Acute Respiratory Infection In India

&

Economic Burden of Acute Respiratory Tract Infection in India

A dissertation submitted in partial fulfillment of the requirements

For the award of

Post Graduate Diploma in Health and Hospital Management

By

DR. VISHAL YADAV

International Institute of Health Management Research

New Delhi - 110075

May, 2013

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Certificate of Internship Completion

Date: 27-04-13

TO WHOM IT MAY CONCERN

This is to certify that **Dr. Vishal yadav** has successfully completed her 3 months internship in our organization from January 01, 2013 to April 01, 2013. During this intern he has worked on – **"Acute Respiratory Infection In India & Economic Burden Of Acute Respiratory Tract Infection in India"** under the guidance of me and my team at AIIMS.

We wish him/her good luck for his/her future assignments.

Dr. Anand Krishnan

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Certificate of Approval

The following dissertation titled**"Acute Respiratory Infection In India & Economic Burden Of Acute Respiratory Tract Infection in India"** is hereby approved as a certified study in management carried out and presented in a manner satisfactory to warrant its acceptance as a prerequisite for the award of **Post- Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation

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Certificate from Dissertation Advisory Committee

This is to certify that **Dr. Vishal yadav**, a graduate student of the **Post- Graduate Diploma in Health and Hospital Management**, has worked under our guidance and supervision. He is submitting this dissertation titled **"Acute Respiratory Infection In India & Economic Burden Of Acute Respiratory Tract Infection in India"** in partial fulfilment of the requirements for the award of the **Post- Graduate Diploma in Health and Hospital Management**.

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

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ABSTRACT

Background Information on cost of health services is needed for planning and resource allocation and for assessing efficiency in services. Economic evaluations, however, have not been an inherent part of the thinking in public health planning, maybe because health has been considered as a part of social sector. It is also widely perceived that cost data are difficult to generate and require laborious calculations. Or objective was to estimate the cost of services provided at secondary level Hospital at Ballabgarh Block of District Faridabad in the State of Haryana. Methods The costing methodology followed was as per the stated guidelines. However, instead of using registers and records for calculating the inputs, we used a key informant approach to get the estimates of cost. For the output, however, registers were used. Six cost centres were identified in the hospital where direct patient contact was present: Outpatient, in-patient, Emergency, Laboratory, X-ray, Operation Theatre. The cost of ancillary centres were estimated and allocated to the above six centres. Results The total annual cost incurred on the hospital for the a year was estimated to be Rs. 15.4 million rupees. The salaries constituted 78% of the total cost. Doctors" salary constituted almost a quarter of the total costs. The cost per outpatient consultation was Rs. 20.50 and the cost per occupied bed day in Indmedica - Journal of the Academy of Hospital Administration the hospital was about Rs. 400. For providing an emergency consultation at the hospital, the cost was about Rs. 250 per patient. The costs of the two departments concerned with investigations were Rs. 17.60 per laboratory test and Rs. 134 per X-ray. The cost of each surgical procedure was estimated to be Rs. 1541. A total of Rs. 566,248 (3.6%) was being recovered from the patients. Conclusion Our estimates of the cost of secondary level hospital using key informant are similar to available information. The cost recovery is very poor. These estimates could also provide a basis for finalization of health insurance packages and their premiums. More data is required so that an economic thinking becomes an integral part of health planning process in the country.

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TABLE OF CONTENTS

ABBREVIATIONS

1. ARI - Acute respiratory infections
2. CHWs - Community Health Workers
3. ALRI - Acute Lower respiratory infections
4. AURI - Acute Upper respiratory infections
5. RSVs - Respiratory Syncytial Viruses
6. CDC - Centers for Disease Control and Prevention
7. WHO - World Health Organization
8. OPD – Out Patient Department

INTERNSHIP REPORT

1.1 ABOUT THE ORGANIZATION

1.1.1 HISTORY

AIIMS was created in 1956 to serve as a nucleus for nurturing excellence in all aspects of health care. Creating a country imbued with a scientific culture was Jawaharlal Nehru's dream, and immediately after independence he prepared a grand design to achieve it. Among the temples of modern India which he designed, was a centre of excellence in the medical sciences. Nehru's dream was that such a centre would set the pace for medical education and research in Southeast Asia , and in this he had the wholehearted support of his Health Minister, Rajkumari Amrit Kaur.

The health survey and development committee ,chaired by Sir Joseph Bhore, an Indian Civil Servant ,had in 1946 already recommended the establishment of a national medical centre which would concentrate on meeting the need for highly qualified manpower to look after the nation's expanding health care activities . The dreams of Nehru and Amrit Kaur and the recommendations of the Bhore Committee converged to create a proposal which found favor with the government of New Zealand. A generous grant from New Zealand under the Colombo Plan made it possible to lay the foundation stone of All India Institute of Medical Sciences (AIIMS) in 1952.The AIIMS was finally created in 1956,as an autonomous institution through an Act of Parliament ,to serve as a nucleus for nurturing excellence in all aspect of health care.

All-India Institute of Medical Sciences was established as an institution of national importance by an Act of Parliament with the objects to develop patterns of teaching in Undergraduate and Post-graduate Medical Education in all its branches so as to demonstrate a high standard of Medical Education in India; to bring together in one place educational facilities of the highest order for the training of personnel in all important branches of health activity; and to attain self-sufficiency in Post-graduate Medical Education.

The Institute has comprehensive facilities for teaching, research and patient-care. As provided in the Act, AIIMS conducts teaching programs in medical and para-medical courses both at undergraduate and postgraduate levels and awards its own degrees. Teaching and research are conducted in 42 disciplines. **In the field of medical research**

AIIMS is the lead, having more than 600 research publications by its faculty and researchers in a year. AIIMS also runs a College of Nursing and trains students for B.Sc.(Hons.) Nursing post-certificate) degrees.

1.1.2 DEPARTMENTS

Twenty-five clinical departments including four super specialty centers manage practically all types of disease conditions with support from pre- and Para-clinical departments. However, burn cases, dog-bite cases and patients suffering from infectious diseases are not entertained in the AIIMS Hospital. **AIIMS also manages a 60-beded hospital in the Comprehensive Rural Health Centre at Ballabgarh in Haryana and provides health cover to about 2.5 lakh population through the Centre for Community Medicine**. The Comprehensive Rural Health Services Project (CRHSP), Ballabgarh, situated in the state of Haryana in Northern India, was started in 1965 by the All India Institute of Medical Sciences in collaboration with the state government of Haryana. The field practice area of the project comprises of 28 villages catering to a population of 87052. Health Management System (HMIS) is a computerized management system introduced in the project in 1988. Demographic data, Maternal and Child Health Services data, and data pertaining to various health services provided in the area are stored.

