# DETERMINANTS OF COMMON HEALTH PROBLEMS AMONG FLOWERS FARM WORKERS IN TIMAU, IMENTI NORTH DISTRICT

**BY**

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## DECLARATION

I HEREBY DECLARE THAT THIS DISSERTATION IS MY ORIGINAL WORK AND IT HAS NOT BEEN PRESENTED FOR A DEGREE IN ANY OTHER UNIVERSITY.

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# DEDICATION

This work is dedicated to my daughters

Caroline Gatwiri , Sylvia Kathambi and Michelle Karimi

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## List of abbreviations

| | |
|---|---|
| **AIDS** | Acquired Immunodeficiency Syndrome |
| **DC** | District Commissioner |
| **DDT** | Dichloro-Diphenyl-Trichloroethane |
| **DO** | District Officer |
| **FAO** | Food and Agriculture Organization |
| **FIAN** | Food First Information Action Network |
| **GOK** | Government of Kenya |
| **HCDA** | Horticultural Crops Development Authority |
| **HIV** | Human Immunodeficiency Virus |
| **ILO** | International Labour Organization |
| **IOM** | International Organization for Migration |
| **KAP** | Knowledge, Attitude and Practices |
| **KPCPB** | Kenya Pests Control Products Board |
| **KSH** | Kenya Shillings |
| **NGO** | Non- Governmental Organization |
| **NHIF** | National Hospital Insurance Fund |
| **PANUPS** | Pesticide Action Network Updates Services |
| **PPE** | Personal Protective Equipments |
| **STD** | Sexually Transmitted Disease |
| **Std Dev**. | Standard Deviation |
| **STI** | Sexually Transmitted Infections |
| **SPSS** | Statistical Package for the Social Sciences. |
| **US$** | United States Dollar |
| **USA** | United States of America |
| **VCT** | Voluntary Counseling and Testing |

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## ABSTRACT

**Background**

Flower farming in the world has grown considerably since early 1980s. Kenya boasts the most successful flower industry in Africa and there has been rapid expansion in this industry in Kenya over the last few years.

This industry in Kenya is becoming one of the top earners of foreign exchange and a leading source of employment in the agricultural sector.

Presently there are over 500 producers / exporters growing cut flowers in Kenya. Production is largely concentrated on some 60 or so medium to large scale flower operations of which the 25 largest producers account for over 60% of total exports. The larger flower farms range in size from 20 to over 100 hectares under production with labour force ranging from 250 – 6000 workers/farm and by the year 2008 horticulture industry in Kenya was employing 1.5 million people directly and 4.5 million indirectly dependent on it.

However, floriculture being a relatively new industry in this country, not so much research on the health status of the workers in this industry has been carried out. This means that the morbidity pattern of the workers in floriculture industry may not be known therefore unavailable for proper planning of the health needs of these workers.

**Objective:** This study broadly aimed at assessing the common health problems and their determinants among flower farm workers in Timau division of Imenti North District and specifically to describe the socio-demographic characteristics of the flower farm workers, determine the prevalence of occupational health problems among the workers and to assess the safety of working practices on the farms.

**Design:** This was a descriptive cross-sectional study which involved data collection by administering structured questionnaires to 372 randomly selected workers working in six sampled flower farms and review of health records of the workers in the dispensaries in these six farms.

**Results:** On demographic characteristics, the age of the study population ranged from16-61 years for the respondents and 15- 70 years from records review. The

largest proportion of the workers (30%) was aged between 25 – 29 years. The education level was relatively low with 42.5% having primary school level of education. Only 4.6% of the workers had post secondary level of education. Females were more than males with a ratio of 1.5:1 and most of these workers (84.1%) were from outside Timau area (Immigrants).
On the other characteristics, only 41.1% of the workers had been trained on the job they were doing. The study established that use of personal protective equipment was not common and the main reason (95.2%) was the unavailability of these protective equipments. The pre-placement medical examination had only been done on 21.5% of the workers. Among the health problems noted, the commonest were respiratory tract problems (42.5%), gastrointestinal problems (16.7%) malaria (14.8%) pneumonia (8.9%) injuries/accidents (6.5%) skin problems (6.5%) and eye problems (2.4%).

