CHAPTER 5

DISCUSSION

The possible risk factors for severe ARI in under
five children were investigated using a case control design in
this study. There was no refusal to participate and no drop
out or failure to follow up. Most (70%) of the 360 children
came from area around the hospital, living in slums or from
low income families. Since both age and sex were thought to be
major risk factors for severe ARI, age sex matching was
avoided. In the interpretation of the results obtained, it is
important to rule out different types of bias.

As for methodology this study had certain advantages.
Enrollment of cases and controls from same setting and at the
same time period would have facilitated to avoid some
selection biases. At the same time short recall period might
have avoided some information biases. A case control study
still could suffer from some other uncontrolled biases. This
study might have chances to miss some cases of severe ARI, so
the result might lose some credibility to the true
representative of all children with severe ARI. On the other
hand most of the children, especially from low income group in
the hospital catchment area attended this hospital[66]. When
discussing the study results it was also important to notice
that the study referred to a poor urban population who had at

least some access to health care or health input of whatsoever nature. Therefore some findings may not be applicable to rural or other settings.

Demographic Variables

A number of factors were noted to be associated significantly with severe ARI on univariate analysis. Of the demographic variables the boys were found to be more sufferer (Table 4.2), but the risk was recorded as even among both sex statistically. The BOSTID combine analysis found this risk as marginal[22] and also in other studies with a little variation[4,11]. This fact was also reflected by the national demographic profile which had observed similar mortality pattern genderwise in under five population[67]. Very young infants (≤1 month) on the other hand been associated with high risk (OR 13.33) though the C.I was not significant. Similar result was encountered in the literature from both developed and developing countries[4,11,22,51], however the most susceptible age group differed from country to country. The modal age group in this study was below one month. Children with their ill developed immunological system was suspected to be the main physiological cause behind this. Breast milk provide some passive immunity at this period and some studies recognized age group 6-11 months as the most vulnerable[23,24], yet others reported 6-23, 2-5 and ≤ 1 month as risky group[22,25]. It was

noted that the different way of grouping of age at the time of analysis and different child raring practice may affect these results. Moreover the presence of only one control in this cell might produce this result (Table 4.2). Very young infants with non severe ARI usually do not attend hospital and in Bangladesh some follow the social practice of confining the new mother and baby inside home for initial forty days after delivery[67], however in the urban area this practice was not mandatory.

Socioeconomic Variables

On univariate analysis the socioeconomic variables did not produce any significant results. Contrary to other studies in this regard, maternal age, education , occupation and marital status failed to show any effect (Table 4.3). The possible reason could be the similar pattern of socio cultural background of both cases and controls. Mothers' engagement outside home sometime compelled them to leave their children at day care center, which might be reflected as the poor maternal care due to occupation. The Gambian study reported non significance of this variable[20], While in Brazil highest Odds Ratio was found in children who attended day care center[37]. This variation reflects the different socio cultural aspects of different societies and countries. Day care center is not at all practiced in Bangladesh. Mothers are still the sole caretaker in this country. A small number of mothers were

found to work outside and the number was more in control group
(7 and 10). But when analyzed separately children with mothers
spending more than 8 hours outside home were found at high
risk (OR 6.00), although only about 5% of the children were
exposed to this risk and the confidence interval was not
significant. However this could be important in terms of hours
spent by mothers in taking care of their children. The role of
care taker, distance of work place from home did not produce
any effect. As a whole 35% of mothers had no education (case
80, control 46). This strata showed a OR of 1.09, though this
result was not statistically significant. All the strata above
this had no effect at all. The lowest income group produced a
OR of 1.77 but again was not statistically significant. The
reason probably the similar distribution of this factor among
the two groups. A trend was marked that, families with higher
income group showed a gradual decrease of OR with advancement
of income (Table 4.3). It could be easily understood that more
affluence provide security, nutrition and knowledge. Thus this
result could have been influenced by other confounders.

Environmental Variables

The role of environmental variables have been
documented recently in literature[4,11,54-56]. Although no valid
study was done in Bangladesh, it was postulated that crowding
might have some deleterious effect on the severity of the
disease. The assumption behind this was the average big family

size (5.5) in Bangladesh, and that ARI was a contagious disease. Crowding could be the suitable environment for the transmission of the disease. But in this study, number of under five children when more than three in a family had only marginal risk(OR, 1.49). Sleeping density rather had a higher risk. When five persons or more were found sharing the child's bedroom, the risk was more than twice(OR,2.69), although none of these variables had valid confidence interval.