1.1.3 OBJECTIVES OF AIIMS

- To develop a pattern of teaching in undergraduate and postgraduate medical education in all its branches so as to demonstrate high standard of medical education to all medical colleges and other allied institutions in India.
- To bring together in one place educational facilities of the highest order for the training of the personnel in all important branches of the health activity to attain self sufficiency in postgraduate in medical education.

1.1.4 FUNCTIONS OF AIIMS

- Undergraduate and postgraduate teaching in medical and related physical biological sciences.
- Nursing and dental education

- Innovations in education.
- Producing medical teachers for the country.
- Research in medical and related sciences.
- Health care: preventive, promotive and curative; primary, secondary & tertiary.
- Community based teaching and research.

1.2 AREAS ENGAGED IN AND TASKS UNDERTAKEN

1.2.1 ROUTINE OR GENERAL MANAGEMENT

- Involved as a Senior Research Fellow in the project named **Epidemiological study of Respiratory Pathogens in Acute Respiratory Tract Infection among Children and elderly in India**
- Roles and responsibilities in the project
  i. Participate in proposal development
  ii. Development of study tools and manuals
  iii. Implementation of study protocol SOPs
  iv. Coordinate and undertake data collection
  v. Ensure data quality assurance
  vi. Participate in analysis and interpretation of data

1.2.2 REFLECTIVE LEARNING DURING INTERNSHIP

- Designing tools for the survey
- Understanding the process of designing of community and hospital mobilization plan.
- Procedures for budgeting of community and hospital mobilization plan.

DISSERTATION REPORT

2.1 INTRODUCTION

Acute Respiratory Infection (ARI) is defined as an acute illness of the respiratory tract caused by an infectious agent transmitted from person to person. The onset of symptoms is typically rapid, over a period of hours to several days. Symptoms include fever, cough, and often sore throat, coryza, shortness of breath, wheezing, or difficulty breathing.

Acute respiratory infections (ARI) are the single greatest cause of death among children throughout the world. They are responsible every year for the deaths of 4.3 million children under 5 years of age worldwide, which represents 21.3% of all deaths in this age group. Acute respiratory infections (ARI), including pneumonia, bronchiolitis, and bronchitis, are responsible for the vast majority of ARI deaths in developing areas. For the purpose of the present review, risk factors for ARI have been organized into demographic, socioeconomic, environmental, nutritional, and behavioural groupings. Vaccines also represent an important and promising strategy for ARI prevention, including both new vaccines developed specifically against agents such as Haemophilus influenzae (type b) and pneumococcus, as well as the existing measles and pertussis vaccines.

Summary of risk factors and possible intervention: Information on risk factors, along with feasibility and cost considerations, is essential for guiding preventive strategies against respiratory infections. Demographic risk factors, such as age and gender, may be important for defining high-risk groups but are not amenable to intervention. Socioeconomic factors represent the ultimate determinants of a large proportion of the burden of severe ARIs, but interventions against factors such as low income or low educational levels fall outside the scope of the health sector. Available epidemiological evidence, however, should be used to support the political struggle against inequality. Of environmental factors, environmental tobacco smoke, air pollution (especially particulate levels), and crowding are clearly associated with respiratory morbidity among young children. Although further studies are required on the effect of domestic biomass pollution, these are likely to confirm its causal role. Chilling and humidity, on the other hand, have not been established as independent determinants of respiratory infections. Possible effective interventions for reducing respiratory morbidity and mortality include air pollution control, anti-smoking campaigns, and improved

biomass-burning stoves, as well as birth spacing and improved housing to reduce crowding. Regarding nutritional factors, low birth weight, malnutrition, and lack of breast-feeding constitute independent risk factors, while vitamin A supplementation does not appear to have an effect on ARI. A recent review by the World Health Organization concludes that interventions to improve LBW in children and promote breast-feeding appear to have similar potential effects on pneumonia mortality, whereas improvements in nutritional status would have less effect. The cost-effect ratio of promoting breast-feeding is probably higher than that of efforts to fight LBW or malnutrition. It should be noted that most of the above interventions would have other beneficial effects in addition to their impact on respiratory infections among young children. Further work is needed to establish the cost-effectiveness of possible interventions, taking into account their multiple benefits.

The cost of treating patients with acute respiratory tract infections (ARIs) is high, especially for patients who require hospitalization. Pneumonia is one of the most frequent causes of hospitalization, accounting for many deaths each year. Information on cost of treatment provides important background information for the potential introduction of new vaccines. In a study in pakistan, the average cost of treatment for an outpatient case of child pneumonia was estimated to be US$ 13.44. For hospitalized care, the health system spent an average of US$71 per episode for pneumonia and US$235 per severe case of pneumonia. In rural Vietnam, the average expenditure for the first treatment of acute respiratory infection was estimated at US$ 1.7 (which is equal to about a third of the monthly per capita income in that district). In an unpublished study in 1999 from this study site, it was estimated that the cost of outpatient treatment of pneumonia was around US$ 2 in public facilities and US$ 6 in private facilities. For hospitalized patients, the cost varied from US$ 100 to US$ 200 depending on sector (private/public) and level (secondary or tertiary). Most of the estimated burden research has been conducted in high income countries with very few studies in low and middle income countries.

For example, The paucity of cost of seasonal ARI studies in low and middle income countries is likely driven by two major factors. Most low and middle income countries are in the tropical temperature zone where the incidence of ARI was historically perceived low. Second, the lack of adequate surveillance systems for estimating the burden of the disease and the lack of adequate national costing and burden datasets in some of these

countries make estimation difficult. Inadequate datasets partially stem from incomplete billing and record keeping which complicates easy access to data by investigators. The incidence rate of seasonal ARI infection in India has been estimated to be between 4-14.5 per 100 persons based on region and year. The Indian Academy of Pediatrics estimated that there were 1257 confirmed cases of influenza with 128 deaths in the week ending 5th September in year 2010 alone. Confirmed cases are often an underestimate of the prevailing cases. However, the cost of seasonal influenza-associated illness inIndia has not yet been estimated.

Acute Respiratory Infections (ARI)

Childhood acute respiratory infection (ARI) especially pneumonia are a major cause of childhood morbidity and mortality in developing countries accounting for approximately 1.9 million (95% confidence interval 1.6 to 2.2 million) deaths globally in children under five each year. More than 90% of ARI-related deaths occur in the developing world. There are multiple social and environmental factors associated with ARI morbidity and mortality in childhood. These include comorbid illnesses especially HIV, malnutrition, prematurity or measles, environmental determinants particularly passive smoke exposure, overcrowding or poor living conditions and social factors principally poverty and poor access to both preventative (including immunization) and curative health services.