On statistical analysis, use of personal protective equipment was found to have a significant relationship with the health problems of the workers in that those workers who were using personal protective equipment were less likely to have health problems as compared to those who never used these protective equipment ($p= 0.05$). A multinomial logistic regression was used to predict presence of health problems from the degree of adherence to safety practices. Never adhering to the safety practices was a significant predictor for presence of respiratory and gastrointestinal problems but was not a significant predictor for the other health problems.

**Conclusions:** Flower farms in Timau mainly engaged the labour of young men and women mostly with no education or those of primary school level. Majority of the workers were migrants in respect to Timau area having come from all over Kenya Majority of the workers lacked basic training in what they were doing and have poor adherence to safety practices at work place.
The workers were at high risk due to lack of personal protective equipment and non compliance of re-entry rules to green houses following spraying.
Respiratory problem and gastro intestinal problems top the illness list of these workers like in other areas where floriculture is done. However malaria is also a major problem for these workers.
The various effects of the work and working conditions of floriculture industry on the health of workers were not apparent to these workers in Timau.

There was very low enrollment to health care schemes such as the National Hospital Insurance Fund (NHIF) among the workers.

Lack of adherence to safety practices especially use of personal protective equipments was associated with presence of various health problems among the workers in floriculture.

**Suggestions;** Further studies should be carried out to find out if there exists a relationship between flower farming and malarial as is the case with rice farming and malaria.

**Recommendations;**

1. The flower farms should recruit workers with moderate level of education especially sprayers for them to be able to read safety instructions and understand their importance.
2. Workers should get initial training and frequent periodic trainings on their jobs and safety and be offered pre-placement and periodic medical examinations.
3. Farms management should ensure provision of adequate personal protective equipment and strictly observe re-entry time rules.
4. There should be provision of safety materials in pictorial form for the illiterate workers while ensuring that most of workers recruited have some education.
5. Flower farms' health facilities and other health facilities within flower growing areas should be stocked with adequate and relevant medicines especially for respiratory diseases, gastrointestinal problems and malaria.

# CHAPTER ONE: INTRODUCTION

## 1.1 Overview

Flower farming in the world has grown considerably since the early 1980s. The total global acreage allocated to flower farming is now over 200,000 hectares[1]. While Netherlands remains the largest producer of cut flowers worldwide, developing countries such as Colombia, Kenya, Ecuador and Zimbabwe have become important players in the global markets such that by1998 exports from developing countries comprised 29% of the world total cut flower production and provided employment to approximately190, 000 people [2] .

## 1.2 Kenyan Picture

Kenya boasts the oldest and most successful cut flower industry in Africa.
Flower farming in Kenya began during the early settlement of immigrant races under British colonial rule[2].

However it never assumed great importance until the country's independence in 1963. Since then, the industry has expanded from a small-scale trade to become one of the most important suppliers of cut flower in the world [2].

The industry is now an economic success story, with value of cut flower exports increasing from Ksh. 940 million in 1990 to 27,457 million in 2004 [3] .
Cut flowers are now the nation's second largest source of foreign exchange after tourism, bringing in US $ 110 millions in 2001 [4] and providing employment to an estimated 50,000 – 65,000 workers [3].
There has been an exponential growth rate in both the volume of cut flowers and employment as demonstrated in Table 1.1.

Table 1.1 Kenyan Horticulture Exports value for the years 1995– 2008

| Year | Value (Ksh. Billions) |
|---|---|
| 1990 | 0.94 |
| 1995 | 3.64 |
| 1996 | 4.37 |
| 1997 | 4.86 |
| 1998 | 4.90 |
| 1999 | 7.24 |
| 2000 | 8.65 |
| 2001 | 10.63 |
| 2002 | 14.79 |
| 2003 | 19.87 |
| 2004 | 27.46 |
| 2005 | 45.15 |
| 2006 | 52.50 |
| 2007 | 75.00 |
| 2008 | 106.50 |

***Sources: HCDA statistics***[5]

Presently there are over 500 producers / exporters growing cut flowers in Kenya. Production is largely concentrated on some 60 or so medium to large scale flower operations of which the 25 largest producers account for over 60% of total exports.

The larger flower farms range in size from 20 to over 100 hectares under production with labour force ranging from 250 – 6000 workers/farm and by the year 2008 horticulture industry in Kenya was employing 1.5 million people directly and 4.5 million indirectly dependent on it.[5] Most of these workers are migrants from various parts of the country [6]. The association between migration and health status of affected population is well documented worldwide [7].

