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AN EPIDEMIOLOGICAL ASSESSMENT OF THE PREVALENCE OF SICKNESS AND INJURIES AMONG WORKERS IN ZAMBIAN INDUSTRY: THE CASE OF NAKAMBALA SUGAR ESTATE .

BY

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DECLARATION

I, PHILLIMON NDUBANI, do hereby solemnly declare that this dissertation represents my own work and that it has not previously been submitted for a degree at this or any other University.

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Date: 7 - 4 - 98

We have read this dissertation and have approved it for examination.

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APPROVAL

This dissertation of Mr. Phillimon Ndubani is approved as fulfilling part of the requirement for the award of the degree of Master of Public Health by the University of Zambia.

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	7.4.98
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DEDICATIONS

This work is dedicated to the following:

Late Grandfather with whom I shared the same spirit of dedication. My late mother, to my wife and to my children.

To all I say *naitumele shikuma nimwenu* for contributing in many ways towards my education which has culminated in the production of this piece of work.

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LIST OF ABBREVIATIONS

TB	:	Tuberculosis
STD	:	Sexually Transmitted Diseases
ZCCM	:	Zambia Consolidated Copper Mines
CMA	:	Company medical Advisor
HRD	:	Human Resources Department
ZID	:	Zambia Industrial Development
NSE	:	Nakambala Sugar Estate
ILO	:	International Labour Organisation
WHO	:	World Health Organisation
UNEP	:	United nations Environmental Programme
MPH	:	Master of Public Health
MF	:	Medical Form
ZSC	:	Zambia Sugar Company
GDP	:	Gross Domestic Product

CHAPTER ONE
INTRODUCTION

1.0 Overview

This study was conducted at Nakambala sugar estate to assess and determine the prevalence of sickness and injuries among workers.

Sickness and injuries at workplaces continue to be a growing problem worldwide. The situation could be worse in developing countries where occupational health and safety standards are unsatisfactory. In many African countries, including Zambia, the policy and legal framework is either lacking or where it exists, the rules are not strictly adhered to. Furthermore, good data on sickness and injuries is not usually available.

In understanding sickness, the starting point is the view that people's perceptions of sickness and injuries at workplaces develop in relationship with specific social, industrial and cultural context. Every industrial organisation has a work culture which influences workers perceptions about health and safety. Therefore, most of the discussion presented in this dissertation includes an elaborate description of the workers perceptions of their own working milieu. This focus reflects the author's disciplinary background as a Social scientist. The research reported in this dissertation was conceived, framed and conducted within the orientation of epidemiology. An explication of the epidemiological conceptual framework and a critical literature review have provided a solid base for the discussion of the empirical data arising from this research.

1.1 Conceptual Background

Epidemiology is concerned with the pattern of disease occurrence in human populations and the factors that influence the disease pattern (Lilienfeld, 1980). Epidemiology is divided into descriptive, analytical and experimental. Descriptive epidemiology studies the geographical, temporal and social variations in the frequency of morbidity (Unger, 1992) while analytical is concerned with hypothesis testing.

The present study conveniently combines both descriptive and analytical epidemiology. The study has endeavoured, not only to give a descriptive profile of sickness and injuries at Nakambala but also attempted to test some specific hypotheses.

A fuller appreciation of epidemiology ought to start with a brief elucidation of its historical place in the world of science. The development of epidemiology has spanned many centuries. As an eclectic discipline, epidemiology has borrowed from sociology, demography and statistics, as well as other fields of study. A first reader of epidemiology should not be surprised to learn that its history is interwoven with that of other scientific disciplines (Terris, 1962). It was not until the nineteenth century that the fabrics of epidemiology were finally woven into a distinct and coherent discipline with its own philosophy, concepts and methods (Lilienfeld, 1980).

When applied to occupational health and safety, epidemiology has the dual task of; firstly, describing the distribution of sickness and injuries among the occupationally active population; and secondly, searching for determinants of health, sickness and injury in the occupational environment (Karvonen, 1986 Cheokoway, 1989).

Until recently, the concept of occupational disease or sickness denoted a specific clinical and pathological syndrome caused by a hazard specific to a particular type of work or work environment. Epidemiological studies have, however, somewhat shaken of this notion of specificity. There is a growing recognition that the occurrence of occupational diseases may be affected by non-occupational factors, such as nutritional state and other social habits. On the other hand, as Karvonen (1986) has observed, the prevalence and the incidence of several common diseases may also be influenced by occupation.

Work-related accidental injuries, like sickness, can be caused by numerous environmental and human factors. Epidemiological research has helped to identify these factors and to suggest effective control strategies.

Theoretically, two important aspects of accidental events are: firstly, the risk or probability that an accident will occur; and, secondly, if it does occur, the probability that a worker will be injured. Lawrence and Comm (1972) postulated this as follows:

If a total of n workers are employed for a given period of time, they may be divided into three categories as follows:

a) The number of workers who are not involved in accidents.

b) The number of workers who are involved in accidents but who are not injured.

c) The number of workers who are involved in accidents and who are injured.

Then $n=(a+b+c)$ and the total risk or probability of injury is c/n

For example, if 4000 workers are employed and 6 injuries occur during a given period of time(say, one month) then the probability of an individual worker being injured is 6/4000 or 0.0015 per month. This could be stated as 0.15 injuries per 100 workers per month or as 1.5 injuries per 1000 workers per month.

The base period should be long to make c large enough to provide a reliable index.

The probability that a worker will be involved in an accident in a given time is $(b+c)/n$, and the probability that a worker who is involved in an accident will in fact be injured is $c/(b+c)$.

$$\text{Therefore } c/n = \frac{b+c}{n} \times \frac{c}{b+c}$$

Thus:

> the probability that a worker will be injured= the probability of an accident x the probability of an injury in the event of an accident.

Arising from the above postulation, it is clear that there are two possible ways in which the total injury risk can be reduced. One is to reduce the likelihood of an accident occurring and the other is to reduce the risk of injury when an accident does occur.

Several difficulties arise, however, when compiling statistics about accidents as means of devising safer working conditions. An important problem is that it is usually impractical to collect information about b. Many accidental events occur but because they do not result into injury, they are not recognised as accidents. Consequently, accident statistics usually concentrate on the number of injuries c and the injury rate c/n

Historically, Sickness and injuries at workplace have long been a subject of epidemiological study. Starting with the first systematic publication of trade diseases by Ramazzini in Italy in the 18th century, sickness and injury at workplace have continually received growing attention (Waldron, 1985). Today, workers throughout the world are exposed to numerous chemical and physical hazards associated with industrial technologies and workplace characteristics. It is reported that about 33 million acute injuries and 150,000 deaths from chronic diseases due to occupationally related infections and exposure to dusts, metals and chemicals occur each year (WHO, 1993). However, the data for many countries are still lacking and scarce. This reflects lack of epidemiological studies especially in many developing countries where health and safety regulations either do not exist or where they do, are not strictly enforced.

1.2 Occupational Health and Safety in Zambia.

Occupational health and safety in Zambia should be understood within the historical context of the development of the socio-economic circumstances of the country.

The Zambian industry has been growing since independence in 1964. Mining, which is the major industrial activity in the country has, over the last two decades or so, been joined by quarrying, agriculture, construction, hydro-electric power generation, manufacturing, transport, textiles and weaving (Hansson, 1995 Nkurlu, 1996). Despite the growth in industry very little has been achieved in the area of occupational health and safety. Policy and legal framework for effective execution of occupational health and safety have been lacking. As a result, the majority of the workers in Zambia have continued to face numerous occupational health and safety risks in all the various industrial and agricultural undertakings (Nkurlu, 1996). However, recent events indicate that the situation is changing. A policy document has been drafted at the Ministry of Labour and Social Security although it is not clear yet as to when this policy draft will be finalised (Nkurlu,1996, Investigator's personal communication with Officials from the Factory Inspectorate at the Ministry of Labour, 1997). In 1994, a draft bill on occupational health and safety was discussed by the tripartite workshop held in Lusaka. The aim of this bill is to harmonize the existing legislation. In 1995, the draft was refined by yet another tripartite committee and it is now being studied by the Attorney General. It is expected that the bill will be presented to parliament during the course of 1997 after receiving comments from interested ministries, employers and workers organisations (Loewenson,1996).

The process of legal review in the country is widening the definition of occupational health and safety from the more narrow and fragmented 'work safety' concept of the old 'factories Act' to the broader concept of risk to safety and health (Loewenson, 1996).

The development of the new laws indicate an awareness on the part of the policy makers about the need to safeguard the health and safety of the workers. Puta (1994), reviewing the health and safety of women in workplaces in Zambia, observed that adequate occupational health and safety laws and their enforcement measures are necessary to ensure the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations. For this to be accomplished, a sound legal framework must be established.

It is against the foregoing background that the present study was proposed and conducted. Owing to time and resources allocated to carry out a research project within the MPH programme, it became obvious that a larger study could not be carried out. In order to save time and resources whilst at the same time do a good and constructive study, Nakambala Sugar Estate was selected for study. Firstly, Nakambala was chosen because it is a consolidated organization embracing several agricultural and industrial occupations within one company. Workers were interviewed within one and the same setting. Secondly, it has a medical service with records on sickness and injuries. This made the collection of data easier and more convenient.

1.3 Nakambala Sugar Estate: The Microcosm of the Zambian Industry.

Nakambala Sugar Estate is situated at Mazabuka, about 128 Km from Lusaka. It is on the main highway to Livingstone. Mazabuka has a total population of 157,724, (CSO, 1990) and the predominant language is Tonga. The population is serviced by a district hospital and one urban clinic both run by the Ministry of health. Nakambala Sugar Estate has one main clinic and 2 sub-clinics which cater for a population of 30,000 workers and their dependents.

It may suffice here to give a brief historical background of Nakambala Sugar estate. The Company was started in June 1964, just before independence. Up to 1955, most of Zambia's sugar came from the factories of Sena estates limited on the Zambezi river in Mozambique. Due to the growing demand for sugar in both Northern and Southern Rhodesia (Zambia and Zimbabwe), a company called Rhodesia Sugar Refinery was formed and in October 1939 the first refinery was opened in Bulawayo. In 1951 a second refinery was opened in Salisbury.

The sugar cane that supplied the Rhodesian refineries came from small cane growers scattered throughout Southern Rhodesia. As the demand for sugar cane grew, two cane growing projects were developed. One of these cane growing projects was in the Zambezi valley at Chirundu. The Rhodesia Sugar Refinery limited, with financial and technical assistance from Tate and Lyle, developed the Chirundu sugar estate in 1955 (Hughan, 1966). In Northern Rhodesia, sugar industry started in 1960 when a sugar refinery at Ndola was commissioned. Its raw sugar cane was supplied by the Chirundu estate. When the federation of Rhodesia and Nyasaland was dissolved in 1963 the sugar estate at Chirundu was liquidated and Tate and Lyle, the major shareholders, started to search for alternative cane growing in Zambia(ZID, 1967). Potential cane growing areas in the country were carefully investigated between 1963 and 1964 and a more suitable area was selected on the south bank of the Kafue river. This is what became known as Nakambala (Hughan,1966).

Nakambala Sugar Estate was established after Tate and Lyle Limited acquired about 17,000 hectares of freehold land with water rights on the Kafue river. The development of the Zambian sugar industry became a joint effort of Tate and Lyle and the government. To facilitate and co-ordinate the activities of the industry, Zambia Sugar Company (ZSC) was incorporated in June 1965 (ZSC, 1984). The ZSC Limited replaced the Ndola Sugar Company Limited that had been incorporated in 1960. This new company became in charge of both the Ndola Sugar Refinery and the Nakambala Sugar Estate.