Impact and burden of disease: Pneumonia constitutes a major proportion of the global burden of childhood disease responsible for around 20% of childhood deaths, especially in developing countries. Annually, almost half of the 1.9 million deaths due to acute respiratory tract infections in children under 5 years of age occur in Africa. In South Africa, childhood community acquired pneumonia accounts for between 30-40% of hospital admissions with associated case fatality rates of between 15-28% . Studies from South Africa have estimated the proportion of under-5 deaths due to pneumonia to range from 8% to 22%. A study investigating childhood pneumonia deaths from 1968 to 1985 reported high rates in all population groups, ranging from 7 to 270 times those in developed countries and highlighted the large differences in rates by ethnic group. This is consistent with the observation that the proportion of children dying from pneumonia is related to the general under-5 mortality rate, declining as the under-5 mortality diminishes. In South Africa, under-5 mortality for 2003 was reported as 66 per 1000, representing a 1.3% increase from 1995-99 and a 1.6% increase from 2000-2003. Moreover, in South Africa there is wide variation in under-5 mortality according to geographical and socioeconomic factors. Besides directly causing childhood deaths, pneumonia is frequently an associated cause of mortality in children with other underlying conditions. Thus for every death directly 6 attributable to pneumonia, 2 or 3 additional deaths associated with pneumonia may occur. Co-morbid conditions especially malnutrition, measles or immunosuppression such as HIV increase the severity and risk of mortality from pneumonia. Respiratory disease especially ARI has been reported to be

the dominant cause of hospitalization and death in HIV-infected African children . Pneumonia-specific mortality rates are higher in HIV-infected children with case fatality rates consistently reported as 3 to 6 times those of HIV-negative patients. Thus ARI remains one of the most important causes of illness and death in such children. Besides the impact on the epidemiology and outcome from childhood pneumonia, HIV has changed the spectrum of pathogens responsible for childhood pneumonia with increased emergence of opportunistic infections such as *P jiroveci* pneumonia (PCP) and a large increase in TB incidence. Therefore, the HIV-epidemic has increased the burden of childhood pneumonia with a concomitant need for health care resources.

RISK FACTOR FOR ARI:

a. Malnutrition
b. Lack of breastfeeding
c. Low birth weight
d. Lack of immunisation
e. Environmental tobacco smoke
f. Indoor air pollution
g. Outdoor air pollution
h. Crowding and number of siblings
i. Sanitation
j. Housing quality
k. Socio-economic status

Interventions like : Integrated management of childhood pneumonia: Use of case management guidelines for treatment of childhood pneumonia can significantly reduce overall and pneumonia-specific mortality in children under-5 years. A meta analysis of community-based studies found a reduction in all-cause mortality by 27%, 20%, and 24% among neonates, infants, and children 0-4 years of age, respectively. In addition, pneumonia-specific mortality was reduced by 42%, 36%, and 36% amongst these three groups.

Another intervention like community-based programme to reduce ALRI: In rural Bangladesh in an area with low literacy rates and IMR approximately double that of South Africa. The programme consisted of 2 years of general interventions including promotion of oral rehydration therapy, family planning, promotion of childhood immunization, distribution of Vitamin A, referral of severely ill children to clinics and nutritional rehabilitation of malnourished children. These services were primarily provided within the health sector by Community Health Workers (CHWs) with referral to higher levels of health care where appropriate. This initial programme was followed by an ALRI-specific intervention, namely systematic detection and case management by CHWs linked to a referral system for support. Compared to a control area receiving only usual services, there was a 28% reduction in mortality in the intervention area during the initial non-ALRI specific services period. In the intervention area, ALRI mortality was reduced by a further 32% compared to the preceding period during the ALRI-specific intervention. 19 This study highlights the equal importance of non-ALRI specific interventions, such as immunization, family planning and nutritional improvement, together with specific case management in reducing ALRI mortality. Although a major reason for the reduction in ALRI mortality in this study was improved measles and DPT vaccine coverage which would not yield similar benefits in our setting where vaccine coverage is high, improvements in contraceptive use, crowding and duration of breastfeeding were also noted.

Similarly, ARI control programme reports similar success with case management: A Nepalese ARI control programme**,** it was found that while a health sector specific programme including health education, immunization and case management resulted in substantial reductions in ARI-specific death rates, there was still unacceptably high mortality from malnutrition, chronic diarrhoea and other factors, many of which themselves impact on ARI incidence and severity. This study points to the need managing controlling many of the major disease killers of children.

Another Studies in developing countries assessing the effectiveness of integrated neonatal care packages in reducing neonatal mortality, of which death due to ARI is an important cause. These packages focused on training of traditional birth attendants and or community health workers to ensure safer birthing practices, provide health education to

new mothers, promote breastfeeding and immunization and appropriate management and referral of sick children. Some programmes included provision of nutritional support, family planning services and transport to health care facilities. All programmes were associated with significant reductions in neonatal mortality.

Acute Respiratory Infections **in Children** & Burden of Disease: Acute respiratory infections (ARIs) are classified as upper respiratory tract infections (URIs) or lower respiratory tract infections (LRIs). The upper respiratory tract consists of the airways from the nostrils to the vocal cords in the larynx, including the paranasal sinuses and the middle ear. The lower respiratory tract covers the continuation of the airways from the trachea and bronchi to the bronchioles and the alveoli. ARIs are not confined to the respiratory tract and have systemic effects because of possible extension of infection or microbial toxins, inflammation, and reduced lung function. Diphtheria, pertussis (whooping cough), and measles are vaccine-preventable diseases that may have a respiratory tract component but also affect other systems; Except during the neonatal period, ARIs are the most common causes of both illness and mortality in children under five, who average three to six episodes of ARIs annually regardless of where they live or what their economic situation is. However, the proportion of mild to severe disease varies between high- and lowincome countries, and because of differences in specific etiologies and risk factors, the severity of LRIs in children under five is worse in developing countries, resulting in a higher casefatality rate. Although medical care can to some extent mitigate both severity and fatality, many severe LRIs do not respond to therapy, largely because of the lack of highly effective antiviral drugs. Some 10.8 million children die each year. Estimates indicate that in 2000, 1.9 million of them died because of ARIs, 70 percent of them in Africa and Southeast Asia. The World Health Organization (WHO) estimates that 2 million children under five die of pneumonia each year .

Causes of ARISs and the burden of disease: ARIs in children take a heavy toll on life, especially where medical care is not available or is not sought.

Upper Respiratory Tract Infections: URIs are the most common infectious diseases. They include rhinitis (common cold), sinusitis, ear infections, acute pharyngitis or tonsillopharyngitis, epiglottitis, and laryngitis—of which ear infections and pharyngitis cause the more severe complications (deafness and acute rheumatic fever, respectively). The vast majority of URIs have a viral etiology. Rhinoviruses account for 25 to 30

percent of URIs; respiratory syncytial viruses (RSVs), parainfluenza and influenza viruses, human metapneumovirus, and adenoviruses for 25 to 35 percent; corona viruses for 10 percent; and unidentified viruses for the remainder. Because most URIs are self-limiting, their complications aremore important than the infections. Acute viral infections predispose children to bacterial infections of the sinuses and middle ear, and aspiration of infected secretions and cells can result in LRIs.

