to Birth Order

Variable name	Acute respiratory infection		Total (%)	p – value
	Yes	No		
<i>Birth Order</i>				
= 2 children	56 (9.3)	545 (90.7)	601	
> 2 children	34 (15.4)	115 (84.6)	149	0.035

Table 5.1.2 shows that the prevalence was more in children less than or equal to 2 children of birth order than more than 2 children in the family.

Prevalence according to Religion

Table 5.1.3

Variable name	Acute respiratory infection		Total (%)	p – value
	Yes	No		
<i>Religion</i>				
Hindus	33 (7.4)	412 (92.6)	445 (59.3)	
Others	45(14.7)	260 (85.3)	305 (40.7)	0.001

Table 5.1.3 shows that the prevalence is more in children belong to others than compare to Hindu religion

Prevalence according to Location of slums

Table 5.1.4

Variable name	Acute respiratory infection		Total (%)	p – value
	Yes	No		
<i>Location of Slum</i>				
Next to Main Road	45 (13.8)	282 (86.2)	326 (43.7)	
Not to Main Road	33 (7.8)	390 (92.2)	420 (56.3)	0.008

Table 5.1.4 shows that the prevalence was more in children who are living in households located next to main road than not next to main road.

Prevalence according to Smoker in family

Table 5.1.5

Variable name	Acute respiratory infection		Total (%)	p – value
	Yes	No		
<i>Any smokers in Family</i>				
Smoker	43 (8.9)	481 (91.1)	524	
Non Smoker	35 (18.3)	191 (81.7)	226	0.003

Table 5.1.5 shows that the prevalence is more in families of children who had smokers in family than non smokers.

6.1 Results of Multivariate logistic regressions

Multivariate logistic regression model was developed to examine the association between ARI symptoms in particular fever, cough with rapid and fast breathing or difficulty in breathing for 2 weeks preceding the survey and risk factors of ARI in children. This was done with the understanding that ARI is multifactorial in nature involving demographic, genetic, nutritional, immunization status and toxic exposure to smoke in the kitchen as well as passive smoking due to smoker in family. The logistic regression model used was 'Enter' method. The variables which are found to be significant are shown in the table below.

Multilogistic Regression of ARI (Dependent Variable) with selected predictor variables

Variable Name	Reference	Adjusted OR	P value	95% Confidence interval	
				Lower	Upper
Religion (Others)	Hindus	2.163	0.003	1.296	3.615
Family members sharing the room with child (< 4)	> 4 members	0.576	0.070	0.315	1.051
Breast Feeding (= 6 months)	> 6 months	2.579	0.055	0.979	6.793
Smoker in the family	Non-smoker	2.034	0.007	1.213	3.410
Children < 5 years > 2 children	= 2 children	1.629	0.080	0.943	2.816

Table 6.1 shows the results of multi variate logistic regression when adjusted for family members sharing the room with child (< 4) children, breast feeding, smoker in family and under 5 children in family with more than two children, children of others are at high risk of developing ARI. The odds ratio was 2.163; the 95% confidence interval of 1.296 to 3.615 and p-value significant (< 0.05). When adjusted for religion, breast feeding, smoker in the family and under 5 age group in family, family of < 4 members sharing the room with children had lower risk of developing ARI. The Odds ratio was 0.57; the 95% C.I. 0.315 – 1.051 and p-value is 0.070.

When adjusted for religion, smoker in family, family members sharing the room with child and under five children age group in family, breast feeding = six month are having more risk of developing ARI. The odd's ratio was 2.579; 95% confidence interval of 0.979 – 6.793 with significant 'P' value (= 0.05). When adjusted for religion, breast feeding, family members sharing the room, families of children who had smokers have more risk of developing ARI. The odd's ratio was 2.034; 95% confidence interval of 1.213 – 3.410 and P – value is 0.007. When adjusted for religion, smoker in family, family members sharing the room with child and breast feeding = six months. Families of children = than 5 years of age with more than 2 children have more risk of getting ARI. The odd's ratio is 1.629; 95% confidence interval of 0.943 - 2.816 and P value is 0.080.