Most tasks in these flower farms are labour intensive requiring intense concentration and long periods of standing and bending. Other tasks include those with significant

physical risk such as spraying, irrigation, construction, packing in the cold store and maintenance [5]

The main areas in Kenya where flower farming is being done include; Timau, Thika, Athi River, Naivasha and Kinangop [3].

It is possible therefore that flower farm workers may have unique health problems and needs bearing in mind the various factors that are in play such as those related to workers, farms and health.

### 1.3 Factors influencing workers health

In respect to occupations, several factors that have adverse effects on workers have been document, namely worker factors, those related to the working environment, and health care accessibility, just to mention a few.

**Factors related to the worker**

These include migration status, income levels, education levels gender issues and their general vulnerability.

**Factors related to the working environment**

These include factors such as safety and conditions of working environment (e.g. exposure to chemicals, cold temperature, and ergonomic hazards). This includes observation and application of relevant legislations. Of great importance is The Occupational Safety and Health Act of 2007, Chapter 14 of the Laws of Kenya which provides for the standard requirements at work places [8].

**Healthcare Accesses ability**

These include access to health services at work place and in their immediate locality.
This entails physical affordability, availability and acceptability of these services.
Planning and provision of good health services is essential for well being of any worker and more so to the flower farm workers, the majority whom are migrant workers.
However, no national wide accurate information on the health of this population, such as morbidity patterns, mortality rates are readily available.
Data on chronic diseases and occupational related diseases in flower farming industry remain scarce.

This study therefore aims at establishing morbidity pattern and its determinants among the flower farm workers in Timau Division of Imenti North district.

Since flower farming in other parts of the country occur in similar conditions as those of Timau, it is hoped that the findings from this study could be generalized to those other areas and be used to plan for health intervention for Timau and other similar areas of the country.

With the introduction of horticultural farming especially the cut flower farming in Timau division over the last decade or so, there has been a rapid influx of migrant workers from all parts of Kenya, in addition to foreigners who own the flower farms in Timau.[10]

This rapid increase in population, especially that of flower workers was never taken into account in the planning of infrastructure and social services such as health services in Timau.[9]

This migrant population of workers together with the factors at the flower farms at place of work and pressure exerted on social amenities in Timau might have modified significantly the health status of Timau population in general and morbidity patterns in particular. However, the extent and nature of this modification is unknown.

## 1.4 **Description of the study area**

Timau Division of Imenti North district was initially a rangeland or a livestock grazing area for Meru and Maasai Communities until 1918. After the World War II (1914 – 1918), the British war generals and soldiers were allocated huge tracks of land as a reward for their contribution during the war by the British colonial governors [9].

Africans were not allowed to own land here until after independence in 1963.The first Africans are said to have settled in Timau in 1965. The white settlers, perhaps due to panic, voluntarily surrendered, sold or refused to renew their lease titles. This gave the Africans a chance to form land buying cooperatives and own land in Timau [9].

The main form of farming in Timau was livestock keeping, wheat and barley growing until early 1990s when flower and horticultural farming was introduced. The flower farming has now spread to almost every corner of Timau division. Most of these flower farms are owned by Europeans except two farms – Loberi and Wangu- Embori investments, which are owned by local Kenyans [9].

### 1.4.1 Geography

Timau division is the largest of the four divisions of Imenti North district in Eastern Province. It has an area of 660.7 square kilometers.

Timau is on the leeward side on the slopes of Mt. Kenya, it has annual rainfall of between 800mm-2000mm.The rainfall pattern is bimodal, with long rains occurring from March to May and short rains from October to December [10]

### 1.4.2 Population

Timau division has a population of 49,118 persons as projected from the 1999 Census[11] with 25,600 males and 23,518 females. It has a population density of 72 persons per square kilometer, which is the lowest in the district due to the expansive nature of the division. It has 13,769 households and annual population growth rate of 1.48 % [11].

### 1.4.3 Administrative Divisions

Timau division, the largest of the four divisions of Imenti North district is headed by a district officer (DO) with headquarters at Timau town. The division is divided into five administrative locations, each headed by a chief [9].