Lower Respiratory Tract Infections: The common LRIs in children are pneumonia and bronchiolitis. The respiratory rate is a valuable clinical sign for diagnosing acute LRI in children who are coughing and breathing rapidly. The presence of lower chest wall indrawing identifies more severe disease. Currently, the most common causes of viral LRIs are RSVs. They tend to be highly seasonal, unlike parainfluenza viruses, the next most common cause of viral LRIs. The epidemiology of influenza viruses in children in developing countries deserves urgent investigation because safe and effective vaccines are available. Before the effective use of measles vaccine, the measles virus was the most important viral cause of respiratory tract–related morbidity and mortality in children in developing countries.

Interventions: Interventions to control ARIs can be divided into four basic categories: immunization against specific pathogens, early diagnosis and treatment of disease, improvements in nutrition, and safer environments. The first two fall within the purview of the health system, whereas the last two fall under public health and require multisectoral involvement.

Vaccinations: Widespread use of vaccines against pneumococcus, and influenza has the potential to substantially reduce the incidence of ARIs in children in developing countries. The limited data on influenza in developing countries do not permit detailed analysis of the potential benefits of that vaccine.

Cost-effectiveness of intervention: Pneumonia is responsible for about a fifth of the estimated 10.6 million deaths per year of children under five. Where primary health care is weak, reducing mortality through public health measures is a high priority. As noted earlier, the available interventions are primary prevention by vaccination and secondary prevention by early case detection and management. In addition, current vaccine prices are relatively stable in developed countries, but the prices for low- and middle-income countries are expected to be substantially lower when vaccines are purchased through a

global tender. We evaluate case-management intervention strategies for LRIs in children under five. Health workers who implement case management diagnose LRIs on the basis of fast breathing, lower chest wall indrawing, or selected danger signs in children with respiratory symptoms. Because this method does not distinguish between pneumonia and bronchiolitis, nor between bacterial and viral pneumonia, we group these conditions into the general category of "clinical pneumonia". This approach assumes that a high proportion of clinical pneumonia is of bacterial origin and that health workers can considerably reduce case fatality through breathing rate diagnosis and timely administration of antibiotics . The analysis addresses four categories of case management, which are distinguished by the severity of the infection and the point of treatment: i. nonsevere pneumonia treated by a community health worker, ii. nonsevere pneumonia treated at a health facility, iii. severe pneumonia treated at a hospital, iv. very severe pneumonia treated at a hospital.

Information about these categories of case management and their outcomes is drawn from a report on the methodology and assumptions used to estimate the costs of scaling up selected health interventions aimed at children.

Attributable costs of ventilator-associated lower respiratory tract infection (LRTI) acquired on intensive care units: A retrospectively matched cohort study: Lower respiratory tract infections (LRTI) are the most common hospital-acquired infections on ICUs. They have not only an impact on each patient's individual health but also result in a considerable financial burden for the healthcare system. Aim was to determine the costs and the length of stay of patients with ICU-acquired LRTI. So using a retrospectively matched cohort design, comparing patients with ICU-acquired LRTI and ICU patients without LRTI. LRTI was diagnosed using the definitions of the Centers for Disease Control and Prevention (CDC). Study period was from January to December 2010 analyzing patients from 10 different ICUs (medical, surgical, interdisciplinary). The device utilization ratio was defined as number of ventilator days divided by number of patient days and the device-associated LRTI rate was defined as number of ventilator associated LRTI divided by number of ventilator days. Patients were matched by age, sex, and prospectively obtained Simplified Acute Physiology Score II (SAPS II). The length of ICU stay of control patients needed to be at least as long as that of LRTI-patients before onset of LRTI.

RESULTS:

The analyzed ICUs had 40,772 patient days in the study period with a median ventilation utilization ratio of 56. The median device-associated LRTI rate was 3.35 per 1,000 ventilation days. We analyzed 49 patients with ICU-acquired LRTI and 49 respective controls without LRTI. The median hospital costs for LRTI patients were significantly higher than for patients without LRTI. The attributable costs per LRTI patient were 17,015 €. Patients with ICU acquired LRTI stayed longer in the hospital than patients without (36 days vs. 24 days; p = 0.011). An LRTI lead to an attributable increase in length of stay by 9 days.

CONCLUSIONS:

ICU-acquired LRTI is associated with increased hospital costs and prolonged hospital stay. Hospital management should therefore implement control measurements to keep the incidence of ICU-acquired LRTI as low as possible.

2.3 OBJECTIVES AND METHODOLOGY

To estimate the out of pocket expenditure on acute respiratory infection outpatients of selected health facilities in Delhi NCR.

METHODOLOGY

STUDY DESIGN

Cross-sectional Hospital based study

STUDY AREA & STUDY POPULATION

The cost data has been collected from;

1. Patients seeking outpatient care

PUBLIC	PRIVATE
Primary	Primary
Secondary	Secondary
Tertiary	Tertiary

Medical Facilities Enrolled with Project:

- Civil hospital, Ballabgarh (public, secondary)
- B.K. hospital (public, secondary)
- Sarvodya hospital (private, tertiary)
- Sudershan Nursing home (private, secondary)
- Bhatia hospital (private, secondary)
- Zenith/Keshav hospital (private, secondary)
- Ballabgarh nursing home (private, secondary)
- Kalra hospital (private, secondary)

- PHC-Chhainsa (public, primary)
- PHC-Dayalpur (public, primary)
- Dr. Aggarwal Clinic (private, primary)
- Dr. Dua's Clinic (private, primary)

SAMPLE SIZE

To accommodate the inherent variability in costing data especially in private hospitals, we recruited 321 ARI patients from ongoing outpatient surveillance systems between Jan-2013 to Mar-2013. It is a convenient sample size. Most of our data from the private sector (primary, secondary and tertiary care) and public sector primary and secondary care have come from Ballarbgarh, and out tertiary care data came from AIIMS. Enrolled data as follows:

TABLE 1- SAMPLE SIZE INEACH AGE GROUP

Age group	Total
<5	153
5-17	68
18-65	70
>65	30

INCLUSION CRITERIA FOR SAMPLE COLLECTION :

Only patients with acute respiratory infections (ARI) are enrolled in the study. Acute Respiratory Tract infection: Acute Respiratory Infection (ARI) is defined as an acute illness of the respiratory tract caused by an infectious agent transmitted from person to person. The onset of symptoms is typically rapid, over a period of hours to several days. Symptoms include fever, cough, and often sore throat, coryza, shortness of breath, wheezing or difficulty breathing.

SAMPLING TECHNIQUE

The study was done by using a semi-structured OPD questionnaire. It was tested and then modified accordingly.

We started with visit to Enrolled hospital then Identify the eligible patient by looking the medical documents/file then ask from patient and/or his relative for the symptoms to confirm the patient has acute respiratory infection and if yes then patient screened for eligibility of enrolment. Any of the 5 symptom (cough, and often sore throat, coryza, shortness of breath, wheezing or difficulty breathing) present in previous week if yes then ask for date of onset, Severity and are the symptoms still present any of the 5 symptoms still present and/or its severity had increased in between today & last 6 days if yes then note down any other symptoms & perform the clinical examination and and vitals of patient.