DISCUSSION AND CONCLUSION

The main objective of this study was to find out the factors associated with ARI among children under five years of age in urban slums of Bangalore. The overall prevalence of ARI in Urban slums of Bangalore was 10.4%. Females – 351 (46.7%) and Males – 399 (53.3%) as study done by (Saurav chatterjee,2007 Kolkata)²³. Study conducted in Karnataka show the prevalence of ARI (cough with rapid breathing) as 2% and in some other Indian studies also prevalence was low. The high prevalence in this study may be partly attributed to the definition of ARI which is highly sensitive compared to the definitions used in other studies (Symekher SML et al, 2009)³⁸. In addition, inherent difference of population, seasonal variations, sampling method and survey design might have contributed to these geographic variations in prevalence.

Even though the prevalence of ARI was slightly higher amount males than females the difference was not statistically significant in tune with some of the other studies. The prevalence was lowest among children less than 2 years as compared to more than 2 years age groups. No significant relation between age and ARI has been observed in this study.

Statistically significant, prevalence was high among others compared to Hindus (Saurav chatterjee 2007, Kolkata)²³. There was no association between geographical location and the prevalence even though the prevalence was higher among households living near to main road. There was no significant association between SES and ARI but a trend of decline in prevalence with increase in SES was observed in this study also like in some other studies (Victoria et al study)²². There was no association between the type of house and the prevalence of ARI.

Bivariate analysis showed a significantly high prevalence (Chi^2 p-value 0.04) was observed among children below 2 children < 5 years age group in a family compared to more than 2 children living in a family²³. In multivariate analysis also it was significant. In contrast with other studies like study done by(Saurav chatterjee 2007 kolkata), there was no association between the employment status of Mother and ARI.Again in Bivariate analysis, a significantly no prevalence was observed among children with increase in education status of parents. ARI prevalence by fathers education (Chi^2 p-value 0.02) and mothers education (Chi^2 p-value 0.01). But in multivariate analysis the difference observed with education of both parents was not significant. As supporting other studies, even though not statistically significant among children who are fully immunized for age the prevalence was low when compared to the prevalence among not immunized children(S chatterjeec 2007 kolkata)²³. Though statistically not significant, there is a clear trend showing a gradual decrease in the prevalence with the supplementation of correct doses for age of Vitamin A supplementation(Daniel Roth E et al)³¹. There was significant association between breast feeding duration and ARI and a trend showed a decline in prevalence with increase in duration of breast feeding as in other studies (Mardy et al)^{31,32}. There was association between birth order of the child and ARI children < 2 children, the prevalence was high when compared to more than 2 children.

Both in bivariate and multivariate analysis the significantly high prevalence was observed among children from joint families compared to children from nuclear families. Overcrowding in the Joint families might be the reason for the high prevalence²².

No association was found between the number of under 5 children in the house hold and ARI. But a trend was seen that a high prevalence was observed among children with more than 2 children of under 5 children in the household. The relation between maternal age upto delivery and ARI there was no significance but a trend seen was that a high prevalence

was observed among those children who was born when the maternal age was < 18 years and more than 30 years at the time of delivery. Though statistically not significant a trend of increase in prevalence was seen as the number of persons sharing the child's sleep room increased. A high prevalence was observed among those children whose families had a tobacco smoker compared to the prevalence among children whose families did not have a smoker and the p-value was also significant (0.003) as seen in Strachan DP et al study¹⁰. Even though not significant the prevalence was low among children who are living in houses where kitchen is separate from the main building and among children who are living in houses where the kitchen has chimney compared to those who did not have the chimney as seen in studies done by Kirk Smith et al.^{33, 34}

In both bivariate and multivariate analysis a significant association between smokers and non smokers has been found out when adjusted for family members sharing the room with child (< 4 members), breast feeding, a family of more than 2 children of under 5 age group and religion as also seen in Mardy et al study.³²

CONCLUSION

The prevalence of Acute respiratory symptoms at 10.4 % was somewhat higher than that projected in NFHS -2 for Karnataka. This could be because the study was carried out during rainy season and the prevalence has seasonal variation. It also could be because study was carried out in urban poor slums with unsanitary and unhygienic conditions and high risk of pollution either do to smoke in the kitchen or passive smoking because of presence of smoker in the family. The study also reveals the poor economic status of the study population with more than 50% belonging to SLI group (low). Therefore it can be said that the main barriers for ARI among study population are lack of awareness, low motivation among community level health workers and distance to the health facility.