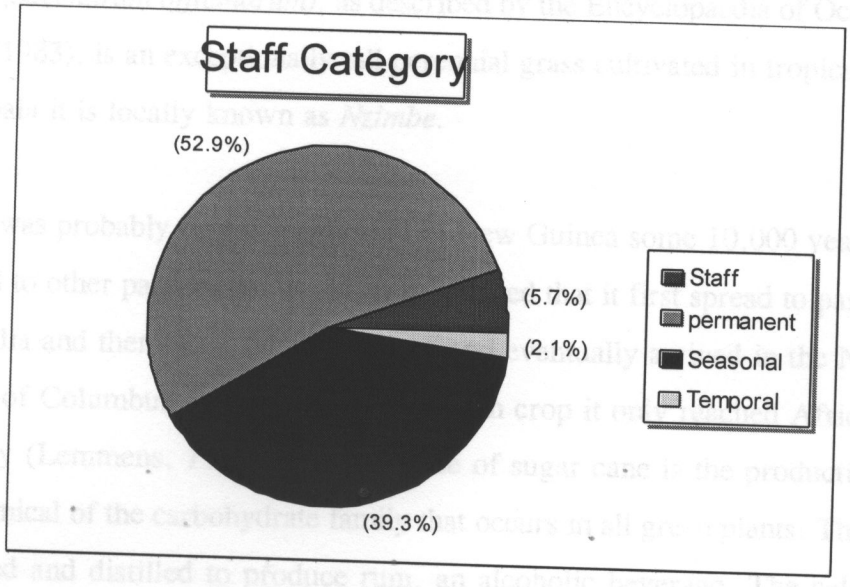
Tate and Lyle pulled lost this involvement in the Zambian Sugar industry when ZSC was wholly nationalised in the 1970's. In the Third Republic ZSC became one of the first Zambian companies to be privatized under the new economic liberalization policy. The company was privatised in August 1995 and Tate and Lyle became, once again, the major shareholder. Its current production is 160,000 tons of sugar per year and this is expected to increase to 190,000 tons by the year 2000. Nakambala Sugar Estate employs up to 5,300 permanent, seasonal and temporal employees. Every year an extra 3,000 cane cutters are recruited from April to about October. With the labour force as big as this, the health and safety policy becomes a crucial matter. Sickness and injuries should never be under-estimated.

Nakambala estate provides medical and public health services to its employees. The estate runs three clinics; Njomona main clinic and Kaleya and Chuula sub-clinics. Each of the sub-clinics is run by a Clinical Officer and a Mid-wife. The sub-clinics attend to minor complaints whilst severe cases are referred to Njomona main clinic. The main clinic has 24 professional members of staff. There are 2 Medical Officers, 7 Clinical Officers, 7 Nursing staff, 3 Environmental Health Officers, 2 Laboratory Technicians and 1 Pharmacy Technologist. The main clinic has an admission capacity of 15 beds; 5 males, 5 females and another 5 beds in a special room for both male and female. Admissions are exclusively for acute cases and mostly for cases on observation. The maximum period a person can be admitted for observations is 7 days. Chronic cases are referred to Mazabuka district hospital. Nakambala clinics attend to an average of 130 cases per day.

As a matter of policy, Nakambala sugar estate provides free medical services to its employees and families. The estate also provides pre-employment and periodic screening for TB. Safety instructions in the use of herbicides and insecticides by spray men are also provided. Employees are entitled to receive protective clothing and those that get injured during the normal course of duty are covered by the Workmen Compensation Act. All the employees are accommodated in company houses.

Figure one shows the manpower strength of Nakambala sugar estate by staff category. The category excluded is that of cane cutters who were on break when the study was being conducted.

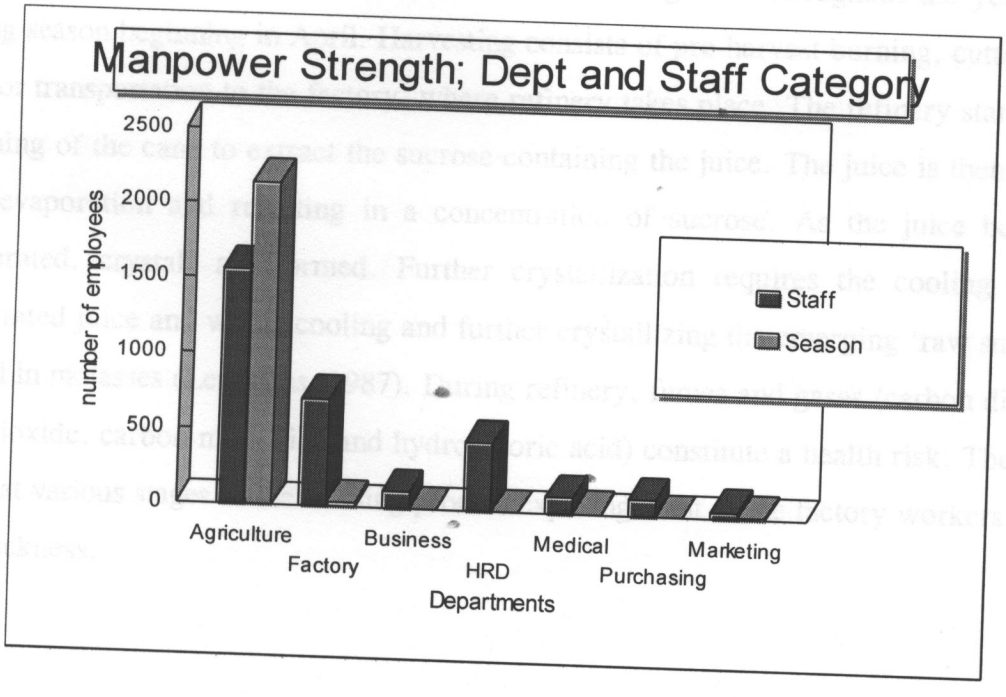
Figure 1: Manpower Strength as at 31st December 1996



Source: Human Resources Department, NSE

Figure two shows manpower strength by department and by staff category.

Figure 2: Manpower strength by Department and staff category.



Source: Human Resources Department, NSE.

1.4 Health risks of Sugar Cane Growing and Refinery.

Sugar cane *(Saccharum officinarum),* as described by the Encyclopaedia of Occupational health and safety (1983), is an exceptionally tall perennial grass cultivated in tropics and subtropics. At Nakambala it is locally known as *Nzimbe.*

Sugar cane was probably first domesticated in New Guinea some 10,000 years ago and from there spread to other parts of the world. It is believed that it first spread to parts of South East Asia via India and then to the Mediterranean and eventually arrived in the New World with the voyage of Columbus in 1493. As a plantation crop it only reached Africa in the middle 19th century (Lemmens, 1987). The main use of sugar cane is the production of sugar, an organic chemical of the carbohydrate family that occurs in all green plants. The cane may also be fermented and distilled to produce rum, an alcoholic beverage. The cellulose material, *bagasse,* which remains after extracting sugar may be used in the production of paper (Permeggiani, 1983).

At Nakambala estate, sugar is cultivated on 10,482 hectares of estate land. For administrative purposes the estate is divided into four fields of about 2700 hectares each. The fields are: Kawama, Chuula, Kaleya and Nakambala. The cane is grown throughout the year with harvesting season beginning in April. Harvesting consists of pre-harvest burning, cutting and loading for transportation to the factory, where refinery takes place. The refinery starts with the crushing of the cane to extract the sucrose containing the juice. The juice is then boiled causing evaporation and resulting in a concentration of sucrose. As the juice becomes supersaturated, crystals are formed. Further crystallization requires the cooling of the supersaturated juice and whilst cooling and further crystallizing the emerging 'raw sugar' is embedded in molasses (Lemmens, 1987). During refinery, fumes and gases (carbon dioxide, sulphur dioxide, carbon monoxide and hydrochloric acid) constitute a health risk. These are given off at various stages of the refining process exposing most of the factory workers to the risks of sickness.

Since high temperatures are used or produced in evaporating pans and boilers, the fumes and steam given off could be toxic. Dust, which contains residue from ovens can irritate the respiratory tract and may sometimes cause *bagassosis*. Areas of the factory that are near the turbines can have noise levels exceeding tolerable limits. Factory floors may be wet and slippery posing risks of injuries. Decomposing organic matter gives of unpleasant odours (sulphurated hydrogen).

Sugar cane is grown where environmental and climatic conditions make certain diseases and pathological conditions endemic. Owing to this, sugar estates have attracted the interest of occupational health and safety experts. Other studies carried out in this field suggest that the health risks associated with cane growing are injuries, fatigue due to hard work, infections and bites from snakes and arthropods (WHO, 1993, Parmeggiani, 1983). Injuries arise mostly from machetes during cane cutting.

It is reported that in Sugar industry sickness is generally 50 per cent higher than in other branches of industry. Tuberculosis, chronic fatigue, sexually transmitted diseases and alcoholism are common in the sugar industry (Parmeggiani, 1983).

1.5 Statement of the Problem.

The incidence and prevalence of sickness and injuries arising from occupational causes in the Zambian industries are not adequately recorded and monitored. This is reflected in the lack of up to date data in all the relevant Government departments. However, the rate of serious and fatal injuries have been steadily rising in Zambia. The available data compiled in the 1970,s and 80's demonstrate the rise. For example, in 1974, 243 accidents, of which 9 were fatal, were reported to the Ministry of Labour (Annual Report, 1974). In 1976, 315 accidents, out of which 10 were fatal were reported (Annual Report,1976). In 1982, 346 accidents were reported (Annual Report, 1982). It must be noted that these figures are underestimates and out of date. Due to weaknesses in the law, many companies do not report.

Similarly, Sickness has not been reported to the Ministry of Labour for over two decades now. Previously, Medical Officers used to report all occupationally related sicknesses to the Ministry of Labour.

There has, therefore, been great need to carry out research to assess the prevalence of sickness and injuries in the Zambian industries. This study has been conducted to assess the prevalence of sickness and injuries at Nakambala Sugar estate. In 1992, 2,314 accidents resulting in injury were treated at Nakambala estate clinics (Medical Report, NSE,1993). During the same period, 12,346 man-hours were lost due to sickness including injuries. In 1996, 2276 accidental injuries were treated at the estate clinic.

This study sought, *inter alia,* to answer specific questions pertaining to sickness and injuries. Some of the specific questions are:

1. How much sickness is in the general population of Nakambala sugar estate?
2. How much sickness and injuries exist among the workers?
3. Which categories of workers are more affected by sickness and injuries?
4. What are the workers' perceptions about risky occupations and jobs?

1.6 Study Justification

The need to safeguard the health and safety of industrial workers has been documented for many years. Unfortunately, the health and safety of workers has not received much attention in many countries. In most cases the employers are always reluctant to improve the health and safety standards of their workers.

In Zambia, good baseline data upon which one can easily make an impression about the health and safety of the workers are no available.

In the absence of adequate data there has been an imperative need to conduct research to assess and determine sickness and injuries among workers in Zambia. A national policy needs to be formulated, as a matter of urgency, to provide a framework within which health and safety standards at workplaces can operate. Hitherto, no epidemiological studies have been done to assess the prevalence of sickness and injuries at workplace.