The risk of parental smoking had been fairly established in most of the studies reported[22,51]. But no effect was found in this study. The probable reason was a similar distribution smoker fathers in both cases and controls. It should be noted here that no mother was recorded as smoker in this study. Exposure to pollution from fuel used for cooking and room heating had been reported to be associated as risk factor for more severe respiratory diseases. In Gambia one study observed indoor smoke from cooking as the sole cause of ARI deaths[20]. The reason they offered was the habit of the mothers to carry their children at back at the time of cooking. Although cooking is practiced in room in Bangladesh, room heating is not widely practiced, particularly in urban areas. This study explored the kind of fuel used for cooking and found biogas (wood, manure etc) users were significantly at risk than gas or electricity users(OR,2.80). This finding was consistent with other studies in Nepal[55], in Gambia[20] and other countries[4,22]. In China chilling and dampness was reported

as risk factor for ALRI. But again this effect might depend on housing quality and weather condition. Sleeping on earth floor might have such effect and which might be very common in Bangladesh. Study of this fact showed a double risk than sleeping on wooden bed. Although how this chilling and dampness affected the child's health was still unclear. Absence of smoke outlet and window in cooking place separately showed significant risk and when collapsed, absence of both together showed even higher risk with odds ratio 11.75 (C.I. 2.61-73.73). But these proxy variables meaning the indoor pollution could be unreliable, as they were measured solely depending on maternal response and their perception in this regard.

Nutritional Variables

Of all the factors studied, nutritional factors were found to be associated with risk in all instances. Among nutritional variables, weight for age was found to be very significant followed by low birth weight and lack of breast milk. These facts were consistent with all other studies done in this field. Malnutrition has many deleterious effect on child health including poor immunological development, delayed recovery from disease, respiratory muscles weakness and diminished energy stores. Malnutrition limits normal growth of lung tissue and predisposes lungs to chronic changes, perhaps in part as result of reduction in the anti-proteinase activity

of alpha-1 antitrypsin[66]. Severe malnutrition may also decrease the ability of the child to respond to hypoxia with tachypnoea and thus predispose to respiratory failure. In this study, malnutrition was demonstrated as a very highly significant risk factor, the risk persisted even when compared among different degrees of malnutrition (Table 4.5). While the OR was 2.2 for all strata, but 3rd degree malnutrition showed OR as high as 15.15. As a whole it was noted that, the more the malnutrition the more was the risk of severe ARI.

The effect of low birth weight on severity of ARI was similarly found as risky in this study. Children having birth weight less than 2500 grams were at ten times risk of severe ARI than children with higher birth weight. The birth weight was recorded from recall of mothers and no adjustment was made for pre terms and small for date babies. This limitation might bias the observed result, the highly significant odds ratio was consistent with other studies though.

The protective effect of breast milk is well documented in published reports[38,39,41]. Breast milk has an unique anti infective property providing protection against infection, stimulation to infants' immune system and inhibition of gram negative bacteria. This effect was also demonstrated in this study. The risk was found to be reduced by 30% when children were given breast milk exclusively three or more months. Exclusive breastfed children were found to be more protected than breast plus bottle, bottle only and mixed

fed children (Table 4.5). But it should be reminded here that the definition of exclusiveness varied among countries from 3 to 5 months.

Immunological Variables

As demonstrated earlier in a Thai study poor quality of parental care in terms of non compliance to immunization resulted in a higher risk for both non immunized and partially immunized children[48]. For the non vaccinated children the risk was four times higher than those vaccinated. Among incompletely immunized children, incomplete DPT yielded the highest odds ratio (OR,4.11). All results were statistically significant.

Previous history of ARI was thought to be a risk factor and was reported irregularly in literatures. Recurrent ARI in index subject and concurrent ARI in the family failed to produce any association with risk in this study. Concurrent diarrhoea in the index subject in last fortnight was rather found significantly associated (OR, 2.86). This result supported the hypothesis that diarrhoea weaken body immune system against ARI and predispose the child to severity[53]. History of allergy was examined and was found to have no effect in general. However on stratified analysis, when parents suffered from allergy with respiratory symptoms the risk was four times. Although atopisity in other members of family and duration of it had no effect at all(Table 4.6).

Similar finding was also noted in some other parts of the world e.g., Argentina, Philippines[22,49].