Study findings emphasize the need for community based measures to make the public aware of the problem of ARI, its associated factors and prevention in children under five years of age in urban slums of Bangalore city, Karnataka.

RECOMMENDATIONS and LIMITATIONS

Limitations

Study design had some inherent limitations. It is not possible to say concretely about causal association but one prime objective was to highlight the magnitude of the problem that was fairly done by this study design. Sampling was not representative of the country but fairly representative of Bangalore slum population, which can represent other district slum areas. Sex ratio of the sample was M: F = 1:0.91, which corresponds to the sex ratio of children under five years in Urban poor slum population of Bangalore. Due to the survey was conducted during winter season, the prevalence resulted was high. Some study results have shown that the incidence of acute respiratory infection is high during winter.

RECOMMENDATIONS

As seen from this study more than 50% homogeneously belong to SLI group (low) in unhygienic and Unsanitary and over crowding in others population (Muslims). The community level workers engaged catering this population group should be allowed special performance based incentives for motivation and should be trained on a priority basis. Special efforts should be made to keep the facilities closest to them well equipped as they are unlikely to seek health care from any further.

Frequent IEC activities should be carried out in these slums atleast once in every three months to generate awareness for regarding health & health care system.

Ethical Consideration

A written consent for participation was obtained after reading out the details of the study in the Kannada language best understood by the participants of the training. The field investigators trained on privacy and confidentiality. Care was taken to ensure least discomfort to the participants. The names of participants were not recorded and all information provided by them was kept confidential. The names of selected slums are also not included in the report.

APPENDIX

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PREVALENCE AND FACTORS RELATED TO ACUTE RESPIRATORY INFECTIONS
IN CHILDREN UNDER FIVE IN URBAN SLUMS OF BANGALORE CITY,
KARNATAKA

Questionnaire

Q.No	Question	Response and code	comments
1	Identity Number of the child	
2	Age(in completed years)	
3	Sex	1.Male <input type="checkbox"/> 2.Female <input type="checkbox"/>	
4	Religion	Hindu <input type="checkbox"/> Muslim <input type="checkbox"/> Christian <input type="checkbox"/> Others <input type="checkbox"/>	
5	Location of house (within the slum)	Within the slum <input type="checkbox"/> Outskirts of slums <input type="checkbox"/>	
6	Location of house in terms of road access	Next to main road <input type="checkbox"/> Not next to main road <input type="checkbox"/>	
7	Occupation Status of the mother	Government <input type="checkbox"/> Private <input type="checkbox"/> Farmer <input type="checkbox"/> Trader <input type="checkbox"/> Daily wage labourer <input type="checkbox"/> Other (specify).....	
8	Occupation status of the father	Government <input type="checkbox"/> Private <input type="checkbox"/> Farmer <input type="checkbox"/> Trader <input type="checkbox"/> Daily wage labourer <input type="checkbox"/> Other (specify).....	
9	Education status of the mother	Illiterate <input type="checkbox"/> Primary level <input type="checkbox"/> Upper primary level <input type="checkbox"/> High school level <input type="checkbox"/> Higher Secondary <input type="checkbox"/> Graduate <input type="checkbox"/> Others (specify).....	