This study hopes to shed some light on the problems of sickness and injuries at Nakambala Sugar Estate. As Nakambala grows and expands due to privatisation, the prevalence of sickness and injury is likely to increase necessitating a comprehensive occupational health and

safety programme. The findings discussed in this dissertation could be useful both to the national policy makers and Nakambala Sugar Estate management.

1.7 Definition of Concepts

In this study the terms used have the meanings set out below:

Bagassosis: Is the name given to an occupational disease of the lungs caused by inhalation of *bagasse* or cane fibre in sugar cane dust. *Bagassosis* has been shown to be due to a *thermophilic actinomycete* for which the name *thermoactinomyces sacchari* was suggested. The symptoms consists of breathlessness, cough, *haemoptysis* and slight fever. Initially there is acute diffuse *bronchiolitis*. There is impairment of lung functioning. If left untreated there is diffuse fibrosis, emphysema and *bronchiectasis* (Parmeggiani, 1983).

Injury : Accidental injuries have been defined by the ILO as:

> 'Those recordable injuries resulting from accidents occurring at the workplace and resulting in death, personal injury or acute diseases' (ILO, 1985).

Occupational disease: When it is clear that a causal relationship exist between an occupational exposure and a specific disease or injury, that disease or injury is usually considered both medically and legally as occupational and may be defined as such (Karvonen et. al. 1986).

Prevalence: The total number of old and new cases of a specific disease in a geographical location in a given point in time or period of time (WHO, 1994). Prevalence is computed as the number of cases divided by the number of workers in the study company.

Sickness: Sickness is a state of social dysfunction i.e. the role that the individual assumes when ill or diseased. A sick person is unlikely to perform his work as effectively as a healthy person would do.

Sickness Absenteeism: Absence from work arising from sickness or/and injury (Flippo 1980).

CHAPTER TWO

AIMS AND OBJECTIVES

The principal aim of the study was to review and assess the prevalence of sickness and injuries at Nakambala Sugar Estate.

2.1 Specific Objectives are stated as follows:

1. To outline the laid down health and safety regulations.
2. To determine compliance to the occupational health and safety laws.
3. To determine sickness and injury occurrences.
4. To compare the rates of sickness and injuries among different occupational groups.
5. To identify occupations that are perceived as risky by the workers.
6. To make recommendations on how to improve health and safety standards.

2.2 STUDY HYPOTHESES:

A high prevalence of sickness and injuries at Nakambala Sugar Estate was predicted. Arising from this, a number of hypotheses were formulated for testing.

The General hypothesis:

It was hypothesized that workers in particular occupations are at higher risk of sickness and injury than their counterparts in other occupations.

The specific hypotheses are as follows:

1. Workers in the fields are more likely to suffer from sickness and injury than workers in other occupations.
2. Workers doing general work are more likely to suffer from sickness and injuries than workers doing other jobs.

3. Female workers are more likely to suffer from sickness than male workers.
4. Unskilled workers are more likely to suffer from sickness and injuries than skilled workers.
5. Skilled workers are more likely to know the risks associated with their occupations than unskilled workers.
6. Highly educated workers are less likely to suffer from sickness and injuries than lowly educated workers.

2.3 Study Limitations

i. The assessment of sickness and injuries was done in one company - Nakambala. Thus the findings may not be easily and plausibly generalized to other industrial settings. Industries are diverse and complex institutions with unique goals and problems. A study of this nature would have been comprehensively and representatively complete if a nation wide assessment was conducted on a sample of industries. But such a study was not possible due to financial and time constraints.

ii. It was not possible to make conclusive associations between sickness and occupations from this cross-sectional study. A study of this nature would probably have reflected a stronger association between occupations and sickness if randomized clinical trials or a prospective study were conducted.

iii. A cross-sectional study could not adequately inform the research on the changing views and perceptions as regards sickness and injuries. A Prospective and process - oriented study using observational methods would have provided additional information on the ways in which both the workers' and the managers' views and perceptions evolve and how these views are influenced by changing circumstances.

CHAPTER THREE

REVIEW OF RELEVANT LITERATURE

3.1 Overview

In this chapter some of the key studies and works done in the area of sickness and injuries at workplace are indicated. It has been observed that the relevant literature appears to be dominated by organisations such as the WHO and ILO as opposed to studies by individual scholars focusing on individual countries and situations. This review has focused more on the empirical rather than theoretical literature. Theoretical literature has been extensively covered in the first chapter under conceptual background.

3.2 Relevant Literature.

It is essential to recognize that sickness and injuries are part of both the general population and a specific working environment. Hernberg (1986) observes that sickness may be caused by occupational exposure or the work conditions in general, but most sickness in working populations is actually part of the general morbidity. This sickness also has a bearing on occupational health, since almost any sickness can interfere with the working capacity of the employee. Hence, a complete health picture of the 'community' is crucial. Sickness and injury pattern among employees at Nakambala cannot be viewed in isolation of the sickness pattern in the general population. Occupational health must, therefore, be given a broader meaning that takes into account non-occupational factors.

Studies show that sickness and injuries remain the most appalling human tragedy of modern industry. They are also the most serious forms of economic waste. The best estimates currently available on a world basis reckon the number of fatal injuries at workplaces to be close to 33 million annually (WHO, 1993 Parmeggiani, 1983). These data point to the fact that the problem is growing especially in developing countries where workplaces remain largely unsatisfactory in terms of occupational health and safety standards.

Worldwide, workers in many heavy industries -mines, quarries, construction sites, textile factories- are constantly exposed to respirable dusts some of which is fibrogenic and/or carcinogenic. These workers are also often exposed to irritant gases and fumes. Chronic bronchitis and emphysema are highly prevalent among such workers, leading to respiratory symptoms and functional impairment (Sheppard, 1990).

Similarly, agricultural workers have high risks of pesticide poisoning, infectious and parasitic diseases, organic dusts and allergies(Karvonen,1986). Industrialization and mechanization of agriculture have made the problem acute. Agricultural production now depends so much on pesticide usage in an effort to stem crop losses to pests (WHO/UNEP, 1990). Notwithstanding their importance, pesticides pose significant health hazard throughout the world (Moses, M 1983).

A study carried out in Costa Rica showed that 3,330 pesticide -related hospitalizations occurred from 1980 - 86 resulting in 429 deaths(Wesseling et al. 1993). Sugar production is one of those agricultural industries affected by industrialisation and mechanisation. As a result, sickness and injuries are common. Several studies have shown that sickness in the sugar industry is very high in some cases 50 per cent higher than other industries (Parmegiana, 1983. Sickness and injury in the sugar industry result from the nature of activities involved in sugar processing and production (WHO, 1993).Furthermore sugar cane growing is done in the tropics where environmental conditions promote sickness (WHO, 1995).

In Zambia, although mining is still the largest industrial activity, employing about 42,000 workers and earning more than 90 per cent of Zambia's foreign exchange (ZCCM, 1995), other industrial activities such as agriculture, construction, metal fabrication, manufacturing, food processing, textiles and weaving have shown remarkable growth. Agriculture now engages about 38 per cent of the Zambian population and accounts for 28 per cent of the GDP (Hansson, 1995). As agriculture takes more prominence in the economy, there is an urgent need for health and safety legislation to address the health hazards associated with agricultural occupations. In Zambia, for example, pesticide poisoning has largely remained unreported. There is need to strengthen the health and safety legislation to compel industries to report pesticide poisoning.

Accidents are also a major cause of injury and sickness in many occupations. The incidence of sickness and injuries may be affected by such factors as organisation of work, proper training, ergonomics and safety campaigns (Karvonen, 1986 Waler, 1985) which are rarely undertaken by management or understood in Zambian industry. Most occupational injuries are avoidable. Broadly they are the result of defective adaptation to or inadequate control of the working environment. However unintended and unforeseen they may be, accidents can often be averted by sufficient care or by technical safeguards (ILO, 1995).

In Zambia, with poor economy, much of the industrial plant equipment could be obsolete. This factor, coupled with increased production demands, result in higher sickness and injury rates that go unnoticed. The under-notification of occupational diseases has deceived policy makers into thinking that occupational health problems virtually do not exist. The level of integration between the mainstream health services run by the Ministry of Health and the occupational health and safety often co-ordinated by the Ministry of labour is unsatisfactory. In effect the country's health information system does not adequately record occupational sickness (ILO, 1996) and consequently the magnitude of sickness and injury is not well known.
The application of the law has not been stringent in as far as ensuring the health and safety of the workers is concerned. The law has been fragment. The factories Act, in particular, has been narrow in its definitions of the workplace.

It is, however, gratifying to note that there is now a strong will to enact an occupational health and safety law in Zambia. The new bill seeks to move away from the narrow specification of a 'factory' towards the inclusion of all workplaces where there is a contract of employment, independent of the type of work or the number of workers (Loewenson, 1996). This more comprehensive inclusion is a logical response to a wide range of types of workplaces that exist in the country and the need for basic safety and health standard to be applied to all of them.

There is now general agreement to strengthen the legal framework in order to reduce sickness and injuries at workplaces. Sickness in the labour force affects productivity. When a worker is sick he is unable to perform adequately; he may often be absent. The direct cost of sickness and injury will often manifest as higher product prices caused by absenteeism and workers

compensation payments. The indirect costs appears as welfare costs, aid to families, medical and rehabilitation costs (Flippo, 1980). This has a retarding effect on the development of the nation as a whole.

3.3 Limitations of literature reviewed

i. Literature on studies done in the area of occupational health and safety in Africa and Zambia in particular are scarce. This has necessitated reliance on WHO and ILO reports and manuals. The ILO and WHO publications tend to give overviews rather than comprehensive and in-depth analyses of country studies. They rarely focus on specific industries within the countries they report on.

ii. Accurate and up to date data is essential. The reporting by Zambian government departments on occupational health and safety is erratic and in most cases non-existent. This limits the literature that should be available for a study such as this one.

CHAPTER FOUR

METHODOLOGY AND PROCEDURE

4.0 Overview

In this chapter the methods and procedure of the study are discussed under the following main headings: study population; and data collection.

Epidemiological methods have been widely used in the field of occupational health to identify specific work related hazards and to assess the health status of the specific working populations (Jardel, 1986). The present study was a cross-sectional study designed to assess the prevalence of sickness and injuries among employees at Nakambala Sugar Estate. Data was collected from several sources as discussed below. The methods for data collection are also discussed in this chapter.

4.1.0 STUDY POPULATION

The study population consisted of the unionised employees in the permanent and seasonal categories. These constituted the main study population and they provided the bulk of the data. The study population also included the Human Resources managers and safety officers; sectional managers and supervisors from all the departments including the clinic staff. Secondary data at the clinic was also collected.

4.1.1 Entering Nakambala Sugar Estate

Nakambala Sugar Estate was particularly chosen to provide an industrial setting for this epidemiological study because of its diverse occupational representation. Nakambala also provides a good setting for the study because, by virtue of its ecological and geographical set up, its population may be vulnerable to a class of pathological conditions which may be unique to the estate.

Nakambala was entered through the Company Medical Advisor who was contacted four

months prior to the commencement of the study (See appendix 1). Entering Nakambala Sugar Estate with the help of the CMA proved very useful. Managers in the medical field appreciated epidemiological research and viewed the research with optimism, although this is not to imply that the other managers from the non-medical departments did not.

Studies of morbidity patterns among the workers in industry can be very sensitive. Employers often do not wish to acknowledge that their workers know and understand the health risks associated with their jobs. One manager at Nakambala, remarked;

> 'We do not want to start getting adverse reports about the connection between certain diseases and occupations. The issue of cause - effect must be avoided. Workers want to blame others (management) for their sickness, so do not ask the workers whether they know that their sickness is due to the jobs they do'.

