CHAPTER 1

INTRODUCTION

1.1 Introduction

Increased air pollutants in the environment has become an environmental issue in the current society because so many industries as well as vehicles are located within the urban centres. As populations increase, as more and more regions industrialize, air pollution is turning into a global issue. This is especially important in urban centres where the volume and density of traffic is high. In Indonesia, the growth in the pace of urbanization has compounded the levels of air pollution, unfortunately has developed serious impacts over the public health. Cities like Jakarta and Surabaya often have AQI more than the limit set by WHO standards of 20 μg/m3 for PM2.5. The major contributors are car emissions, industrial discharges, burning of waste and others while the key pollutants are particulate matter – PM2.5 and PM10, nitrogen dioxide NO2, sulphur dioxide SO2, carbon monoxide CO and ozone O3. These pollutants are hazardous to human health since they have adverse effects on the cardiovascular and pulmonary systems, it also increases the chance of early death.

Air quality and its impacts on human health in urban areas of Indonesia have been more of a concern in recent years, and study reveals increased health incidences linked to polluted air. However, there is still the lack of the *comprehensive* descriptive analysis that indicates the current state of air quality and corresponding influence on public health. This study aims to describe the effects of air pollution and its effects on human health in the urban setting of Indonesia using descriptive epidemiological and predictive modelling analysis. The study will use data collected from several sources including; governmental air quality stations, health records of urban hospitals, and meteorological parameters. By integrating descriptive

epidemiology with predictive modelling the study identifies not only the contemporary state of pollution's effect on health but also forecasts future health outcomes.

1.2 Problem Background

Indonesia currently at a position of being one of the world's most populous countries and contains a relatively large population comprising urban areas. Indonesian cities are developing very fast at the moment so they experience high emission from transport, industries, and buildings. Pollution levels in large cosmopolitan regions are usually high and may have adverse effects on public health. Major cities like Jakarta often feature in the list of the most polluted cities; the air quality in the city often becomes unhealthy for several days in a week. The impact of such pollution on health is severe as it increases occurrence of respiratory diseases, including asthma, Chronic Obstructive Pulmonary Disease (COPD), heart attacks, and strokes. Children, elderly, and those with pre-existing health conditions are vulnerable groups that have higher health risk.

However, the response to the problem has been challenging due to inadequate statistical analysis and research on the Indonesian condition with emphasis on the urban setting. Most empirical studies are built on partial information, which results into efficient solutions. For this reason, it is necessary to accumulate and systematize large amounts of information on pollution concentrations and health indicators in order to effectively combat the public health problem. This study aims to establish a solid theoretical framework and to formulate predictive models that can predict for the purpose of understanding the extent of air pollution in Indonesian cities and its immediate effects on the health of the population.

1.3 Problem Statement

Environmental and public health concerns such as air pollution remains to be a significant threat affecting urban areas in Indonesia. The problem concerned by this study is

pollution, particularly air pollution, as it affects the health of the people in urban centres of Indonesia. The goal of this research is to estimate the impact on human health caused by air pollution, as well as estimate the future consequences of pollution and construct the corresponding models. The key research questions include:

- What are the rates of air pollution in Indonesian cities in the present time?
- How does air pollution affect public health in these urban areas?
- What are the possible future trends of air pollution and their effects on health?

In order to answer these questions, the research will use descriptive epidemiological approach together with the modelling analysis. Therefore, it aims to offer an overall view of air pollution-health interface in urban Indonesia. The study also aims at identifying populations and geographical regions that are most at risk and need attention and support to reduce risks to health.

1.4 Research Objective

The research objectives are:

1. To assess the current levels of air pollution in major Indonesian urban areas.
2. To identify the most prevalent health outcomes related with air pollution in urban areas.
3. To develop predictive models that can forecast future air pollution levels and related health risks.

By achieving the objectives, the project aims to improve the understanding of environmental health in Indonesia and contribute in the establishment of particular measures that protect public health.

1.5 Gap Analysis

The analysis of literature shows that there are several gaps in knowledge regarding air pollution and its effects on the health of the population of urban Indonesia. Firstly, there are inadequate records on the state of air quality in different cities so as to give a final verdict on the situation. Second, the majority of the literature has concerned acute health effects, while the chronic effects and diseases remain under researched. Third, more practical and achievable goals include development of prognostic models to estimate future trends for proper preventive policy action.

This study will help fill these gaps by aggregating large amounts of data on air pollution and health from various sources. It will also create and improve mathematical models to assess future trends and possible effects on health. Thus, by addressing these gaps, the study will contribute to a better understanding of the air pollution-health connection in urban Indonesia and help in designing appropriate interventions.

1.6 Scope

The research scope are:

1. The research focuses on collecting and analysing air quality data of urban areas in Indonesia which are in Jakarta and Surabaya.
2. The research focuses on collecting and analysing health data on respiratory and cardiovascular diseases.
3. The target of the research is to integrate air quality and health data to identify correlations and trends.
4. The descriptive analysis is to identify approaches to mitigate the health risks caused by air pollution.
5. The predictive model is to forecast future air pollution levels and health risks.

1.7 Report Outline

This research consist of 5 chapter as follows:

- Chapter 1: Introduction – Introduces the study, covering the background, problem statement, objectives, gap analysis, scope, and report structure.
- Chapter 2: Literature Review – Reviews existing research on air pollution, public health in urban areas, descriptive epidemiology, predictive modeling, and integrated approaches.
- Chapter 3: Research Methodology – Describes the methods used, which are the data collection, preprocessing, modeling, and analytical techniques.
- Chapter 4: Initial Results – Presents preliminary findings from the exploratory data analysis of primary and secondary data.
- Chapter 5: Discussion and Future Work – Summarizes the outcome and future work.