Take the background data, pre hospitalization and current hospitalization information of patient (any past medical history) then done Collection of cost data Patients interviewed for direct and indirect cost of the current episode of the respiratory disease by a semi structured questionnaire. The patients have been followed up telephonically or by home visit a week later to identify the cost of full episode. The instrument contain questions regarding direct, indirect and intangible expenditure due to the ARI .

Confirmation of information from patient interviews

With written permission from hospital administrators from some participating facilities; we collected data from medical records of study participants to confirm medications and laboratory and other procedures reported through patient interview. We gathered such information from both private and public hospitals in rural and urban areas.

STUDY TOOL

The study was done by using a semi-structured OPD questionnaire. It was tested and then modified accordingly. The collection of costs data was geared towards identification of:
Direct Cost: costs of medications, consultation fees, admission fee, costs associated with investigations, cost associated with travel and lodging related to illness etc.

Indirect Cost: loss of wages due to illness- related absenteeism of patient and relatives and opportunity costs.

From each of these patients we collected in addition to direct and indirect medical costs, demographic information, employment information, and any medical information that can help us categorize patients into the various age and risk groups. Additionally, we conducted follow-up telephone interviews of both enrolled inpatients and outpatients to collect expenditure data incurred subsequent to enrollment, visit, and/or discharge.

DATA COLLECTION

The primary data collection is from patients enrolled in ongoing surveillance/other studies including ARI surveillance in India study at AIIMS (New Delhi) and CRHSP (Ballabhgarh, Haryana) .

Delhi-AIIMS Hospital (Both Public sector tertiary hospitals): Data have been collected from ongoing outpatient surveillance of ARI patients of all ages attending the medicine and pediatrics clinics at the AIIMS in New Delhi. These data is used to estimate outpatient costs in an urban public setting.

Ballabgarh-CRHSP (Both urban and rural healthcare providers at primary and secondary level): The Comprehensive Rural Health Services Project (CRHSP) is under AIIMS but located at Ballabhgarh (Haryana). The ongoing surveillance includes patients of all ages from Civil Hospital Ballabgarh, BK Hospital Faridabad, and multiple private facilities in Ballabhgarh. For the purposes of this study, data collection expanded to include persons of all age groups from each of these existing platforms. Data from these settings is used to estimate outpatient costs of primary and secondary care for ARI in public and private institutions in a rural/semi-urban setting..

Outpatient Cost Data: We have collected data from sites with ongoing ARI outpatient surveillance in New Delhi/ballabhgarh(Faridabad). We recruited at least 50 patients from each age group in each site (for a total of at least 300); we have done follow-up after 2 weeks with one-on-one interviews by way of home-visits or telephone calls. We have seek information on the number of visits it took to get well, any prescription drugs purchased, any laboratory or imaging performed, days of lost work and any transportation costs incurred.

2.4 DATA ANALYSIS AND FINDINGS

After collecting all the data from all the regional centers, we categorize data based on condition, age, type of facility, site, and type of ownership. We grouped data in 4 age groups (less than 5 years, 5 to 17, 18 to 64, and ≥65). The cost of ARI is a function of the number of cases and the cost per case. The average value is estimated using arithmetic mean or multiple-regression depending on the size of the sample in each age category and the demographic data collected.

The cost of an outpatient case= [sum of direct medical cost (consultation, prescription, imaging, laboratory, number of visits) and indirect cost (cost of loss productivity and transportation)].

RESULTS

1. Total number of enrolled patients (facility-wise & age group-wise):

TABLE 2- TOTAL NUMBER OF ENROLLED PATIENTS (FACILITY-WISE & AGE GROUP-WISE)

Age group	<5 years	Male	Female
Public facility	Primary	26	14
	Secondary	10	10
	Tertiary	26	9
Private facility	Primary	11	6
	Secondary	10	8
	Tertiary	17	4
Total			153
Age group	5-17 years	Male	Female
Public facility	Primary	13	10
	Secondary	7	3
	Tertiary	14	7
Private facility	Primary	0	1
	Secondary	9	2
	Tertiary	0	0
	Total	68	
Age group	18-65 years	male	Female
Public facility	Primary	11	17
	Secondary	11	8
	Tertiary	5	7
Private facility	Primary	1	1
	Secondary	2	1
	Tertiary	2	4
	Total	70 out of 311	
Age group:- >65 years		male	Female
Public facility	Primary	10	3
	Secondary	5	1
	Tertiary	6	1
Private facility	Primary	0	0
	Secondary	0	0
	Tertiary	2	0
	Total	30	

2. Out of pocket expenditure of acute respiratory infections in Delhi NCR on the healthcare.

TABLE 3- OUT OF POCKET EXPENDITURE OF ACUTE RESPIRATORY INFECTIONS IN DELHI NCR ON THE HEALTHCARE

Age group		*Total(Rs)*	*Total_nonmedical(Rs)*	*Total_medical(Rs)*
		Mean	*Mean*	*Mean*
	<5	*740.99*	*365.07*	*378.34*
	5-17	*624.87*	*253.16*	*371.71*
	18-65	*360.17*	*77.66*	*282.51*
	>65	*399.96*	*256.35*	*143.60*

3. Cost of outpatient visits in public and private facilities

TABLE 4- COST OF OUTPATIENT VISITS IN PUBLIC AND PRIVATE FACILITIES

Facility type							
Private					Public		
Age group		*Total(Rs)*	*Total_nonmedical(Rs)*	*Total_medical(Rs)*	*Total(Rs)*	*Total_nonmedical(Rs)*	*Total_medical(Rs)*
		Mean	*Mean*	*Mean*	*Mean*	*Mean*	*Mean*
	<5	1636.8	905	731.6	212.9	43	170.1
	5-17	2239.4	928	1311.3	266.1	103	162.9
	18-65	724.7	64	661.1	289.8	80	209.5
	>65	600.0	00	600.0	384.6	276	108.5