10	Education status of the father	Illiterate <input type="checkbox"/> Primary level <input type="checkbox"/> Upper primary level <input type="checkbox"/> High school level <input type="checkbox"/> Higher Secondary <input type="checkbox"/> Graduate <input type="checkbox"/> Others (specify).....
11	Socio-economic status :- Type of house:-	Kucha <input type="checkbox"/> Semi-pucca <input type="checkbox"/> Pucca <input type="checkbox"/>
12	Type of floor :-	Mud <input type="checkbox"/> Cow dung <input type="checkbox"/> Cement <input type="checkbox"/> Others specify.....
13	Assets:-	Radio <input type="checkbox"/> TV <input type="checkbox"/> Phone <input type="checkbox"/> Fridge <input type="checkbox"/> Gas stove <input type="checkbox"/> Motorcycle <input type="checkbox"/>
14	What was your household expenditure last month?	Rs.....
15	Information on family members Type of family:	Nuclear family <input type="checkbox"/> Joint family <input type="checkbox"/>
16	Total number of family members:	3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> Others(specify).....

17	Number of under five children in the house hold:-	1 <input type="checkbox"/>
		2 <input type="checkbox"/>
		3 <input type="checkbox"/>
18	How many are sharing the child's bed room	1 <input type="checkbox"/>
		2 <input type="checkbox"/>
		3 <input type="checkbox"/>
		>3 <input type="checkbox"/>
		Others specify.....
19	Is there any smoker in the house hold?	Yes <input type="checkbox"/>
		No <input type="checkbox"/>
		Don't know <input type="checkbox"/>
20	If yes, do they smoke inside the house?	Inside <input type="checkbox"/>
		Outside <input type="checkbox"/>
21	Did any family member suffer from cough and cold in the last month?	Yes <input type="checkbox"/>
		No <input type="checkbox"/>
		Don't know <input type="checkbox"/>
22	If any of your family member get sick, where does they go for check up?	Government Hospital <input type="checkbox"/>
		Municipal Hospital <input type="checkbox"/>
		Urban Health centre <input type="checkbox"/>
		Anganwadi Centre <input type="checkbox"/>
		Private Hospital <input type="checkbox"/>
		Private Clinic <input type="checkbox"/>
		Homeopathy <input type="checkbox"/>
		Ayurvedic treatment <input type="checkbox"/>
		Others (specify).....
	Information of kitchen and fuel used:-	
23	Where is the location of kitchen?	Inside <input type="checkbox"/>
		Outside <input type="checkbox"/>
24	Does the kitchen have a chimney?	Yes <input type="checkbox"/>
		No <input type="checkbox"/>

25-30	Fuel used and location of stoves	Fuel	Presence	Location
		25a. Wood	Yes <input type="checkbox"/> No <input type="checkbox"/>	25b. Inside House <input type="checkbox"/> Outside House <input type="checkbox"/>
		26a. Cow dung	Yes <input type="checkbox"/> No <input type="checkbox"/>	26b. Inside House <input type="checkbox"/> Outside House <input type="checkbox"/>
		27a. Charcoal	Yes <input type="checkbox"/> No <input type="checkbox"/>	27b. Inside House <input type="checkbox"/> Outside House <input type="checkbox"/>
		28a. Kerosene	Yes <input type="checkbox"/> No <input type="checkbox"/>	28b. Inside House <input type="checkbox"/> Outside House <input type="checkbox"/>
		29a. Electricity	Yes <input type="checkbox"/> No <input type="checkbox"/>	29b. Inside House <input type="checkbox"/> Outside House <input type="checkbox"/>
		30a. LPG	Yes <input type="checkbox"/> No <input type="checkbox"/>	30b. Inside House <input type="checkbox"/> Outside House <input type="checkbox"/>
31	Does the kitchen has windows?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
32	Time spent in the kitchen.	1 hr <input type="checkbox"/>	2 hrs <input type="checkbox"/>	3 hrs <input type="checkbox"/>
		> 3 hrs <input type="checkbox"/>		
Birth history &				

