



## CHAPTER 1

### BACKGROUND AND RATIONALE

#### 1.1 Magnitude of the problem

Acute respiratory infections (ARI) have been emerged as a major and leading health problem in developing countries. Diarrhoea and infections preventable by immunization were once considered as important causes of death in under five population and had received considerable attention. Widely practiced oral rehydration therapy and extended program for immunization were clearly reducing threats of mortality from these diseases. But during last decade, ARI were found to be the leading killer of children under five years of age<sup>1</sup>. Although the problem was outlined in 1978 only recently did it reach prominence.

Of the 12.9 millions death of children under five, that occurred in 1990, some 4.3 millions were attributed to ARI. ARI is also a leading contributor to the loss of disability adjusted life years (DALY) in children under five years of age<sup>2</sup>. ARI account for 30-50% of the visits by children to health facilities and 20-40% of hospitalization of children. They are the conditions most frequently involved in the unnecessary use of antibiotics and other drugs in outpatient services<sup>3</sup>. Constituting a complex and heterogenous

group of conditions the ARI now involve over 300 antigenic types of viruses and bacteriae<sup>3</sup>. This make it virtually impossible to control by regular preventive measures and vaccines. Since the beginning, this complex problem remained as a largely ignored challenge in the field of communicable diseases. It has no clear cut solution and indeed it has never been.

Children under five years living in urban areas of developing countries have a higher number of ARI, between five and nine a year, than those living in the rural areas, who average between three to five episodes. Most ARI are caused by common cold viruses and are mild and self limiting diseases<sup>4</sup>. The high incidence of ARI deaths are due to high incidence of severe ARI in developing countries. Of the 10,000 deaths globally per day in children due to ARI, 80% or more occur in developing countries. Severe ARI, especially pneumonia is responsible for the majority of these ARI deaths. Registered death rate from influenza and pneumonia in children are often 20 to 50 higher in developing countries than in the developed countries<sup>4,5</sup>. Most episodes of ARI in developed countries are caused by viruses, and non severe in nature.

In developing countries, the picture is significantly different. Although viruses are obviously responsible for some episodes, studies have shown that more than half of severe ARI cases in children presenting to hospitals are due to

bacteria<sup>4</sup>. Despite low sensitivity and difficulty in isolation of bacteria from lung aspirate and other methods used in searching etiology in severe ARI cases, in a hospital based study in Bangladesh, 10% to 30% were found to be positive on blood culture. The case fatality rate (CFR) ranged both in viral, bacterial and mixed positive cases from 8 to 14 percent<sup>6</sup>.

Treatment certainly cures the disease but which is not always available to all, and sometimes is costly, specially in Bangladesh where 86% of people live below poverty level, with 60% of the population only getting 80% of their calorie requirement<sup>6</sup>. For those caring for sick children on a day to day basis, the reasons for this preventive tragedy are clear: Young children live in conditions that put them at great Risk of severe ARI; their parents do not know when to seek care; health workers can not identify the children who have pneumonia and who require antibiotic treatment; simple and cheap antibiotics are not always available; and health services, where trained health workers and antibiotics are available, are often not accessible to families. Contrary pictures are often seen in other parts of globe. Although the great majority of ARI cases require no treatment, other than general care at home including extra fluids and making sure that the child eats well, upto 70% of these children are treated with antibiotics and other medicines when they are taken to a health facility in Africa<sup>7</sup>. A study in Peru showed

that approximately 50% of the expenditures to treat ARI cases were inappropriate at an excess cost of US\$ 18.47 to 21.97 per child covered<sup>8</sup>.

Wherever infant and childhood mortality are high, ARI is a major cause of death. Of all the ARI deaths globally in children under five years of age daily, pneumonia unassociated with measles causes 70% of these deaths; post measles pneumonia 15%; pertussis 10% and bronchiolitis or croup 5%<sup>9</sup>. Why such excess complications in developing countries! A number of Risk Factors have been postulated to be associated with these formidable catastrophes. These factors are more abundant in developing countries.

## 1.2 Economical aspects

The indirect cost associated with ARI and severe ARI are astronomically high. In many developing countries the economic burden of treatment of ARI already exceeds the expected costs of other social development and welfare coverage. More appropriate use of existing health personnel and facilities can be made to avert mortality with little or no additional expenditure. ARI accounts for an average one third of all absences from work<sup>2</sup>. Data from Ghana indicate that over 94% of the 52 days lost per case of ARI are due to mortality rather than morbidity<sup>10</sup>. Particularly in the setting of developing countries, where case fatality ratios are high and access to services are limited, the bulk of costs attributable to ARI

will be indirect costs due to mortality. Although no such estimate are available from the developing world, there is also likely a relatively greater toll due to ARI in these settings<sup>11</sup>.