Maternal Knowledge and practice

Knowledge and practice of mothers on ARI was investigated with the intention that these factors might affect the natural course of the disease in a number of different ways. For example, delay in care seeking might itself could be a potential risk factor for severity of ARI. Similarly failure of mothers to recognize the danger signs of severe ARI might put a child's life in danger. Both these and others intern depend lot on local religious and cultural beliefs and practices. Attempts were made before by WHO to look into this issue and a focus ethnographic study (FES) model was developed[61]. Questions adopted from this model were tried in this present study with the intention to identify (1) Terms used by mothers for the illness present in their children, (2) Health care seeking behavior in terms of nature of care given initially, (3) Triggering factors to seek care from hospital, (4) Perception of mothers of any delay in initiating treatment and the reason and (5) feeding practices during illness at home. A few of the chosen variables were put into the univariate analysis, like whether any treatment was offered to the child or not, and if so, what types of treatment. Children not treated before coming to this hospital did not show any risk in comparison to children who were

treated. Risk varied on the kind of treatment offered. Maximum risk was shown with the group who were given a combination of treatment. However delay in initiating treatment as perceived by mother had no significant effect. When analyzed separately delay more than four days onwards showed some marginal risk. This result confirms the hypothesis generated after a meta analysis by WHO/ARI program[61] that delay more than three days might be a risk factor.

Fever and cough were consistently present in all children and their local names were same for all mothers. However other illness names yielded multiple response and were varyingly present in subjects. The frequency distribution showed that most of the mothers of severe ARI cases named the disease as pneumonia(106), while most of the mothers in control group named the illness as cold and cough (144). This result produced the idea that a good portion of urban mothers could recognize the severity of the disease as pneumonia, which was generally considered as serious condition and non severe ARI as cold or cough, which was the local meaning of common cold.

The principal reason for seeking care from this hospital were referral from outside doctors in case group and mental satisfaction in control group. In that sense the control mothers showed a more concerned and better health practice. The major reason for delay as given by them was consultation with a pharmacist and buying some drugs. This

could be explained as the wide availability of drugs without prescription under the counter and which hence become cheaper with minus physicians' consultation fees. Moreover most of the pharmacist also used to offer some consultation and sell drugs in piecemeal, which for the low income group population was provocative and profitable.

Feeding practice during illness bears important significance. During ARI illness mothers were expected to give their babies more fluid, normal diet and not to stop breastfeeding if practiced. In this study 52% of mothers in case group continued to give solid food as usually, but less than 20% increased the amount of fluid. While in control group 61% gave usual solid food and 34% increased the fluid. This reflected the better health practice in control group, which might have indirect bearing on the severity of the disease.

Factors related with clinical outcome

Most of the children presented a polymorph leukocytotic reaction which was the usual reaction in any acute infection(45.5%). Twenty one percent of the cases showed normal reaction, which again could be normal findings in case of pneumonia and or any viral infection. In chest films most of the cases were normal. Thirty three percent showed pneumonic consolidation and in 17% patchy opacities were reported. These findings were not quite different from other studies[69].

Multiple logistic regression

Vaccine when given, certainly prevent target diseases effectively but it's relation with severe ARI had been connected in respect of parental care. When not given meant poor quality of care which predisposed the child to risk. The significance was consistent among different studies in this regard[48,49].

Recent diarrhoea in the index subject certainly lower his or her defence against infection, particularly ARI. Again this result confirmed the findings of the study done in Bangladesh[53], though they failed to relate diarrhoea with severe ARI. In Bangladesh diarrhoea is a very common feature and every child has on an average 3.5 episodes per year. So the excess incidence of severe ARI could be related to this particular phenomenon. It was to be noted here that the risk increased even after adjustment.

Biogas had already been proved to contain many noxious substances[54,56]. They directly or indirectly affect the child's immune system and make her vulnerable to respiratory infections. The twice the risk in biogas users was well documented and biologically explainable too.

The most significant risk was associated with nutritional status of the child. This risk remained highly significant after adjustment (OR, 9.13). On univariate analysis although 1st degree malnutrition had an OR higher than 1, but this relation did not persist after adjustment.

The risk increased with the increment of the degree of malnutrition. This result was also highly consistent with other studies in this field[32-34]. The biological relation of state of nutrition and respiratory infection had been described by Berman S[68], and also well studied in different parts of the world[29-35]. Now it could be safely concluded that nutrition status was inversely related with severity of ARI.