

CHAPTER I

INTRODUCTION

1. Background and Significance of the Problem

Acute respiratory infection (ARI) is the most common cause of illness in children and a major cause of death in the world, accounting for more than 6% of the global burden of disease (Ezzati & Kammen, 2001). Among children under five years alone, three to five million deaths annually have been as a result of acute respiratory infection (ARI); of which 75% deaths are from pneumonia (Smith, et al., 2000).

Acute respiratory infection is the chief source of childhood morbidity worldwide, and acute lower respiratory infection (ALRI- mainly pneumonia), kills more children than any other disease making it also the chief cause of lost life-years in the world. In South Asia, it is responsible for more than 8% of burden of disease (Smith, 2003).

Indoor air pollution emerges as an important risk factor for acute respiratory infections (ARI) in developing countries. In many developing countries, in addition to an increasing amount of tobacco smoke, many homes contain high levels of smoke from the combustion of biofuels such as wood, crop residues, and animal dung for cooking or heating. In about half the world's households, such fuels are used for cooking daily, usually without a flue or chimney and with poor ventilation (Pandey, et al., 1989).

Globally, indoor air pollution ranks eighth in terms of disability adjusted life years (DALYS) and ranks eleventh in terms of mortality (Ezzati et al., 2002). In South Asia, Indoor Air Pollution ranks third among all major risk factors (Smith, 2003).

In a joint statement made by the World Health Organization (WHO) and the United Nations Development Program (UNDP) stated that indoor air pollution is one of the major cause of death and disease in the developing countries. Smoke from indoor cooking fires kills one person every 20 seconds (WHO, 2004b)

Approximately half of the world's population and up to 90 % of rural households in developing countries still depend on biomass fuels in the form of wood, dung and crop residues. Most indoor air pollution results from the burning of solid fuels for cooking and heating. Such fuels are burnt indoors in open fires or poorly functioning stoves. As a result, there are high levels of air pollution, to which women, who are responsible for cooking, and young children, who are usually with their mothers, are heavily exposed (Bruce et al., 2002).

Children are commonly exposed to very high levels of pollution for 3 to 7 hours daily over many years. During winter in many cold and mountainous areas, exposure may occur over a substantial portion of each 24-hour period. Young children, who spend more time indoor, are exposed many hours breathing smoke from early infancy (Bruce et al., 2000). According to the World Energy Assessment estimates the amount of smoke from these fires is equivalent of consuming two packs of cigarettes a day (WHO, 2004b).

Bhutan is a mountainous country located in the eastern Himalayas, with altitude varying from 180 m to 7,755 m above sea level. The climate includes a cool dry season from October to March with regular night frost. Most of families burn wood on open fires, with or without chimney. Most often only one room, usually the kitchen is heated by using the heat from the stove. About 86% of people living in the rural areas use fuel for cooking and heating. However, the majority of the rural and urban population uses biomass for cooking and heating in the form of wood. In urban areas, electricity, cooking gas, kerosene, and fuel wood are also used for cooking and heating. On an average, typical village home has a fire for 10 hours each day. On special occasions such as social functions, religious ceremonies etc., the fire hours extend to almost 15 hours. Mostly stoves used in the rural setting are on open fires or traditional mud stove without chimneys (Sharma cited in FAO, 2000). Considering the hours of a fire burnt, even though no study was done on effects on acute respiratory infections, people are exposed to indoor air pollution. In view of knowing that it causes respiratory diseases from indoor air pollution, Bhutan has launched a program on improved cooking stove with the objective to prevent respiratory diseases (Khandelwa & De Beoer, 1990).

In Bhutan, acute respiratory infections are the leading cause of morbidity and mortality among other communicable diseases in the country. (A report: National Health Survey, 2000). According to this report, 21% of deaths are due to acute respiratory infection, contributing significantly to infant mortality rate. Even though infant mortality and under five mortality rates dropped from 71 and 97 per 1000 live births in 1994 to 60.5 and 84 respectively in 2000, this is still considered high in Bhutan. While so many studies have been conducted on indoor air pollution related disease in most of the

developing countries, there is no known study of this kind in Bhutan. This study could be taken as baseline to obtain frequency of acute respiratory infection and other respiratory conditions associated with indoor air pollution among children.

2. Purpose of Study

To characterize the relationship between indoor air pollution (IAP) and acute respiratory infection (ARI), and other respiratory problems, in children under age five.

3. Research Questions

1. To what degree is exposure to indoor air pollution associated with risk of ARI and other respiratory problems in children under five in Bhutan?
2. What factors, other than IAP, influence risk of acute respiratory infection and other respiratory problems in these children?

4. Objectives of the Study

4.1 General Objective

To investigate whether indoor air pollution from household cooking and heating is associated with increased risk of acute respiratory infection and respiratory symptoms in children under five years of age

4.2 Specific Objectives

- 4.2.1 To describe the environmental factors, including indoor air pollution, children's factors, socio-demographic factors, acute respiratory infection and other respiratory problems.

4.2.2 To examine relationship between indoor air pollution, other environmental factors and ARI and other respiratory problems.

4.2.3 To examine the relationship between the children's factors and ARI and other respiratory problems

4.2.4 To examine the relationship between socio-demographic factors and ARI and other respiratory problems.

5. Research Hypothesis

The use of biomass fuels for household cooking or heating increases risk of recent acute respiratory infection and respiratory symptoms among children under 5 years of age.