A researcher may be seen as a conscientiser by management and as a redeemer by the employees. As one employee said to the investigator;

> 'Please help us, the management here at Nakambala does not care about our safety'.

This shows how important it is for the researcher to explain his role to both parties otherwise he may be mistaken for an advocate by the employees.

At the start of the study it was imperative that management understood the aims and the scope of the research. As soon as the CMA formally introduced the investigator to the HRD, a short briefing was held during which the data collection instruments were studied. Permission to collect data was then obtained. However, the issue of Sampling proved controversial. There was a question of who should prepare and provide a sampling frame, a duty some managers felt should be the responsibility of the Human Resources Department. But according to the other managers in HRD, this was going to consume more of their time and energy. The sampling procedures were then left to the investigator to do, of course, in liaison with departmental and sectional managers.

$$n = \frac{3.84 \times 20 \times 80}{5^2} = \frac{6144}{25} = 245$$

The total sample size for the survey was 245 individual workers.

Table one below shows the sample size for each of the 10 sections that participated in the study. The sample size for each section was arrived at arbitrarily depending on the manpower strength. All the sections had to be represented. The more employees the section had the larger was the number of employees allocated to the study.

Table 1: Number of workers per section selected for participation in the survey.

Section	Sample Size	Actual Interviewed
Medical	10	10
Human Resources	10	10
Land Preparation	20	14
Workshop	20	20
Factory	30	30
Cane Haulage	10	10
Civil Engineering	30	29
Agriculture	80	80
Research	15	15
Materials/stores	20	20
TOTAL	**245**	**238**

SOURCE: Field Data

A semi-structured questionnaire comprising pre-coded and open ended questions was administered to 238 employees randomly selected from the 10 sections. There was a 95 per cent response rate.

Five workers did not respond to the questionnaire because they were absent on the days of the interviews and replacement could not be immediately available. Two employees refused to participate; one from land preparation and another from engineering.

The sampling frame containing the names of all the employees in each section were provided by sectional managers and supervisors a day before the interviews. The potential participants were then randomly chosen using simple randomisation.

4.2.0 DATA COLLECTION

4.2.1 Data Collection Instruments

Four separate data collection instruments were developed each designed for a specific category of the study population. The data collection instruments were designed to elicit information from the following categories: human resources manager and safety officers; the sectional managers and supervisors; the clinic records and staff; and the individual workers. The instruments administered to the managers and supervisors were interview schedules intended to collect background and mostly factual information about the health and safety of the employees (see appendix 2 and 3). A checklist was also used to ascertain the existence and availability of protective devices and clothing (see appendix 4). The main instrument that provided the bulk of the data was a semi-structured questionnaire administered to 238 employees in 10 sections on the estate. The questionnaire sought to collect data on three main aspect of the selected employees. It sought to collect, *inter alia*, socio-demographic information of individual employees; sickness and injury experience since coming to Nakambala; and finally, knowledge about risks associated with jobs and working situations (see appendix 5).

4.2.2 Pretest

The questionnaire for the employees was pretested in Chiawa at Masstock farms. Ten employees on the farm were interviewed to determine the appropriateness of the questions. The pretest indicated that the questionnaire was adequate except for minor changes in sequencing and numbering of the questions. The interviews were conducted by the investigator with the help of one research assistant who was able to provide valuable and critical assessment of the questionnaire.

Masstock farms was chosen for convenience and practical reasons and it shares many similarities with Nakambala Sugar estate. Masstock is a large commercial farm located in chief Chiawa's area, 10 km east of Chirundu border post. The farm employs over 3000 workers and cultivates a total of 1000 hectares of land. Most of the employees are migrant workers majority of whom are Tonga speaking from the Southern province. Masstock grows cotton, paprika and marigold. Marigold is processed into semi-finished products within the farm to facilitate transportation to overseas markets.

During the pretesting it was found out that some workers had difficulties in responding to an English questionnaire. The questions had to be asked in Chitonga or Chinyanja as the interviews progressed. This meant that extra training would have to be given to the research assistants to enable them translate the questions without altering the meaning and the context. At Nakambala it was possible to use English, Chitong and Silozi.

4.2.3 Interviews with workers

The investigator with the help of one research assistant carried out the interviews. The research assistant was a third year student at the University of Zambia doing Public Administration. The interviews were conducted over a period of 10 days within the different sections of the estate. The interviews were done during the normal working hours at the usual workplace of the participating employees.

Before the start of each interview session the participating employees were normally addressed either individually or in groups to explain the purpose of the study in the presence of their immediate supervisor or manager. After explaining the purpose of the study, they would then be interviewed one by one in privacy. Immediately before the start of the interview permission

would be sought and the worker asked to sign the letter of consent. Those workers who were able to read and write were given the questionnaire to complete on their own but would be debriefed when handing back the completed questionnaire.

The impression obtained was that, those employees who were able to fill in the questionnaires on their own provided more information than those who responded directly in a person to person interview. This can plausibly be explained by the fact that the workers were more free and relaxed when they wrote down the answers themselves. This was unlike person to person interview where the employees probably felt that they were divulging their opinions to a person they did not know very well. This also indicated that the briefing prior to the start of the interview was successful in reassuring them about the anonymity of the questionnaire.

The interview generally lasted, on average, 20 minutes and were conducted in the language that the respondent understood better. The majority preferred to respond in Chitonga, seconded by Silozi. Fortunately the interviewers are fluent in both languages.

4.2.4 Interviews with Managers and supervisors

The Human Resources department provided background information around issues of corporate health and safety policy and implementation, manpower strength and absenteeism during 1996 period.

The Estate Safety Officer who falls under the HRD provided information on injuries and compensation procedures.

Eighteen section supervisors provided data on the work circumstances as they saw them on a day to day basis. They furnished the study with information on routine recording of sickness and injuries among the employees in their respective sections. They also provided some data on average daily absenteeism. Data from these sources was collected using an interview schedule containing both open and closed ended questions. The supervisors completed the interview schedules in the presence of the investigator.

4.2.5 Review of Medical Records

The data from the medical department on sickness and injuries covered a retrospective period of 3 months (October, November and December) on which the prevalence rate was calculated. The main source of the data was MF47 (a Ministry of Health monthly return form, see appendix 6). The MF form is completed every month and submitted to the district and provincial medical officers. In addition, to the medical records, an interview schedule was also completed by two supervisors.

The MF 47 form had some shortcomings in meeting some of the data requirement for this study. The form has no provision for aggregating the patients according to socio-demographic factors such as age, sex, occupations. The routine at the estate clinic is that the total number of monthly attendances are transferred straight from the daily tally sheets to MF47.

This limitation was echoed by Enterline and Jacobsen (1972) when they pointed out that most types of data used in epidemiological studies are a re-assemble and supplementation of existing data in such a way that they become relevant to the defined objectives, although originally the data may have been recorded for some other reasons. They argue that such data rarely permit definitive conclusions and this is usually because it is difficult to ensure that the data are indeed strictly relevant to the objective of the study.

4.2.6 Triangulation of data sources

The term triangulation is often used to describe the combined use of different methods and methodologies. According to Knafl and Breitmayer (1989) there are two primary purposes for triangulation, which should generally be used as a means to an end, rather than an end in itself. One use is for confirmation of data from a single method, as a type of 'multiple operationalism'. Data from different sources may be combined to counteract known weaknesses in one type of data and to counterbalance threats to validity. The other goal of triangulation is for obtaining a more complete picture of a situation or phenomenon. Knafl and Breitmayer (1989) further state that this purpose is most applicable in qualitative research, while the use of triangulation for confirmation is more often seen in research with quantitative premises.

Triangulation has been used in this study for both purposes, even though this was not a planned facet of the study design. The different purposes are not mutually exclusive. As described already, data was collected from a variety of sources, both primary and secondary. Whilst the information from the workers interviews has provided the bulk of the analytical material, the other data sources have provided both background and depth. The danger of confusing perspectives may exist here. Workers have tended to discuss health and safety from one perspective, whilst supervisors and managers from another perspective. Medical records have reflected a third dimension, showing still another aspect of the situation. The three perspectives, though sometimes antagonistic, have complimented each other.

4.2.7 Ethical Considerations

Three basic principles have dominated ethical discussions of research with human subjects. These include the principle of respect for persons, the principle of beneficence and the principle of justice. These principles imply that researchers must not only respect individual autonomy but also the health and welbeing of the subjects (Hardon et al, 1994).

Permission to conduct the study at Nakambala Sugar Estate was sought from management through the CMA three months before the commencement of the study. Letters of permission and informed consent to individual participants were attached to the questionnaires and permission had to be sought before the start of any interview.

This study did not require taking of medical specimens. There was therefore no harm to participants from diagnostic techniques. Confidentiality was upheld through anonymity. The names or any identification numbers of the individual employees interviewed were not written down anywhere in the data collection instruments. The request for participation was based on a clear statement of what the study was all about, its objectives and its implications for the participants as individual members of Nakambala Sugar Estate.

Ethical Clearance from the University of Zambia Research and Ethics Committee was obtained prior to the commencement of the study (see Appendix 7).

4.2.8 Data Analysis

Data was analysed using EPI-INFO statistical package. The questionnaires were given identification numbers, serially from 001 to 238. The open ended questions were coded by assigning numbers to response categories. The coded questions were then entered into the computer over a period of 4 days. The data analysis consisted of mainly running frequency tables and 2 x 2 cross tabulations.

CHAPTER FIVE

PRESENTATION OF RESULTS

5.0 Overview

This chapter presents the results of the study. The chapter is divided into two sections- A and B. Section A presents descriptive data and section B presents analytical data. The descriptive data presents the findings on the prevalence of sickness, the socio-demographic information; and the workers views and knowledge about safety and health at workplaces. The descriptive data presents the usual basic epidemiological data on time; place and person. The analytical data presentation, on the other hand, deals with hypotheses testing. A number of hypotheses are tested.

5.1 SECTION A: DESCRIPTIVE DATA PRESENTATION

5.1.1 Prevalence of sickness and injuries.

The period prevalence of sickness and injuries for the months of October, November and December was 32.8% or 328 cases for every 1000 persons. This prevalence was calculated from the base population of 30,000 employees and their dependents. Table four shows the diseases and the number of patients attendance for the stated months. The table also presents the number of attendance by disease. A total of 9653 patients were treated at the estate clinics during the stated period.

Table 2: Patients attendance for all diseases during October to December, 1996.

Disease	Number of cases				
	Children	Adult	Total	Prevalence	%
Malaria	561	817	1378	4.59	14.28
Diarrhoeal diseases	299	1089	1384	4.62	14.34
Tuberculosis	1	102	103	0.34	1.07
STDs and other genito-urinary	9	462	471	0.48	4.88
Roundworms	76	67	143	1.57	1.48
Eye disease	149	266	415	0.48	4.29
Ear disease	69	59	128	1.38	1.33
Upper Respiratory inf.	409	1327	1736	5.79	17.10
Pneumonia & other pulmon.dis	129	168	297	0.99	3.10
Skin infections and ulcers	152	427	579	1.93	5.10
Injury and poisoning	68	487	555	1.85	5.75
All other dis.	635	2011	2646	8.82	27.41
TOTALS	**2573**	**7080**	**9653**	**32.8**	**100.00**

SOURCE: Compiled from Medical Record; NSE clinic

5.1.2. Socio-demographic characteristics of the respondents.

Table 3: The socio- demographic characteristics of 238 employees who participated in the survey.