In 1976 the World Health Assembly requested the WHO to tackle the ARI problem. In 1991 international consultation on the control of ARI notified that; although most ARI episodes are due to common cold and resolves themselves, the more serious episodes mainly pneumonia, represents a major public health problem<sup>4</sup>. Even though WHO had started ARI control programme (Case management) in 1986, it was found to have little impact on excess mortality rate in developing countries. Statistical reviews showed that ARI mortality did not decrease in parallel to other causes of infant mortality during last 10 years<sup>12</sup>. The stress now is more on degree of severity of the illness, which calls for different courses of action<sup>13</sup>. In a joint statement on the management of ARI, United Nations Children Fund (UNICEF) and WHO emphasized research on factors determining the incidence and severity of the disease<sup>14</sup>.

### 1.3 ARI in Bangladeshi context

Bangladesh, one of the developing countries of Asia, is of no difference in this context. In 1995 the country has a population of 122 million, children under five constitute 17.7% of them. The infant mortality is estimated as 94 per

thousand live birth and under five mortality is 122 per thousand live birth. While 50% of all babies are born with low birth weight, 65% of the present children are already stunted<sup>15</sup>. The principal causes of death and illness in children under five years of age in Bangladesh are acute respiratory infections (ARI), diarrhoeal diseases, premature birth and Tetanus<sup>16</sup>. ARI constitutes more than one third of all child deaths. Data from rural community based surveillance project showed that 10% of neonatal deaths, 40% of deaths in the 1-5 months age group, 38% of deaths in the 1-11 years age group and 15% of deaths in the 1-4 years age group were ascribed to ARI for 1986-87. In a city based study, data showed that ARI accounted for 30-40% of all deaths in children below five years of age<sup>17</sup>.

#### **1.4 Risk Factors: Nature, distribution and importance**

A number of host, environmental and other factors have been shown to be associated with ARI deaths. These factors are also more common in developing countries. The reported incidence of severe ARI varies widely, from country to country as well as the quality of reporting. The excess mortality and high incidence of ARI cases and deaths indicate the wide spread distribution of these risk factors in Bangladesh. Risk factors increase the incidence and severity of the disease. Generally it is believed that low socioeconomic status is associated with high ARI mortality; it

is important to understand the relative contribution of other and related risk factors. But the limitations of routine statistics are well known, and in many developing countries comprehensive systems of data collection do not exist<sup>4</sup>. Interpretation of the available data is compromised by the difficulty in establishing whether differences among studies represent true geographic differences rather than methodological differences related to patient selection, study design and or laboratory methods<sup>13</sup>.

It now seems clear that there is alarming episodes of severe ARI in developing countries, especially in Bangladesh; that risk factors for these diseases are widely distributed in this country; and that the nature, extent and relative importance of these factors are not well documented. It is not known whether factors act alone or in concert with each other and if there is any difference among risk factors for severe ARI and for ARI as a whole. Certainly amelioration of risk factors have a broader impact and in the long run would be cost effective in the Bangladeshi context, where the health budget is already constrained by over population, regular lashing of natural calamities and socio political instability. The stark choice is to look at the problem practically with a view to control it permanently not to cure temporarily. However ARI control is not just about treatment and stopping illness from becoming fatal. Taking steps to prevent severe ARI and subsequent mortality is equally important.

The challenge for prevention is to select the most efficacious, feasible and cost effective interventions against some of the many risk factors that increase the morbidity and mortality rates. It is equally difficult to establish which risk factors are the most important ones to target with intervention. The causal relationships between risk factors and illness are extremely complex. Moreover risk factors can not be studied in isolation, as many interact with each other, and some may not in themselves be directly related to ARI. Risk factors and their significance vary considerably from country to country, even within countries themselves. For example in some places breastfeeding is rarely practiced, but in others it is widespread. Each ARI program will need to assess prevention priorities on the basis of local circumstances and local feasibility of interventions. Considering all these practical as well as unresolved problems this study was designed to explore the risk factors for the severe ARI in children under five years of age of an urban community in Bangladeshi context where millions of underprivileged children did not know who would die in the next seven seconds.