other details:-			
33	Where did you go for ante-natal check up?	Government Hospital	<input type="checkbox"/>
		Municipal Hospital	<input type="checkbox"/>
		Urban Health centre	<input type="checkbox"/>
		Anganwadi Centre	<input type="checkbox"/>
		Private Hospital	<input type="checkbox"/>
		Private Clinic	<input type="checkbox"/>
		Homeopathy	<input type="checkbox"/>
		Ayurvedic treatment	<input type="checkbox"/>
		Others specify.....	
34	Where did you give birth to your last child?	Government Hospital	<input type="checkbox"/>
		Municipal Hospital	<input type="checkbox"/>
		Private Hospital	<input type="checkbox"/>
		Home	<input type="checkbox"/>
		Others specify.....	
35	Mother's age at deliver	18yrs	<input type="checkbox"/>
		20yrs	<input type="checkbox"/>
		25-30yrs	<input type="checkbox"/>
		>30 yrs	<input type="checkbox"/>
36	What was the weight of the child at the time of delivery?	< 2.5kgs	<input type="checkbox"/>
		2.5 to 3kgs	<input type="checkbox"/>
		>3kgs	<input type="checkbox"/>
37	Did you breast feed the baby within half an hour after delivery?	Yes	<input type="checkbox"/>
		No	<input type="checkbox"/>
38	How long did you breast feed your child?	Up to 4 months	<input type="checkbox"/>
		Up to 6 months	<input type="checkbox"/>
		Up to 1 year	<input type="checkbox"/>
		>1 year	<input type="checkbox"/>
39	What is the Birth order of the child in the family?	1	<input type="checkbox"/>
		2	<input type="checkbox"/>
		3	<input type="checkbox"/>

40	Who is the primary care taker of your child/baby?	Mother <input type="checkbox"/> Grandmother <input type="checkbox"/> Others specify.....	
Immunization status of the child:-			
41	Has the baby received any vaccinations?	Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know <input type="checkbox"/>	
42	If yes, which are the vaccinations that are received so far?	BCG <input type="checkbox"/> Polio 0-3 <input type="checkbox"/> DPT 1-3 <input type="checkbox"/> Measles vaccine <input type="checkbox"/>	
43	Do you have immunization card of the baby/child?	Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know <input type="checkbox"/>	
44	Did you give your baby Vitamin A drops in the health centre?	Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know <input type="checkbox"/>	
45	Where did the baby/child receive the vaccinations?	Government Hospital <input type="checkbox"/> Municipal Hospital <input type="checkbox"/> Urban Health centre <input type="checkbox"/> Anganwadi Centre <input type="checkbox"/> Private Hospital <input type="checkbox"/> Private Clinic <input type="checkbox"/> Homeopathy <input type="checkbox"/> Ayurvedic treatment <input type="checkbox"/> Others specify.....	
ARI assessment of the child:-			
46	Did the child had fever at any time in the last 2 weeks?	Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know <input type="checkbox"/>	
47	Did the child had been ill with cough at anytime in the last	Yes <input type="checkbox"/>	

48	<p>two weeks?</p> <p>When child had an illness with a cough, did he/she breath faster than usual with short, rapid breaths or have difficulty in breathing?</p>	<p>No <input type="checkbox"/></p> <p>Don't know <input type="checkbox"/></p> <p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p> <p>Don't know <input type="checkbox"/></p>	
49	<p>When child had this illness, did he/she have problem in the chest or blocked or runny nose?</p>	<p>Chest only <input type="checkbox"/></p> <p>Nose only <input type="checkbox"/></p> <p>Both <input type="checkbox"/></p> <p>Other specify.....</p>	
50	<p>How long did the fever/cough start?</p>	<p><1 week <input type="checkbox"/></p> <p>2 weeks <input type="checkbox"/></p> <p>Other specify.....</p>	