Variables	Number	%
Sex:		
Male	209	87.8
Female	29	12.2
Marital status:		
Married	198	83.2
Single	31	13.0
Divorced	7	2.9
Widowed	2	0.8
Ethnicity:		
Tonga	136	57.1
Lozi	43	18.0
Nyanja	22	9.2
Other	37	15.7
Educational Level:		
None	5	2.2
Primary	41	17.2
Junior secondary	86	36.1
Senior secondary	72	30.3
College	34	14.3
Religion:		
Seventh Day Adventist	58	24.9
Roman Catholic	46	19.7
New Apostolic	35	15.0
Salvation Army	19	8.2
Watchtower	10	4.3
United Church	9	3.9
Apostolic Faith	8	3.4
Pentecostal	6	2.6
Other	42	18.0

More male employees responded to the questionnaire than the female employees. The ratio was 7.2 males for every female employee.

The age range was 20 to 54 years. The population is middle aged with the mean age of 35 years. Majority of the respondents were married. The dominant ethnic group is Tonga followed by Lozi. The other ethnic groups represented, though insignificant, were Bemba, Soli, Lenje and Luvale.

The level of literacy is high amongst the employees. Only 5 employees did not attend formal schooling.

Christianity was the only religion reported by the employees. The respondents were spread across 11 Christian denominations. However, at least 4 denominations were popular. These are the Seventh Day Adventist (SDA), Roman Catholic, New Apostolic and Salvation Army.

5.1.3. Data on the duration of employment and job titles.

Number of years worked: The number of years worked at Nakambala by the respondents ranged from 1 - 27. The mean number of years worked was 9.6 years. This indicates a stable labour force and employment pattern.

The nature of the jobs: The jobs within the seasonal and permanent categories ranged from unskilled jobs such as weeding to specialised and technical jobs such as mechanics. Table three shows the job titles and the proportion of the employees who participated in the survey.

One hundred and seventeen (49.2%) of the employees had previously done other job before their present ones suggesting a high mobility, vertical or horizontal, within the ranks and file of the seasonal and permanent categories of workers.

One hundred and ninety-One (80.6%) were recruited from Nakambala whilst only 46 (19.4%) were recruited from elsewhere. There was no follow up question asking those who were not recruited from Nakambala to state where they were actually recruited from. It is likely that the majority of those recruited from elsewhere may have been recruited from the western province because that is the only place where Nakambala formally recruits from.

One hundred and six (44.6%) had vocational training for the jobs they were doing. They had attended training either at a public training institution or had undergone intensive job on training.

Table 4: Frequency Job Titles for the respondents.

Job Title	Frequency	%
General Worker	81	34.0
supervisor	58	24.4
Clerical	27	11.3
Mechanic	19	8.0
Driver/operator	17	7.1
Fitter	12	5.0
Builder	9	3.9
Security	8	3.4
Storekeeper	7	2.9
Total	**238**	**100.0**

Source: Survey data

5.1.4. Sickness and injury experience

To assess sickness and injury experience, the employees were asked to report any past sickness or injury since coming to Nakambala. Eighty-nine (37.4%) reported having suffered from a serious sickness or injury. The common illnesses reported are shown in table four. Malaria is the commonest disease at Nakambala. These findings are consistent with the data from the clinic records.

The perceived cause of sickness and injury are also shown in table four. Generally, the majority (over 85%) perceived their working circumstances to be the source of sickness. Sources of treatment were also investigated. Those who reported having had serious sickness were asked to indicate where they went for treatment.

The common source of treatment was the estate clinic. Seventy-nine (88.88%) of all those who reported having suffered (n=89) were treated at the estate clinics. This choice of treatment

option seems plausible for the workers since the majority (85.4%) of them attributed the sickness to their work.

Table 5: Frequency of Types of sickness reported by the respondents

Sickness	Frequency	%
Malaria	24	27.0
Injury	22	24.7
Tuberculosis	17	19.1
Chest pain/cough	11	12.4
Other sickness	11	12.4
Diarrhoea	4	4.5
Total	**89**	**100.0**

Source: Survey Data

Table 6: Frequency of perceived causes of Sickness and Injuries.

Cause	Frequency	%
Accident	22	25.0
Infection	18	20.5
Hard work	14	15.0
Exposure to dust	11	12.5
Other causes	7	8.0
Exposure to chemical	6	6.8
Do not know	6	6.8
Insanitary living	5	5.7
Total	**89**	**100**

Source: Survey Data

5.1.5 Sickness absenteeism

Absenteeism appears to be a major problem at Nakambala. Records show that at least 15,000 man days are lost every year due to absenteeism (NSE, Medical Report, 1993). According to HRD, a total of 5,592 man days were lost due to absenteeism during the period of October to December, 1996. This means that an average of 1864 man days are lost every month. The HRD records further show that during the same period, sickness absenteeism accounted for 20 per cent, whilst 64 per cent were due to other reasons, such as attending a funerals or caring for a sick member of the family. The other reason for absenteeism (accounted for 15%) was workers going on unpaid leave. When a worker decides to go on unpaid leave, there must be a pressing issue. Sickness could be one of the issues that can compel a worker to go on unpaid leave.

Among 18 section managers, 13 reported sickness as the major cause of absenteeism among the employees. The remaining 5 reported other reasons such as attending funerals or just staying away due to fatigue. What the section managers considered fatigue, could be easily classified under sickness. The boundary between sickness and fatigue is rather very thin.

Among the survey respondents, 45 (19%) reported being absent from work in the last three months. Asked why they had been absent, 18 (40%) went on leave, 17 (37.8%) had been absent due to sickness, whilst 5 (11.1%) had been attending to a sick relative. The other 5 (11.1%) had been absent due to funerals after a death of a relative.

Injuries are common at the estate due to the nature of the activities going on. Apart from the general period prevalence of 1.85 per cent obtained from the medical records, I was able to get specific figures for the employees from the safety officers. During the whole of 1996, 94 accidental injuries were reported to the safety officers. For the period of October to December, 24 injuries were reported giving a period prevalence of 0.45%, calculated from the base population of 5,298 workers. The common injuries reported are hand, head, foot and toe injuries.

During the survey, the employees were asked to state whether they knew any of their colleagues who had been injured whilst on duty. One hundred and seventy-one (71.7%) said they knew people who were injured on duty. Caution should be used when analysing this data because there could be over-reporting by the employees, especially when they perceive the investigator as an advocate.

5.1.6 Sickness Among family members.

The respondents were asked to indicate whether any member of their family had suffered from a serious illness in the last three months preceding the study. One hundred and one (42.4%) reported serious sickness among members of their families. The common illnesses were TB, diarrhoea, malaria, chest infections and skin diseases. It appears that the pattern of sickness among family members is not very different from that of the employees. Malaria, Tuberculosis and chest infections are prominent in both.

5.1.7 Views on occupational health risks.

One hundred and seventy four (73%) of the workers perceived their jobs to have health risks. The reported risks are shown in table eight below.

Table 7: Reported health risks associated with the respondents current jobs.

Health risks	**Frequency**	**%**
Exposure to chemical	38	22.0
Exposure to dusts(bagasse,saw dust)	35	20.2
Mechanical Injuries	25	14.5
Exposure to infection(TB,STD)	19	11.0
Snakebites	14	8.1
Exposure to water(rain,drains)	14	8.1
Exposure to skin irritants	7	4.0
Attack by thugs	6	3.5
Lifting heavy loads	4	2.3
Fire/burns	4	2.3
Others	4	2.3
Exposure to gases	3	1.7
Total	**174**	**100.0**

Source: Survey data

5.2 SECTION B: ANALYTICAL DATA PRESENTATION

5.2.1 Hypotheses Testing

The study set out to test a number of hypotheses formulated during the proposal and planning stage. These hypotheses are outlined below:

General Hypothesis:

It was hypothesized that workers in particular occupations are at high risk of sickness and injury than thier counterparts in other occupations.

Specific Hypothesis:

Statistical tests were done on specific hypotheses stated as follows:

Hypothesis one:

Workers in agriculture are more likely to suffer from sickness and injuries than workers in other occupations.

In other words;

The null hypothesis: There is no association between working in agriculture and sickness and injury.

The alternative hypothesis: There is an association between working in agriculture and sickness and injury.

Table 8: A 2 x 2 table showing the association between workers in agriculture and reported sickness.

Exposure	Sickness		
	+	-	
+	33	71	104
-	56	78	134
	89	149	238

Odds ratio : 0.65 (95% confidence limit: 0.36 - 1.14)

Chi square : 2.53 P-value : 0.111602

At 5 per cent level of significance the null hypothesis which states that there is no association between working in agriculture and sickness is accepted.

The odds ratio indicates a reduced sickness risk among workers in agriculture.

Hypothesis Two:

Workers doing general work are more likely to suffer from sickness and injuries than workers doing other jobs.

The null hypothesis: There is no association between working as a general worker and sickness and injuries.

The alternative hypothesis: There is an association between working as a general worker and sickness and injury.

Table 9: A 2 x 2 table showing the association between the general workers and sickness.

Exposure	Sickness		
	+	-	
+	39	43	82
_	50	106	156
	89	149	238

Odd ratio : 1.92 (95% CL : 1.07 - 3.45)

Relative risk : 1.48 (95% CL : 1.08 - 2.05)

Chi square : 5.52 P- value : 0.0187721

At 5 per cent level of significance the null hypothesis which states that there is no association between working as a general worker and sickness and injury is rejected.

The association between working as a general worker and sickness is significant. The odds ratio indicates a 92 per cent risk of sickness among general workers.

Hypothesis Three:

Female workers are more likely to suffer from sickness and injury than male workers.

The null hypothesis: There is no association between being a female worker and sickness.

The alternative hypothesis: There is an association between being a female worker and sickness.

Table 10: A 2 x 2 table showing the association between female workers and sickness

Sex	Sickness		
	+	-	
+	77	132	209
-	12	17	29
	89	149	238

Odds ratio : 0.83 (95% CL for OR : 0.35 - 1.97)

Risk ratio : 0.89 (95% CL for RR : 0.56 - 1.42)

Chi-Square : 0.22 p. value : 0.63605794

At 5 per cent level of significance the null hypothesis which states that there is no association between being a female worker and sickness is accepted.

The odds ratio shows that female workers have a 17% reduced risk of sickness.

Hypothesis Four:

Skilled workers are less likely to experience sickness and injuries than unskilled workers.

The null hypothesis: There is no association between vocational training and sickness and injury.

The alternative hypothesis: There is an association between vocational training and sickness and injury.

Table 11: A 2 x 2 table showing the association between Vocational training and sickness

Vocational Training	Sickness +	-	
+	32	74	106
-	54	75	132
	89	149	238

Chi square : 4.42 P-value : 0.03949516

At 5 per cent level of significance the null hypothesis which states that there is no association between vocational training and sickness and injury is rejected. The alternative hypothesis which states that there is an association between those who attended vocational training and sickness is accepted. In other words, skilled workers are less likely to suffer from sickness. Skilled workers are less likely to suffer from sickness and injuries.

Hypothesis Five:

Skilled workers are more likely to know the health risks associated with their jobs than unskilled workers.

The null hypothesis: There is no association between vocational training and knowledge about health risks.

The alternative hypothesis: There is an association between vocational training and knowledge about health risks.