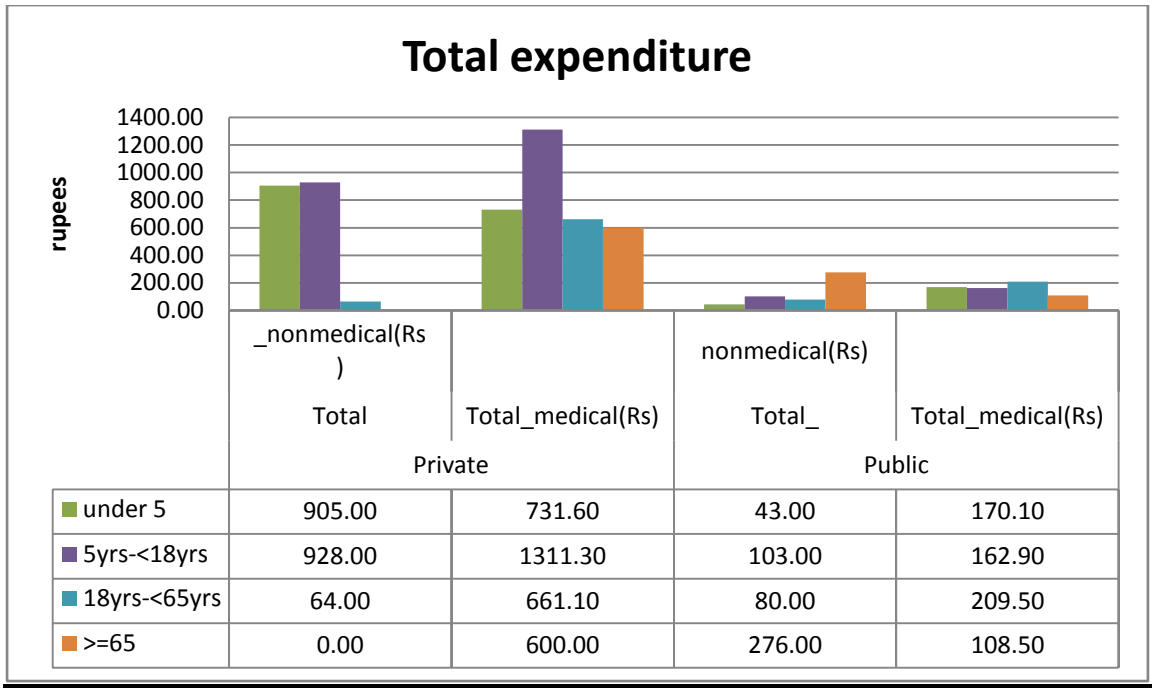

FIGURE 1

4. The cost of outpatient visits in public and private facilities at primary, secondary, and tertiary level.

TABLE 5 - THE COST OF OUTPATIENT VISITS IN PUBLIC AND PRIVATE FACILITIES AT PRIMARY, SECONDARY, AND TERTIARY LEVEL.

				Facility type						Total
				Private			Public			
				Total	Total nonmedical	Total medical	Total	Total nonmedical	Total medical	
				Mean	Mean	Mean	Mean	Mean	Mean	Mean
AGE GROUP	1	Facility level	Primary	237.1	8	229.4	104.5	10	94.3	144.0
			Secondary	1179.5	401	778.4	134.1	39	94.8	629.3
			Tertiary	3161.9	2064	1098.1	382.0	85	299.7	1424.4
	2	Facility level	Primary	50.0	0	50.0	97.5	9	88.6	95.5
			Secondary	2438.5	1013	1425.9	644.6	286	359.0	1584.2
			Tertiary				270.5	120	151.0	270.5
	3	Facility	Primary	60.0	0	60.0	292.3	83	209.6	277.3

		level	Secondary	745.3	60	685.3	145.5	18	127.2	227.3
			Tertiary	936.0	87	849.3	586.6	204	382.8	726.3
	4	Facility level	Primary				113.4	19	94.3	113.4
			Secondary				35.0	10	25.0	35.0
			Tertiary	600.0	0	600.0	1187.9	981	206.4	1057.2

TABLE 6 - MEAN , STANDARD DEVIATION, MEDIAN

Mean , standard deviation, median					
Age group	Facility level	Facility type		Total medical	Total nonmedical
1(<5years)	Primary	Private	Mean	229.441	7.65
			Std. Deviation	397.6063	31.530
			Median	100.000	.00
		Public	Mean	94.300	10.18
			Std. Deviation	269.6867	32.923
			Median	1.000	.00
		Total	Mean	134.605	9.42
			Std. Deviation	315.7710	32.253
			Median	60.000	.00
	Secondary	Private	Mean	778.389	401.11
			Std. Deviation	551.9002	982.511
			Median	650.000	95.00
		Public	Mean	94.800	39.25
			Std. Deviation	126.9151	50.483
			Median	27.500	30.00
		Total	Mean	418.605	210.66
			Std. Deviation	517.5600	691.640
			Median	200.500	45.00
	Tertiary	Private	Mean	1098.095	2063.81
			Std. Deviation	1927.2295	6245.963
			Median	300.000	.00
		Public	Mean	299.714	84.68
			Std. Deviation	427.9099	98.047
			Median	160.000	60.00
		Total	Mean	599.107	840.35
			Std. Deviation	1271.1909	3923.830
			Median	272.500	50.00
	Total	Private	Mean	731.634	905.18

			Std. Deviation	1273.0686	3915.300
			Median	295.000	.00
		Public	Mean	170.084	43.31
			Std. Deviation	331.0108	74.079
			Median	19.000	4.50
		Total	Mean	378.341	365.07
			Std. Deviation	858.4794	2415.977
			Median	101.000	.00
2(5-17years)	Primary	Private	Mean	50.000	.00
			Std. Deviation	.	.
			Median	50.000	.00
		Public	Mean	88.609	8.91
			Std. Deviation	206.0288	33.977
			Median	1.000	.00
		Total	Mean	87.000	8.54
			Std. Deviation	201.6542	33.280
			Median	15.500	.00
	Secondary	Private	Mean	1425.909	1012.55
			Std. Deviation	1435.4386	2063.903
			Median	600.000	50.00
		Public	Mean	359.000	285.60
			Std. Deviation	593.9052	793.272
			Median	28.500	47.00
		Total	Mean	917.857	666.38
			Std. Deviation	1219.4640	1597.319
			Median	350.000	50.00
	Tertiary	Public	Mean	150.952	119.52
			Std. Deviation	315.3925	167.675
			Median	.000	80.00
		Total	Mean	150.952	119.52
			Std. Deviation	315.3925	167.675
			Median	.000	80.00
	Total	Private	Mean	1311.250	928.17
			Std. Deviation	1425.1063	1989.444
			Median	500.000	45.00
		Public	Mean	162.926	103.17
			Std. Deviation	353.2144	358.034
			Median	5.500	.00
		Total	Mean	371.712	253.17
			Std. Deviation	802.8721	936.551