6. Conceptual Framework

Acute respiratory infection and symptoms is dependent variable and indoor air pollution is an independent variable and it includes other determinants such as socio-demographic factors, environmental factors and child factors. This conceptual framework is based on Multiple Exposures Multiple Effects (MEME) model (WHO, 2004a).

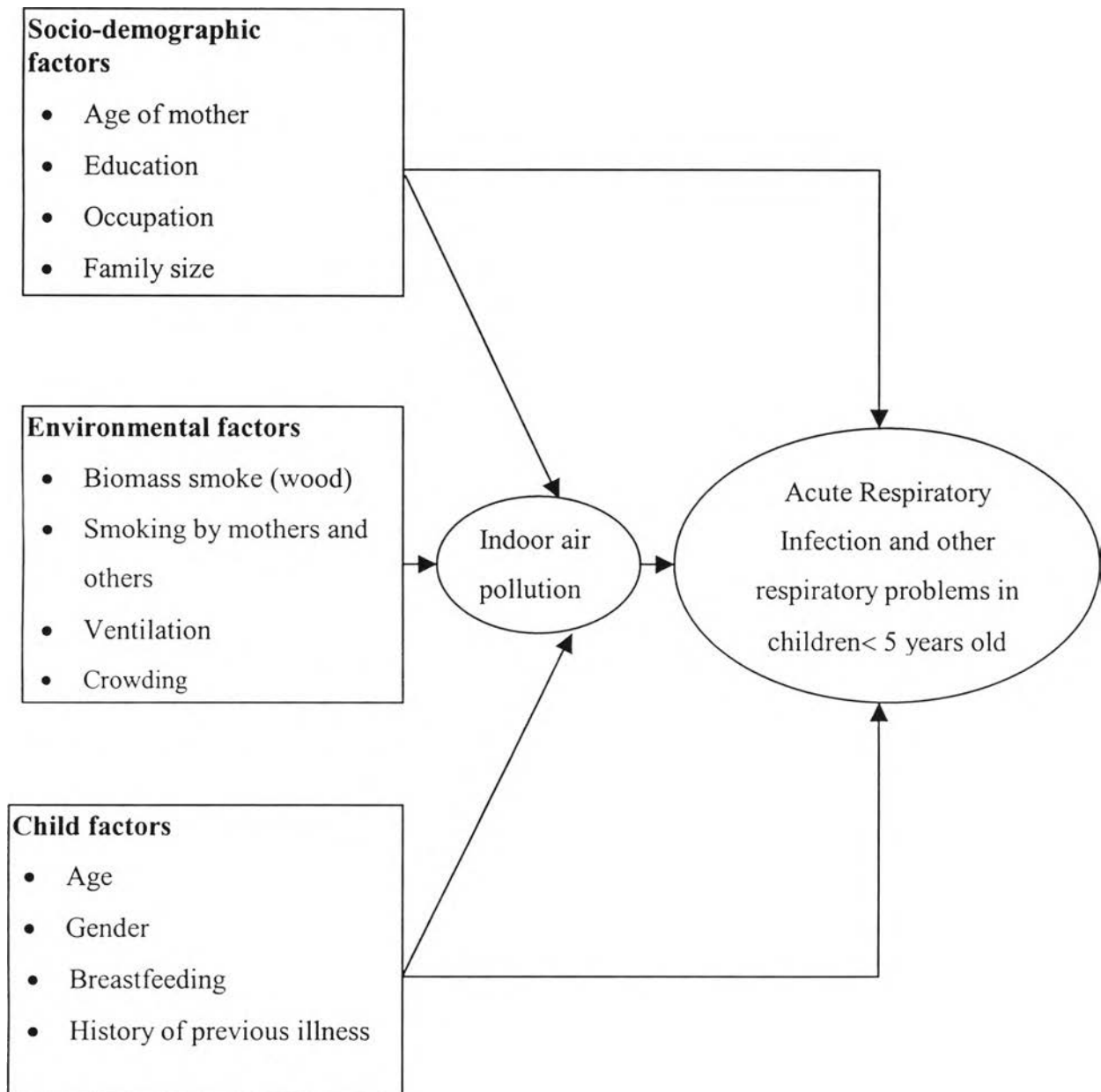


Figure 1: Factors affecting acute respiratory infection and respiratory symptoms

7. Operational Definition of Variables

Acute respiratory infections

Children under five who suffered from cough accompanied by short and rapid breathing at any time during the last two-weeks is defined as having suffered from an acute respiratory infection in the last two weeks.

Age it is the age of child under five year and age of mother.

Education level the education level is divided into different categories, none when the person has not attended any forms of educational institution. Primary is standard six and below. Secondary is standard seven and eight, higher secondary is between standard nine and twelve, college /university after that. Non-formal education is a form of education imparted to all women in basic reading and writing skills.

Exposure refers exposed to indoor pollution due to smoke from biomass fuel (wood) used for cooking and heating.

Biomass fuel refers to wood burned for household cooking and heating.

Indoor air pollution is mixture of gases and particles produced by incomplete combustion of biomass fuel.

Indoor crowding measured by number of persons per room in the household.

Children's exposure to passive smoking was defined as exposure from smoking by parents and other family members.

Breast-feeding is defined as breastfeeding for at least 4 months after birth.

Symptom is defined as combined presence of cough and phlegm of any duration in last the 12 months.