Table 12: A 2 x 2 table showing the association between Vocational training and knowledge of health risks.

Vocational Training	Health Risks		
	+	-	
+	78	28	106
-	96	36	132
	174	64	238

Odds Ratio : 1.04 (95% CL for OR : 0.56 - 1.95)

Risk Ratio: 1.01. (95% CL for RR: 0.87- 1.18)

Chi-Square: 0.02 p. value : 0.88209953

At 5 per cent level of significance the null hypothesis which states that there is no association between vocational training and the knowledge of risky jobs is accepted.

The alternative hypothesis which states that there is an association between vocational training and knowledge of health risks is rejected.

Hypothesis six:

Educated workers are less likely to suffer from sickness and injuries than less educated workers.

In other words, the longer the period at school the less the chances of sickness and injuries.

The null hypothesis: There is no association between the number of years spent in school and sickness.

The alternative hypothesis: There is an association between the number of years spent in school and sickness.

Table 13: A 2 x 2 table showing the association between education and sickness.

Education	Sickness		
	+	-	
+	26	15	41
-	50	108	158
	76	123	199

Odds ratio : 3.74 (95% CL for OR : 1.73 - 8.26)

Relative risk : 2.00 (95% CL for RR : 1.45 - 2.78)

Chi square : 13.92 P-value : 0.001909

At less 5 per cent level of significance the null hypothesis which states that there is no association between the number of years spent in school and sickness is rejected.

There is a very strong association between education and sickness. The higher the level of education the less the reported sickness.

The odds ratio indicates that highly educated employees are 3.74 less likely to suffer from sickness than lowly educated employees.

CHAPTER SIX

DISCUSSION OF RESULTS

6.0 Overview

This chapter presents the discussion of the results or the main findings of the study. The discussion of these results will be presented under four main sub-headings: The health profile of Nakambala; occupations and the risks of sickness and injuries; the workers perceptions of health and safety; and differences in opinions between the worker and the manager. This is described in discussion as 'a hide and seek game in the cane fields'.

6.1. The health profile of Nakambala

Nakambala sugar estate has a population of 30,000 workers and their dependents who require basic health and medical services. This, inevitably, imposes a huge burden and great responsibility on the estate management. An average of 130 persons attend medical treatment at the estate clinics every day. A total of 49,738 cases were treated during 1996. The large number of attendance is due to availability and accessibility, both in terms of physical proximity and cost. Foster and Anderson (1978) point out that the use of medical services is explained by the cost and availability. Workers at Nakambala receive free medical services.

The common diseases recorded from the estate clinics are malaria, diarrhoea, upper respiratory tract infections, skin conditions, sexually transmitted diseases and physical injuries (see Table 2). During the period of October to December the prevalence was 32.8 per cent or 328 cases for every 1000 people. In this study high prevalence was defined as a prevalence of 20 per cent and above for a period of three months. It was predicted that there is a high prevalence of sickness and injury at Nakambala. The data collected has confirmed the prediction that the prevalence of sickness and injury is high. These findings are consistent with findings from other studies. Sickness in the sugar industry is always 50 per cent higher than in other industries.

The Nakambala population appears to be vulnerable to sickness and injuries. On the estate there are environmental factors which predispose the population to sickness and injury. The

nature of the environment, the ecological factors and the activities going on in the sugar production make disease endemic (WHO, 1993). Nakambala consists of 17,000 hectares of land out of which about 10,000 hectares are used for sugar cane growing. Irrigation water stagnates creating ideal breeding grounds for mosquitoes. Just like any other part of the country, malaria is the leading cause of morbidity at Nakambala. In Zambia, malaria is a notifiable disease and it is recorded throughout the year. Poor environmental health facilities such housing, refuse disposal and sanitation and water, may also pose a health hazard. When asked to comment on what management should do to improve the health and safety of the workers; 23 (9.8%) said that management should improve cleanliness and housing in the compounds. This may appear as a misdirected response, but workers who live and work in the same vicinity may not distinguish between work and home environment. There is some irony that management can provide accommodation for the sake of the welfare of the employees yet not maintain the houses. Upper respiratory infections, pneumonia, diarrhoea, worm infestations and skin infections are nothing unusual but could be attributed to insanitary living conditions and lack of clean water.

Recent studies have shown that TB, diarrhoea, Upper respiratory tract infection and pneumonia are interrelated with each other. TB, STD along with diarrhoea are now known to be some of the features of AIDS epidemic. As seen in table 4, if sero-testing for HIV was to be done, it would not be surprising to find HIV to be one of the major cause of sickness.

As already pointed out elsewhere in this dissertation, a distinction between occupational related sickness and non-occupational is hard to draw. Work related diseases are often linked to various risk factors including workers life styles, habits and individual susceptibility. In the past, it was not difficult to identify specific occupational diseases since causative factors in the workplace could be easily recognized. However, many diseases now recognized as being work-related have a more complex aetiology that can be elucidated only through sound epidemiological studies (WHO, 1985).

In Nakambala people live and work within the same environment so that apart from accidental injuries which can be defined in terms of time and space of occurrence, sickness may be extremely hard to classify. For instance, upper respiratory tract infection is one that can easily

defy a categorical distinction, at least in the absence of sound epidemiological studies. If the production process pollutes the air, the general population within the same vicinity is also more likely to inhale dangerous substances from the polluted air just as much as the employees will do, although the extent of inhalation will vary due to proximity.

At Nakambala, Njomona compound is just next to and on the leeward side of the factory. In the absence of another plausible explanation, the 5.79 per cent period prevalence of Upper respiratory tract infections may be caused by this factor. During the field work, the author spoke to a worker who thought that the constant bouts of malaria he suffered were a result of mosquito bites not at his home but at work especially in the sugar cane fields. The question then is; when is malaria an occupational sickness and when is it not? The worker feels that if it had not been for his prolonged exposure to mosquito bites due to his work, he would not have suffered from malaria. This may be as much an issue of perception as it is of fact.

Another worker, a female weeder, when asked about her knowledge of the risks associated with her job, she replied, *ni nsiki*, a Tonga term for sexually transmitted diseases. She explained that her work exposed her to STDs because she works day long in the fields among men, some of whom made constant advances for sex. She said;

'If I do not behave myself I may get infected with an STD'

There is, however, the possibility of confusing aetiology of sickness resulting from behavioural factors and that of strictly occupation. But, indeed, there was sense in what the worker said and the nature and circumstances of her work could be a genuine source of risk. STDs are common at the estate. The investigator interviewed one worker who had had an STD for seven months. He seemed to blame it on poor treatment at the clinic and he asked whether the investigator could intervene.

Of particular interest when discussing the health profile is the sickness reported by survey respondents. Eighty-nine (37.4%) reported having suffered from serious sickness and injuries.

The common illnesses reported were malaria (27.0%), injuries (24.4%), Tuberculosis (19.1%) and cough/chest pains (12.4%). The reported diagnosis may not be accurate. But for diseases like TB the investigator did try to persuade some of those who reported TB to prove that they actually had suffered from the disease. Some of those who had suffered not long ago were able to produce their treatment slips. The weakness of this question, however, was that the period in which the workers were supposed to recall any serious sickness was infinite, i.e. unspecified; for as long as they had worked at Nakambala. This introduced a recall bias especially for those who had worked for many years. Prevalence could not be calculated for reported sickness and injury because of the very fact of unspecified period. If time was specified, then a period prevalence would have been calculated based on reported sickness. More prominent in the reported sickness is injury. This could, perhaps be the most accurate estimates of injuries among the workers. Workers were able to report injuries affecting them personally, rather than being mere statistics in the supervisors'office, which, after all, may never be sent to the safety officer. According to Lawrence and Comm (1972) accidents will not be reported if they result only in minor injuries. In this study, the victims were their own reporters. Some of those who reported being injured did actually show the investigator the scars or deformities. More hand injuries were recorded.

6.2 Occupations and the risks of sickness and injuries.

Nakambala has at least 10 departments and over 15 job titles in the unionised categories. Most of these jobs pose health risks to the workers. The employees who participated in the study were from agriculture, engineering, factory and other auxiliary occupations.

Parmeggiani (1983) points out that some occupations such as those in agriculture, engineering, factory and other activities in the sugar production have been known to pose health and safety hazards. Epidemiological studies have shown that workers in the agriculture have a high risk of sickness from herbicide and pesticide poisoning and infectious diseases (WHO, 1985). Workers in the factory have the risk of exposure to organic dusts and allergies from bagasse. In the factory, there is still the risks of injuries from thermal burns and injuries from falling and being struck by mechanical objects. These risks exist at Nakambala.

Attempts have been made to statistically test a number of hypotheses for associations between occupations and sickness. Some tests have revealed associations between occupations and sickness while others have not. For instance, there was no significant association between working in agriculture and working in non agricultural occupations (see table 7).

Conversely, when different occupations were compared using cross tabulations, they showed differences in reported sickness and injury. For instance, when factory workers were compared with engineering workers, they had more reported sickness (Chi square : 5.81; p-value : 0.016). This means that there is a difference in the risk of sickness between workers in the factory and those in engineering. Factory workers are key in sugar production and could be more exposed to higher risks than in engineering.

Studies demonstrating the higher risks associated with occupations in the factory have already been cited elsewhere in this dissertation. Statistical test for job categories reveal strong associations between the general worker category (See table 10) and sickness and injuries. General workers reported more sickness.

This was also true when cross tabulations of different jobs were done. For instance, when the general worker category was compared with supervisor category the difference in reported sickness was observed. (OR :2.24; 1.04 - 4.90, Chi square : 4.99, P-value : 0.026). These findings conform to expectations. General workers do odd jobs which expose them to the risk of sickness and injuries. They are the weeders, sanitary cleaners, chemical and machine attendants so they are more exposed to infections and mechanical injuries. Most of their work is out-door where they are exposed to insect bites, damp and rainy conditions. General workers are the ones that lift heavy loads during loading and off-loading of various substances and equipment. They are at the bottom of the hierarchy and most likely to be least educated.

On the other hand, when the supervisor category was compared with mechanical category, the differences in reported sickness did not exist (OR : 0.83, 0.34 - 2.06, Chi square : 0.20, P-value : 0.6561287). This was explained by higher proportions of vocational training among supervisors and mechanical categories. When frequencies were run, only 22% (n=84) of the general workers had attended vocational training, whilst vocational training attendance was high among supervisor and mechanics, up to 60 per cent (n=56) and 70 per cent (n=48), respectively.

Sex was not associated with sickness. There was no association between being a female worker and sickness. Women are risk evaders; they are more likely to take extra precautions and avoid occupations that have a high chance of injury. During the research it was observed that most women are assigned relatively safer jobs such as office messengers and cleaners.. The level of education has been found to be statistically associated with reported sickness. The lower the level of education the more sickness was reported (see table 13). The association between sickness and educational level was highly significant in the primary school level from grade 2 to 7. The cross tabulations have shown that the difference in reported sickness is significant between primary and secondary levels. No difference was detected between secondary and college, the fact that further strengthens the association between low education and sickness.

These results indicate that education tends to instil a sense of awareness about health issues. Similarly, there is a significant association between vocational training and sickness. Those employees that have had vocational training are less likely to suffer from sickness and injuries. They may be more careful and enlightened. They are probably the more educated among the seasonal and permanent categories of employees.