			Median	55.500	2.50

3(18-65years)	Primary	Private	Mean	60.000	.00
			Std. Deviation	56.5685	.000
			Median	60.000	.00
		Public	Mean	209.586	82.69
			Std. Deviation	421.3116	159.283
			Median	21.000	.00
		Total	Mean	199.935	77.35
			Std. Deviation	408.8668	155.261
			Median	21.000	.00
	Secondary	Private	Mean	685.333	60.00
			Std. Deviation	290.9043	65.574
			Median	836.000	50.00
		Public	Mean	127.158	18.37
			Std. Deviation	168.4350	20.454
			Median	56.000	20.00
		Total	Mean	203.273	24.05
			Std. Deviation	266.1131	31.336
			Median	81.000	20.00
	Tertiary	Private	Mean	849.333	86.67
			Std. Deviation	976.6866	154.876
			Median	407.500	35.00
		Public	Mean	382.778	203.78
			Std. Deviation	319.2138	525.408
			Median	391.000	20.00
		Total	Mean	569.400	156.93
			Std. Deviation	674.4516	412.114
			Median	391.000	30.00
	Total	Private	Mean	661.091	63.64
			Std. Deviation	766.7483	118.260
			Median	350.000	30.00
		Public	Mean	209.456	80.37
			Std. Deviation	345.7650	236.666
			Median	51.000	10.00
		Total	Mean	282.515	77.66
			Std. Deviation	464.4815	221.226
			Median	60.500	10.00

4(>65)	Primary	Public	Mean	94.308	19.08
			Std. Deviation	138.4151	57.831
			Median	51.000	.00
		Total	Mean	94.308	19.08
			Std. Deviation	138.4151	57.831
			Median	51.000	.00
	Secondary	Public	Mean	25.000	10.00
			Std. Deviation	31.7175	24.495
			Median	10.500	.00
		Total	Mean	25.000	10.00
			Std. Deviation	31.7175	24.495
			Median	10.500	.00
	Tertiary	Private	Mean	600.000	.00
			Std. Deviation	565.6854	.000
			Median	600.000	.00
		Public	Mean	206.429	981.43
			Std. Deviation	247.7350	1532.008
			Median	75.000	140.00
		Total	Mean	293.889	763.33
			Std. Deviation	340.8058	1395.555
			Median	200.000	80.00
	Total	Private	Mean	600.000	.00
			Std. Deviation	565.6854	.000
			Median	600.000	.00
		Public	Mean	108.500	276.08
			Std. Deviation	169.0861	869.287
			Median	50.500	.00
		Total	Mean	143.607	256.36
			Std. Deviation	234.3934	839.599
			Median	51.000	.00

Total	Primary	Private	Mean	203.525	6.50
			Std. Deviation	370.5500	29.069
			Median	100.000	.00
		Public	Mean	124.895	31.03
			Std. Deviation	298.3650	94.365
			Median	1.000	.00
		Total	Mean	137.476	27.10
			Std. Deviation	310.7089	87.632
			Median	48.000	.00

	Secondary	Private	Mean	992.250	579.31
			Std. Deviation	969.3147	1419.466
			Median	675.000	64.00
		Public	Mean	146.400	73.64
			Std. Deviation	291.7682	340.961
			Median	36.000	20.00
		Total	Mean	457.517	259.63
			Std. Deviation	748.6217	927.061
			Median	150.000	30.00
	Tertiary	Private	Mean	1012.276	1512.41
			Std. Deviation	1690.6018	5356.962
			Median	330.000	.00
		Public	Mean	257.639	198.49
			Std. Deviation	372.6339	561.030
			Median	70.000	60.00
		Total	Mean	474.317	579.53
			Std. Deviation	1008.2633	2949.227
			Median	200.000	50.00
	Total	Private	Mean	804.673	771.95
			Std. Deviation	1231.6994	3344.400
			Median	330.000	.00
		Public	Mean	171.190	92.65
			Std. Deviation	325.7419	363.860
			Median	26.000	.00
		Total	Mean	335.126	269.00
			Std. Deviation	738.0914	1750.448
			Median	90.000	.00

CLINICAL FINDINGS:

TABLE 7 - CLINICAL FINDINGS OF ARI

	<5yr	5-17 yr	18-65yr	>65yr
AURI	119	52	65	22
ALRI	42	16	5	8

Clinical manifestations of ARI in the outpatient settings were greater among children (<5years) of age groups as compare to other age groups of patients. Common symptoms included fever (75% of patients), cough (96% of all group of patients) , running nose (92% in children) and (70% in adult patients) and breathing difficulty (60% in children) and (37% in adult patients) . Most children had fever and cough. Pneumonia was diagnosed in (36%) of children, the frequency of these diagnoses did not differ significantly between patients with ARI and patients without ARI. Asthma occurred less frequently among children with ARI. Overall, 95% percent of patients in outpatient settings with laboratory-confirmed ARI infections were given a diagnosis of ARI by their providers. Of these children with a diagnosis of ARI, some children received a diagnosis of asthma, pneumonia, and the rest were given a nonspecific diagnosis of a viral infection.

Overall, rates of visits to clinics and hospitals attributable to ARI were highest among children <5 year of age. Altogether, visits attributable to ARI were common.

2.5 DISCUSSION

We used active, prospective surveillance over a period of three months to estimate rates of ARI infection among all age groups in outpatient settings. We found a much higher burden of ARI infection in the outpatient setting, a large variation in burden according to the time period and site, and a lack of clinical recognition of ARI during most visits. Much of this ARI disease burden may be prevented through vaccination.

In our study, most ARI infections in patients were diagnosed clinically. As previously noted, surveillance that relies on data from physician-directed testing alone substantially underestimates the ARI burden. In addition, mostly patients presented within two days after the onset of illness, when antiviral medications may have shortened the duration and severity of illness. Increased use of rapid ARI testing may raise awareness of the ARI burden among children, increase the use of antiviral medications, improve infection-control activities, and increase the perceived need for and use of ARI vaccine.

Although hospitalization rates attributable to ARI are important, the average annual rates of outpatient visits attributable to ARI were high as hospitalization rates for children 0 to 5 years of age.

The annual rates of hospitalization attributable to ARI, as determined prospectively by the data, correspond to previously reported rates from retrospective studies. Previous estimates of rates of hospitalization attributable to ARI that used different study period, populations, and methods. Similarly, our estimate of the outpatient ARI burden compares favorably with those of previous reports using different study period, populations, and methods. Taken together, these studies document a substantial overall ARI burden among young children. Although the rationale for enhanced vaccination against ARI in children has been based primarily on hospitalization rates, reducing the number of outpatient visits attributable to the prevention of ARI by vaccination would have an even greater effect on costs.

Despite the strength of the data, several limitations was noted. Surveillance was performed in geographically diverse (in Delhi NCR) during the first three month of 2013. Additional geographically diverse sites would enhance the generalizability of the findings. Geographic variation in ARI rates may have occurred, although the outpatient burden of ARI was similar across sites. The lower rates of hospitalization attributable to ARI may in part reflect differences in health care use; these differences are similar to

those shown in previous studies. Although enrolled patients appeared to be representative of the eligible population, failure to enroll all eligible patients and partial-week surveillance may have introduced bias. Because some eligible children were missed or did not meet our enrollment criteria, the observed rates modestly underestimate the true total ARI burden. “However, the detection of ARI infections was maximized by means of both viral culture and laboratory testing.