Treatment practices:-			
51	Did u seek health care?	Yes	<input type="checkbox"/>
		NO	<input type="checkbox"/>
52	If yes, when did you seek the health care after seeing the symptom?	1day	<input type="checkbox"/>
		2days	<input type="checkbox"/>
		3days	<input type="checkbox"/>
		3-7days	<input type="checkbox"/>
		>7days	<input type="checkbox"/>
53	If no, why?	self medication	<input type="checkbox"/>
		Home medication	<input type="checkbox"/>
		Usual for children	<input type="checkbox"/>
54	Who suggested going to health facility?	Others(specify).....	
		Yourself	<input type="checkbox"/>
		Husband	<input type="checkbox"/>
		link workers	<input type="checkbox"/>
		ANM	<input type="checkbox"/>
55	Which facility did you chose?	Others(specify)....	
		Govt. hospital	<input type="checkbox"/>
		Private hospital	<input type="checkbox"/>
		health centre	<input type="checkbox"/>
		private clinic	<input type="checkbox"/>
		others(specify).....	
56	What type of medicine did you chose?	Allopathy	<input type="checkbox"/>
		Ayurveda	<input type="checkbox"/>
57	Why did you choose this system of medicine?	Homeopathy	<input type="checkbox"/>
		Others(specify).....	
		Family belief	<input type="checkbox"/>
		Peer influence	<input type="checkbox"/>
58	Was the treatment effective?	Best for kids	<input type="checkbox"/>
		No side effects	<input type="checkbox"/>
		Others (specify).....	
		Fully	<input type="checkbox"/>
		Somewhat	<input type="checkbox"/>
59	Is any usual member of this household	Not	<input type="checkbox"/>
		Adverse reaction	<input type="checkbox"/>

60	covered by a health scheme or health insurance? If Yes, What type of Health Scheme or Health insurance?	Cannot say <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Dont know <input type="checkbox"/>	
61	Transportation and health facility How did you go to health facility?	Employees State Insurance Scheme <input type="checkbox"/> Central Government Health Scheme(CGHS) <input type="checkbox"/> Community Health insurance programme <input type="checkbox"/> Other Health insurance <input type="checkbox"/>	
62	How much distance did you travel for getting treatment?	Walking <input type="checkbox"/> Bus <input type="checkbox"/> Cycle <input type="checkbox"/> Others(specify).....	
63	Cost of ARI Treatment:- Did you pay any fees for treatment?	< 1 km <input type="checkbox"/> 1 km <input type="checkbox"/> 2 kms <input type="checkbox"/> 3 kms <input type="checkbox"/> > 3 kms <input type="checkbox"/>	
64	How much did you pay as doctor's fee?		
65	How much did you spend for the transportation of the child?	Rs..... Rs Rs.....	

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STUDY ON PREVALENCE AND FACTORS ASSOCIATED WITH ACUTE RESPIRATORY TRACT INFECTIONS (ARI), IN CHILDREN UNDER FIVE IN URBAN SLUMS OF BANGALORE CITY, KARNATAKA.

INFORMED CONSENT

"Namaskara"- my name is Dr. Bhagya lakshmi and presently I am studying the course-Master of Public Health (MPH) at Sree Chitra Tirunal Institute for Medical Sciences & Technology, Thiruvananthapuram. As part of my dissertation, I am conducting this survey

and interviewing the Mothers whose children under five years are suffering from acute respiratory infections and the factors associated with it. The purpose of the study is to gather information that is going to help to make policies to improve knowledge of the people regarding early detection and treatment of acute respiratory infections in children under five years in urban slums of Bangalore.

There will be no direct benefits to you for participating in this interview .You may chose to answer all or some of the questions that I put to you. Everything you will say will remain private and confidential. If you have any further queries, you are free to contact me at my mobile number given below and I will answer all your queries and if you still have any further queries you can address them to the Member secretary, of the Institute Ethics Committee at Sree Chitra Tirunal Institute for Medical Sciences & Technology for any further clarification that you need.

The approximate time I will take is about 20-30 minutes. If you agree to participate in the interview please indicate your agreement. Your name will not be used in any report but your ideas and experiences will be of great help to make better strategies in order to improve the management of Acute Respiratory Infections in children under five years, which will be good for the people in future. However you are free to quit the interview at any point of time if you feel so.

- Yes, the respondent has agreed to the interview
- No, the respondent did not agree to the interview

Signature/Left thumb impression

Or

- The respondent is not willing to sign or give thumb impression (verbal consent)

Signature of the witness.....

Name and address of the witness:.....

.....

If you are not willing to participate, then thank you for your time.

Name of the respondent:.....

Address:

Identification code: _____ Date: __ / __ /2010

Local contact (mobile) no. of self:9035830985

DR.Anoop Kumar Thekkuveetil

Member Secretary

SCTIMST-IEC

Trivandrum