6.3. Workers views on health and safety at Nakambala.

A workers' view of health and safety are based on many personal and employment factors such as education and vocational training, previous experience, sickness experience and indeed the nature of the job. As already observed, the employer often believes that his workplace is as safe as it should be. He may see any changes as a waste of time and resources and a hindrance to production harmony. The employee, influenced by of personal and employment factors, may believe that the employer is cynical and unwilling to care for his health and welfare. The worker may even blame

the health and safety officials for being too lenient to the employer, even when his own neglect contributes to the sickness (Lehtinen, 1994). A mutual trust needs to be cultivated between the employer and the worker. This can be done through safety education and the application of

basic ergonomic principles. Managers should not feel that by educating the workers about safety, they are doing a disservice to themselves. Some managers would rather the workers remained ignorant of the health risks involved in their jobs. This study has found out that many employees (as high as 73%) actually did know the health risks associated with their jobs. The knowledge about health risks cut across the educational and vocational background of the workers. There was no association between education and knowledge of health risks. Similarly, there was no association between vocational training and knowledge of health risks. A cross tabulation of vocational training and knowledge of health risks yielded no association (OR=1.04: 0.56 - 1.96, Chi square :0.02, P-value : 0.882).

6.4 The manager Vs the workers' views.

Nakambala sugar estate management policy on health and safety of employees is clear with regards to medical facility, accommodation, pre-employment and periodic screening, safety training, provision of protective clothing and compensation. The information provided by the human resources department indicates that the above services and facilities are provided. The sectional managers and supervisors echoed the provision of these facilities. The managers felt that there was no doubt that the medical services at Nakambala were, by any present day Zambian standards good. Whilst the managers had their own perspective, the employees also had theirs. When the workers were asked to rate the medical services as excellent, good, fair or poor, the majority said that the services were fair (43.0%), seconded by poor (26.6%). Those who said excellent and good were 7.2 per cent and 23.2 per cent respectively. In the minds of people, the boundary between fair and either good or poor may be hazy, so is the boundary between good and excellent. If the questionnaire was to be re-designed, only two response categories would be created (good or poor). Nevertheless, the workers were also entitled to their own opinion. If one was looking at these results with management spectacles, they would regard fair as almost good, whilst those wearing the workers spectacles would see fair as poor. In occupational health and safety there will always be need and scope for improvement. If the standard of a service is measured by the number of the clients attending, then Nakambala estate clinic offers good service. There are up to 130 people attending treatment daily. This statement, however, would be more realistic if the workers had the option of choosing.

The policy is clear on accident prevention. Protective devices and clothing are supposed to be provided to all the workers that are entitled to them. Despite the policy and sometimes the availability of the devices, it is almost impossible to find those that are entitled to them using them all the time. One does not know whether to blame the employer or the worker or both of them. Whilst almost all the sectional managers and supervisors said that all their workers had protective clothing, some workers were seen without any. When the employees were asked to comment on what management should do to improve their health and safety, the larger proportion (32.5%) wanted an improvement in the provision of protective tools, clothing and safety training. *The point I seem to get from Abeysekera (1996) is that neither the worker* nor the manager should be blamed;

> 'Ergonomic deficiencies or poor consideration of human factors have discouraged wearers from using the personal protectors that are available today. Heat, cold and the extra workload involved in carrying the weight of personal protectors are additional physiological stresses experienced by their wearers. Improper fitting and obstructed use of the senses such as vision, hearing feeling etc. are common problems' (Abeysekera, 1996).

The record keeping on accident statistics by the safety officer was excellent. From the interview, it appeared that the compensation procedures for employees who get injured whist on duty were strictly followed. An injured employee qualifies for compensation if he is granted 3 days off duty by a medical officer. During 1996, a total of 94 injuries were reported to management out of which 41 were compensatable.

Whilst workers expressed fear at the alarming rate of accidents, some of the managers felt that the workers were exaggerating. The investigator interviewed one manager who categorically denied that he had any accident in his section in the last three months preceding the study. But when asked about any deaths in his section, he replied, 'yes one death'. When he was further asked what he thought was the cause of death, he said, 'the worker was run over by a front-end loader while sleeping in the sugar cane'. But sir, is that not an accident? the investigator further inquired. 'Yes it is, but the worker was sleeping where he was not supposed to'. Such differences in interpretation of reality reminds me of my childhood days back home when my friends and I used to play hide and seek game in the sugar cane fields. I recall how the older boys would entice the younger boys into touching a live snake with a belief that it would not

bite them or if it did, it would be due to their negligence. It is true that workers can be negligent, but I think that when they sleep in the fields, something has gone wrong. If they slept because they were drunk, the fault lies with the supervisor who should have sent them home and penalise them for reporting drunk.

There is an interesting relationship between the study population and their perceptions of occupational health. Managers are defensive and perceive health services as good. On the other hand, workers blame all their sickness on their working environment. Yet health in Zambia, in general, is very poor. The question that begs an answer is; would the employees health be any different elsewhere? There are shortcomings in as far as occupational health and safety are concerned. The policy and the laws are inadequate. The Nakambala sugar estate has invested substantial amounts of effort and resources in the health and safety of their employees. Sickness and injury among employees should not be blamed solely on the work environment. Sickness at workplaces is a combination of several factors including non occupational. The general morbidity in Zambia is very high; poverty is at its peak. The situation is compounded by the rising incidence of AIDS in the general population. It may not be fair and appropriate to attribute all sickness to poor work environment. A case control study to compare sickness at the estate and the general population in Mazabuka could help clear misconceptions.

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATIONS

7.0 Overview

This chapter draws the conclusions from the study. The chapter is divided into three parts. The first part provides the general conclusion, the second part briefly spells out the implications for further research, and the third and last part outlines the recommendations.

7.1 General Conclusion

Even though the health and safety of the worker has been echoed from the 18th century, much is yet to be done especially in developing countries such as Zambia, where data is either missing or incomplete. This epidemiological study was designed to assess the prevalence of sickness and injuries at Nakambala sugar estate. The lack of concern by the policy makers was one of the motivation for this study. Zambia does not have a national policy on health and safety. Any keen student of public health should get concerned with this state of affairs.

This study was a cross-sectional study which targeted the unionised employees on permanent and seasonal basis. Managers and sectional supervisors were also included in the study. Two hundred and thirty-eight (238) workers responded to a semi-structured questionnaire.

This study has shown that the prevalence of sickness and injuries is high at Nakambala sugar estate. During the months of October, November, and December, 1996, a total of 9653 patients were treated at Nakambala estate clinics. The period prevalence was 32.8% of sickness and injuries. Among the workers interviewed, 37.4 per cent reported having suffered from a serious illness since coming to Nakambala. Most of the sickness was perceived to be caused by occupational factors. The cause of most sickness was attributed to the nature of the work. These findings are consistent with findings from other studies which have shown that sickness and injuries in the sugar industry are high. Sickness and injury is estimated to be 50 per cent higher in the sugar industry than in any other branch of industry. However, in the absence of any comparative studies in the Zambian industry, it may not be realistic to conclude

that Nakambala sugar estate has a 50 percent higher prevalence than the other industries.

Admittedly, this study has implications for the Zambian industry. Although Nakambala sugar estate is a unique branch of industry with its own goals, it operates within the same legal, health and industrial framework as all the other organizations. On the basis of this one may suggest that what the Nakambala study has revealed could apply to many Zambian industries. There is little doubt that the prevalence of sickness and injuries in many Zambian industries could be high.

Other industries have a lot to learn from these findings as does management at Nakambala. Nakambala should be seen as a microcosm of the Zambian industry. Nakambala has provided the tip of the iceberg.

7.2 Research Implications

The research presented in this dissertation is of such nature as to raise more questions than it provides answers. The research has led to an increasing recognition of the need to better understand occupational health and safety in Zambia. As far as understanding sickness experience is concerned, there may be need to follow a cohort of workers with certain familial and personal characteristics. The mortality and morbidity rates from occupationally-related are unknown. This study has laid a solid foundation for future epidemiological research in the area of occupational health and safety in Zambia

7.3 Recommendations

Based on the results of this study, specific recommendations have been made. The recommendations are classified into two categories based on whether their implementation can be carried out as: Short-term and at the estate level; or long-term and national level policy decision and action.

7.3.1 Short-term recommendations are:

1. Conduct in-depth research which will further explore:
   i. Disease pattern in the general population;

ii. Disease pattern and their aetiologies among the employees;

iii. Find out why there is dissatisfaction among employees with the health and safety programmes of the estate.

2. Medical records should be reorganised to include personal and occupational details of the workers who attend treatment. This will in future facilitate occupational health and safety programmes. There is need for medical staff to easily identify workers who need more health and safety orientation.

3. The use of protective devices and clothing must be enforced at all times by all the sectional supervisors and managers.

4. Environmental health measures must be strengthened to reduce the spread of infectious diseases such as malaria and diarrhoea. There is need for intensification of malaria control through vector control.

7.3.2 Long-term recommendations.

1. Need for the government to strengthen the inspectorate division of the Ministry of Labour and Social security by adequate staffing and financing.

2. Enforce and improve the reporting of all accidents by all the companies.

3. Strengthen the link between the occupational health and safety services and the mainstream health services by the Ministry of health.

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APPENDIX 1

Telephone 252641
+260 1 250154

29th August, 1996

RE: MPH STUDENT DISSERTATION - MR. PHILEMON NDUBANI

Dear Dr Sinyangwe

This letter will introduce to you Mr Philemon Ndubani who is an MPH Student on the 1996/197 course.

He has to write a dissertation for his Part II examination. He has a particular interest in Occupational Medicine and would like to study some aspect of this at the Nakambala Sugar Estates between September 1996 and January, 1997.

He was supported by Tate and Lyle while studying in Cambridge as an Overseas Scholar.

I hope you will be able to assist him and the research that he does can be useful and important to your Company.

I am most grateful for your help.

Yours Sincerely,

Pete Sims

Prof. P A Sims
DEPARTMENT OF COMMUNITY MEDICINE

cc: Mr Philemon Ndubani

PAS/hh

APPENDIX 2

AN EPIDEMIOLOGICAL ASSESSMENT OF THE PREVALENCE OF SICKNESS AND INJURIES AT NAKAMBALA SUGAR COMPANY

Dear Sir/Madam,

As you may be aware, we are students from the University of Zambia, carrying out research here at Nakambala Sugar Company. The aim of the research is to assess the prevalence of sickness and injuries among the workers in different occupational groups within this enterprise. This research is being carried out as part of the Master of Public Health in the Department of Community Medicine at the School of Medicine. We feel that finding out how much sickness and injuries exists here at Nakambala is very important, not only for this study, but also for management at this enterprise as well as for the policy makers at the national level. We would, therefore, appreciate if you could, on behalf of this department, fill in the attached record schedule.

The information you will give will be kept in strict confidence. Kindly provide as much information as possible.

Thank you

INTERVIEW SCHEDULE FOR HUMAN RESOURCES DEPARTMENTS

DEPARTMENT.....

1. Total No. of the Labour Force during 1996:.....
   1. Male..... 2. Female.....
   Staff.....
   Permanent.....
   Seasonal.....
   Cane-Cutters.....
   Temporal.....

2. No. of workers per department/Section

Department	No
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

Does the company provide?