Outpatient surveillance was performed in selected clinics and hospitals of ballabhgarh (FBD). Hence, we used visits to clinics and hospitals from January to March of 2013 to estimate the 12-week rate of visits attributable to acute respiratory tract infection or fever. This seasonal definition included the majority of visits associated with ARI for each ARI season.

Children's vaccination status was determined by parental report. Although the report of vaccination against influenza by adults is highly sensitive and specific, the accuracy of parental report is not yet known.

ARI illnesses cause a substantial health burden, yet most ARI infections are unrecognized clinically. Enhanced recognition of ARI can provide the opportunity for improved infection control, education about vaccination, and antiviral therapy. Although the universal recommendation that all children <5 years of age be vaccinated was driven primarily by high hospitalization rates, our findings demonstrate that the outpatient burden of ARI is substantial.

2.6 CONCLUSION AND RECOMMENDATION

This study clearly shows that the wider use of available vaccines will reduce ARI mortality among young children by half to two-thirds, the cost of which is low enough to be affordable by almost any developing country. These vaccines will reduce ARI mortality by at least one third. The urgent need is to translate this information into actual implementation. The lack of adequate surveillance systems for estimating the burden of the disease and the lack of adequate national costing and burden datasets in some of developing countries make estimation difficult.

Indeed, ARI case management at the first-level facility may still be the most cost-effective when coupled with better care-seeking behaviour interventions. Nevertheless, convincing evidence of the vaccines' cost-effectiveness is required to facilitate national decisions on introducing the vaccine and using it sustainably. In low-income countries, positive cost-benefit and cost-effectiveness ratios alone appear to be insufficient to enable the introduction of these vaccines into national immunization programs.

Key pieces of information to be generated:

1. Epidemiological and Economic Burden of ARIs by age groups can be used For advocacy for ARI prevention and control
2. Burden of ARI due to selected important viral and bacteriological agents will support decision making for introduction of vaccines or other interventions
3. Identification of major treatment seeking behavior of patients for ARIs/Pneumonia towards public/private facility with an aim of identifying interventions for ARI control
4. Estimation of direct and indirect cost will be useful for formulating policy for ARI control
5. Identification of the component cost associated with outpatient treatment of respiratory tract infections will influence ongoing research to establish the clinical and economic continuum of respiratory tract infections, ultimately advancing clinical and policy decision making.
6. Better case definitions understanding of Pneumonia – differentiation between viral/bacteriological pneumonias

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INTERVIEW SCHEDULE FOR OUT-PATIENTS

OPD Interview

Interviewer's Name_____

1. Date of Visit(dd/mm/yyyy) _____
2. Facility

   name:_____

   __
3. Patient ID:_____ Lab ID:

   _____
4. Patient

   Name:_____

   __
5. Respondent's relationship to patient

   ☐Self ☐ Sibling ☐Parent ☐Grandparent ☐Relative ☐Other
6. Telephone number: ☐Self ☐Home ☐Neighbor

   (Note down STD code if landline)_____
7. Ask for convenient time to call at this number for follow up (explain that patient will be contacted again at around 10-14 days later)_____
8. Age: (if <1 year, write "0"): _____years
9. Gender ☐Male ☐Female
10. Occupation_____

11. Did you consult with any provider apart from a hospital or clinic for this episode? (**Ask for any non-formal care like pharmacy/quack/neighbor etc.)** ☐Yes ☐ No

If **Yes**,

a. Which type of visit: ☐ Pharmacy ☐ Other (specify)_____

b. About how much did the visit cost you? _____

12. Have you been told that you have any of the following medical conditions?

☐Diabetes ☐Asthma ☐High Blood Pressure ☐COPD ☐Cancer ☐ Pregnancy

☐ Other Lung Disease (not including COPD)

☐ Other Heart Disease (not including high blood pressure)

☐ Any Other medical condition (specify)_____

13. Prior to this visit, how many times did you visit a doctor or clinic for this episode of illness? _____

a. Visit/Hospitalization 1

Visit type: ☐Clinic ☐Hospital ☐Other (specify)_____

Number of days visited/stayed_____

Medication (Rs)		Consultation fees (Rs)		Transportation (Rs)	
Investigations (Rs)		Other (Rs)		Total (Rs)	

b. Visit/Hospitalization 2

Visit type: ☐Clinic ☐Hospital ☐Other (specify)_____

Number of days visited/stayed_____

Medication (Rs)		Consultation fees (Rs)		Transportation (Rs)	
Investigations (Rs)		Other (Rs)		Total (Rs)	

c. Visit/Hospitalization 3

Visit type: ☐Clinic ☐Hospital ☐Other (specify)_____

Number of days visited/stayed_____

Medication (Rs)		Consultation fees (Rs)		Transportation (Rs)	
Investigations (Rs)		Other (Rs)		Total (Rs)	

14. How much did you pay to the clinic/doctor for this visit? Rs_____

15. Were you prescribed any medications for this visit? ☐Yes ☐No

16. If yes, for each medication that you were prescribed, specify name, dose, number of days, number of doses, and amount you spent on the medication:

Type*	Name	Doses/day	No. of Days	Cost

*Antibiotic, Anti-viral , Antitussive, Analgesics, Others (vitamins)

17. Were you asked to have any laboratory work done? Yes ☐ No☐

18. Were you asked to have an x-ray? Yes ☐ No☐

19. By what means did you get to the clinic or hospital?
☐3-wheeler ☐Taxi ☐Bus ☐Own vehicle ☐Walk ☐ other (specify)_____

20. About how much did you or relatives spend on transportation, to and from the clinics? (**Probe for number of visits, who all accompanied, per person per trip cost etc)** Rs_____

21. Did any of your relatives have to lodge near the hospital to take care of you while on admission? Yes ☐ No ☐

    a. **If yes**, about how much did it cost them? Rs_____

THANK THE RESPONDENT

Wish the patient speedy recovery and inform of next contact over phone after 10 days

Follow-up

Date of interview (dd/mm/yyyy): _____

22. Did you buy any medications after your visit? ☐Yes ☐ No

    a. If **Yes,** about how much did these medications cost you? Rs_____

23. Did you pay for any X-rays? ☐Yes ☐ No

    a. If **Yes** about how much? Rs_____

24. Did any relative miss work to take care of you? ☐Yes ☐ No

    a. If **Yes**, about how many days? _____days

25. Did you miss work because of this episode? ☐Yes ☐ No

    a. If **Yes**, about how many days? _____days

26. Did you lose money because you were not working? ☐Yes ☐ No

    (Probe for loss of wages, business days lost, leave without pay etc.)

    a. If **Yes**, about how much money did you lose? Rs_____

27. How did you pay for your medical expenses? ☐Own resources ☐Loan ☐ Family members ☐Other (specify)_____

28. If by loan, how much interest was charged (round to the nearest %)? _____%

29. Did you get an influenza vaccination this season? ☐Yes ☐No

    a. If **Yes**, about how much was it? Rs_____

    b. If **Yes**, where did you receive it?