3. Pre-employment screening
   1. Yes
   2. No
4. Periodic screening
   1. Yes
   2. No

   IF YES, Specify diseases.....
   .....
   .....
5. Safety training
   1. Yes
   2. No

   IF YES, Specify Occupations.....
   .....
   .....
6. Medical facilities for workers
   1. Yes
   2. No
7. Free medical facilities for family members
   1. Yes
   2. No
8. Family Planning
   1. Yes
   2. No
9. Compensation
   1. No
   2. Yes
10. Protective clothing
    1. Yes
    2. No
11. Accommodation
    1. Yes
    2. No

    IF NO, Specify the category.....
    .....
    .....
12. Estimated total No. of man days lost due to absenteeism in the last 3 months
    .....
13. Common reasons for absenteeism and proportion of each

Reason	Proportion
.....	.....
.....	.....
.....	.....

14. No. of injuries reported in the last 12 months
    No of Injuries.....

15. What are the common injuries?

Injury	Section
.....	.....
.....	.....
.....	.....
.....	.....

16. How many were compensatable?.....
17. Does the company grant paid sick leave?
    1. Yes
    2. No
18. How long is paid sick leave? .....
19. Under what circumstances is paid sick leave granted?
    .....
    .....
20. How many workers were granted sick leave in the last 12 months?
    No of workers.....
21. No. of workers discharged due to sickness in the last 12 months?
    No discharged.....
22. No. of workers who died in the last 12 months?
    No.....
23. Common causes of death and proportion for each

.....	.....
.....	.....
.....	.....

21. Do some occupations expose workers to any of the following substances?

Dusts	Yes	No
Pesticides	Yes	No
Herbicides	Yes	No
x- rays	Yes	No
Vibrating tool	Yes	No
Heavy lifting	Yes	No
High noise levels	Yes	No
High Voltage Electricity	Yes	No

22. Proportion of the budget that goes towards the health of the workers?.....

APPENDIX 2

AN EPIDEMIOLOGICAL ASSESSMENT OF THE PREVALENCE OF SICKNESS AND INJURIES AT NAKAMBALA SUGAR COMPANY

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The information you will give will be kept in strict confidence. Kindly.provide as much information as possible.

RECORD SCHEDULE FOR MEDICAL DEPARTMENT

1. Total Number of staff No.....

   Medical Officer .....

   Clinical Officers .....

   Nursing Staff .....

   Environmental Health .....

   Other Category

   ....

2. Average number of daily patients attendance

   Employees .....

   Non-employees .....

3. Total No. of attendance over the last 1 years by month
   (By disease, Age, section, occupation,and sex)
   .....

4. Common work related diseases treated (Top 5 illnesses)

5. No of attendance for each of the common illnesses per month.....
....

6. Common non-work related diseases (top 5)
.....
.....
.....

7. Section with highest sickness?
.....
.....

8. Average No. of injuries per month.....

9. Sections with higher No. of injuries
.....

10. No. Patients that have been on continuous treatment for over 1 month?
.....

11. Provide the following details for each:
Age
Sex
Ethnicity
Occupation
Section
Diagnosis
Seasonal/casual

12. Medical equipment available
.....
.....

13. The drug supply situation:
1. Good
2. Fair
3. Poor

14. Departmental participation in health and safety training of the workers
1. Yes
2. No

15. Aspects of training:
.....
.....

16. Average No. of STD patients per month: .....

17. No. workers who have died in the last 12 months

.....

18. Causes of death and proportion of each:

.....

.....

19. No. of AIDS related deaths that have occurred in the last 12 months:

20. What proportion is the medical budget?

.....

.....

APPENDIX 3

AN EPIDEMIOLOGICAL ASSESSMENT OF THE PREVALENCE OF SICKNESS AND INJURIES AT NAKAMBALA SUGAR COMPANY

Dear Sir/Madam,

As you may be aware, we are students from the University of Zambia, carrying out research here at Nakambala Sugar Company. The aim of the research is to assess the prevalence of sickness and injuries among the workers in different occupational groups within this enterprise. This research is being carried out as part of the Master of Public Health in the Department of Community Medicine at the School of Medicine. We feel that finding out how much sickness and injuries exists here at Nakambala is very important, not only for this study, but also for management at this enterprise as well as for the policy makers at the national level. We would ,therefore, appreciate if you could, on behalf of this department, fill in the attached record schedule.
The information you will give will be kept in strict confidence. Kindly provide as much information as possible.

INTERVIEW SCHEDULE FOR SUPERVISORS/FOREMEN

1. Section.....

2. Total No. of staff in the section.... Male.....Female.....

3. What are the main tasks of the section?
   .....
   .....
   .....

4. Are there any health hazards associated with this section?
   1. Yes
   2. No

5. If Yes, what are these hazards?
   .....
   .....

6. Do your workers handle any hazardous materials
   1. Yes
   2. No

7. What are these materials?
   .....
   .....

8. What health and safety measures do you institute?
    1. Training
    2. First aid
    3. Protective gear
    4. Warning signs
    5. Other.....

9. Approximately, on average how many workers are absent every day?

    No. of workers.....

10. What are the major reasons for absenteeism?.
    .....
    .....
    .....

11. Do your workers work in shifts?
    1. Yes
    2. No

12. Do any of your workers work in the night shift?
    1. Yes
    2. No

13. How many injuries has your section experienced in the last 3 months?

    No of injuries.....

14. How many workers have died in your section in the last 12 months?

    No of workers.....

15. What were the causes of the death(s)?
    .....
    .....

General comment on the health and safety of the workers in your section:
    .....
    .....
    .....

APPENDIX 4

INSPECTION CHECK LIST

SECTION.....

Are the following protective devices available?

Helmet	Yes	No
Masks	Yes	No
Gloves	Yes	No
Gowns	Yes	No
Aprons	Yes	No
Safety Glasses	Yes	No
Hearing Protection	Yes	No
Safety Boots	Yes	No
Warning signs	Yes	No
First Aid Kit	Yes	No
Knee/Elbow Pads	Yes	No
Other (Specify)		
.....	Yes	No
.....	Yes	No
.....	Yes	No
.....	Yes	No

APPENDIX 5

AN EPIDEMIOLOGICAL ASSESSMENT OF THE PREVALENCE OF SICKNESS AND INJURIES AT NAKAMBALA SUGAR ESTATE

INDIVIDUAL WORKERS' QUESTIONNAIRE.

We are a group of students from the University of Zambia, carrying out research here at Nakambala Sugar estate. The aim of this research is to assess the prevalence of sickness and injuries amongst the workers in different occupational groups within the estate. This research is being carried out as part of the Master of Public Health in the department of Community Medicine at the University of Zambia. Finding out how much sickness and injuries exists here at Nakambala is very important, not only for this study, but also for management as well as policy markers at the national level.

Participation will not lead to any victimisation by anybody. The data collection is by means of a semi-structured questionnaire which seeks to collect among other things, information about; employment history; and your health status here at Nakambala Sugar Estate.

We are therefore, seeking your participation in this study by answering this questionnaire. You are, indeed, free to refuse to participate if you so wish. You are also free to stop the interview at any time. You are not obliged to answer questions you are not very comfortable with. If you choose to participate, the information you give will be treated with maximum confidentiality. The information you give should be given freely and voluntarily. Your name shall not be quoted in any of the documents of this research. If you are willing to participate, kindly sign the consent from below.

CONSENT TO PARTICIPATE

I have read the above statements and have understood the information given. I am willing to participate and therefore given my full consent.

Signature:.....
Date:.....

FOR OFFICE USE ONLY

Respondent No.....
Name of Interviewer:.....
Section/Department:.....

1. How old are you?.....
2. Sex
    1. Male
    2. Female
3. What is your ethnicity?.....

4. Where were you born.....
5. What is your marital status? Are you
    1. Single
    2. Married
    3. Divorced
    4. Widowed
6. Do you have any children?
    1. Yes
    2. No
7. What is your religious affiliation?.....
8. How many years did you spend in school?
    No of years.....
9. How long have you been working for Nakambala?
    No of Months.....
10. What type of job do you do here at Nakambala?
    Type of job.....
11. How long have you been doing this particular job?
    No. of Months.....
12. Did you do any job before the present one?
    1. Yes
    2. No
13. What other job(s)did you do?
    .....
    .....
14. Where were you recruited from?
    1. Nakambala
    2. Elsewhere(Specify.....)

15. Have you received any vocational or professional training?
    1. Yes
    2. No

    b).IF YES, What sort of training?.....
    .....
16. Have you had any serious illness or injury since you started working for Nakambala?
    1. Yes
    2. No

    b).IF YES, What sort of illness or injury was it?
    .....
    .....

    c). What did you perceive to be the cause of illness or injury?
    .....
    .....
    d). How long ago was this?
    No. of month.....

e).Who treated the illness or injury?
1. Clinician
2. Traditional healer
3. Family member
4. Others(Specify.....)

g) Did you consider yourself cured?
1. Yes
2. No

17. Are you currently on any treatment for any sickness?
1. Yes
2. No

b). IF YES, what type of treatment?
.....
c). Why are you on treatment?
.....
.....

18. Has any member of your family or household been sick in the last 3 months?
1. Yes
2. No

b) IF YES, What was the sickness
.....

c) Who was it (relationship to you)?.....

19. Have you stayed away from work in the last 3 months?
1. Yes
2. No

b). IF YES,the last time you stayed away,why did you stay away?
.....

c. how long did you stay away? .....

20. Are you aware of any health risks that are associated with your job?
1. Yes
2. No

b).IF YES, what are the risks?.....
.....

21. Are there any other jobs that you consider risks in this company?
1. Yes
2. No

b). IF YES, Which jobs do you consider risks?

.....

.....

22. Are you aware of any body within this company who got injured whilst on duty?

1. Yes
2. No

b)IF YES, How many have been injured?.....

.....

23. What is your opinion about the medical facilities here at Nakambala? Would you say they are:

1. Excellent
2. Good
3. Fair
4. Poor

24. Do you drink any alcoholic beverages?

1. Yes
2. No

25. Do you smoke cigarette?

1. Yes
2. No

26. In your own view,do you feel that there is anything that management can do to improve the health and safety of the you workers.

.....

.....

27. Do you have any particular comments about your personal health status here at Nakambala?

.....

ENDIX 6

MINISTRY OF HEALTH
MONTHLY RETURN
FOR HEALTH CENTRES AND SUB-CENTRES

MF 47

me of Unit _____ Officer I/C _____
dress/box no. _____ Actual beds _____ Cots _____
strict _____ Province _____ Month _____ Year _____

POPULATION IN CATCHMENT AREA _____

NEW CASES THIS MONTH — AGE:	O/P First Attendances <5	O/P First Attendances 5+	Total New Cases	I/P Admissions <5	I/P Admissions 5+	Deaths <5	Deaths 5+
Diarrhoeal diseases							
Other gastro-intestinal							
Whooping cough							
Measles							
Acute poliomyelitis							
Malaria							
Sleeping sickness							
Tuberculosis (suspected)							
Syphilis							
Gonorrhoea							
Other S.T.D.							
Bilharzia							
Round worms							
Other worms							
Other communicable diseases							
Malnutrition							
Anaemia							
Eye diseases							
Ear diseases							
Dental diseases							
Upper respiratory infection							
Pneumonia							
Other pulmonary disease							
Pelvic inflammatory disease	//////			//////		//////	
Other genitourinary dis.							
Skin infections							
Skin ulcers							
Fever - undiagnosed							
Injuries/poisoning							
All other diagnosed dis.							
Symptoms/ill-defined cond.							
Maternity admissions	//////	//////	//////	//////		//////	
TOTALS							

Reattendances for Outpatient Care need not be tallied.

TOTAL FIRST ATTENDANCES

TOTAL ADMISSIONS

TOTAL INPATIENT DAYS

TOTAL DEATHS

TOTAL REFERRED