These are:

1. Kisima Location
2. Ngushishi Location
3. Kirimara Location
4. Ontulili Location
5. Ntumburi Location

These location are further subdivided into twelve administrative sub location each headed by an assistant chief.

### 1.4.4 Economic activities

Agriculture is the main economic activity of Timau and is mainly through irrigation. Agricultural sector to a great extent supports and sustains other sectors of development such as the "*Jua Kali'* sector, education, trade, business among others.

Agriculture is also the main source of employment in this area.
Both large and small-scale farming is done but large-scale farming dominates. This includes mainly, flower farming, wheat and barley farming and livestock keeping.
There are also wholesale and retail traders in Timau town as well as some hotel businesses in Timau division.

### 1.4.5 Housing

Timau is a small but fast growing rural town and prior to the establishment of the flower farms and subsequent influx of migrant workers, there were only shops in the town and the traders used to reside in their rural homes.

Following the influx of the migrant workers, housing demand has increased. No concrete plans were in place to provide standard houses for this population as a result; shanties came up as this was what could be established by the few local people who own land around Timau town, while other shanties have been put up on the road reserve. Migrant workers earnings are so low that they can only afford these shanties.
The management of these flower farms has no housing provision or plans for these workers. As result, today there are mini-slums around Timau town which lack the basic essential amenities such as adequate safe water supply and sanitary facilities.

### 1.4.6 Infrastructure

a) **Roads**

Timau is served by one all weather road ( Meru-Nanyuki highway). It has several other feeder murram roads.

b) **Sewerage**

Timau has no sewage system. The main mode of human waste disposal is by use of pit latrines.

**c) Water**

Most of the water has been diverted to in irrigation in these flower farms. As a result, water supply nowadays is inadequate and erratic

### 1.4.7 Health Services

Timau division has the following health facilities:

- One GOK health centre – the main source of healthcare to this population
- Two GOK dispensaries
- Two mission dispensaries
- Five small private clinics, which operate on and off.

With exception of Wangu-Embori and Homegrown farms which have a small dispensary each, no other farm has a health facility for its workers.

In addition, Homegrown farms have a resident medical doctor.

Also in collaboration with management of these flower farms, the Ministry of Health and the University of Nairobi's Strengthening STD/HIV Control Project, a VCT site has been established at Timau Health Centre where these flower farm workers are now accessing VCT services.

## CHAPTER TWO: LITERATURE REVIEW

The relationship between health and working conditions as well as conditions at work place is well documented. Occupational disease is as old as civilization [13]. This has given rise to the discipline of occupational health.
Occupational health deals with promotion of highest degree of physical, mental and social well being of workers in all occupations [14]

Occupational health problems have over the years increased with technological advancement. Levy and Wegman point out that over the last 700 years, there has been invention of agriculture that promotes and enriches human being as well as loss of control over the labour processes and hence work related diseases have sprung up as a result of conditions in which many workers now work. [15].
It has also been found out that this rapid development in agricultural industry has not been accompanied by corresponding development in occupational health and safety programmes [16].

Whereas non-work illness and injuries in general population are well documented, very few studies are available on occupational and non- occupational health problems in agricultural industry in Kenya.

The range of illnesses and injuries of occupational nature in agricultural sector is wide, both globally and here in Kenya.
In a study among floricultural workers in Kenya, Wambugu found out that the most prevalent occupational health problems included hearing loss, dermatitis, muscular skeletal disorders, and psychosocial problems among others [17].
The morbidity pattern among floricultural workers is influenced by various factors, namely:

- Factors of the workplace
- Factors of the workers themselves
- Access to health services.

**2.1 Work place factors**

These are several and they act singly or in combination to influence or affect the health of the worker. These factors include exposure to pesticides, level of adherence to safety measures, green house effects, exposure to extremes of temperatures and ergonomic hazards.

**a) Exposure to pesticides**

Pesticides comprise all those types of synthetic and naturally occurring chemicals that are used in man's fight against those organisms, which are harmful to his health or detrimental to food production. [18]

Although statistics on pesticide use in floriculture industry are hard to come by, the industry is known to use a wide range of chemicals including fertilizers, insecticides, fungicides, nematocides and plant growth regulators some with potential for serious harm to human health. According to official statistics, Kenyan commercial pesticide imports average 7,300 tones annually and the Kenyan market is valued at US $ 40.4[19] Millions, placing it among the highest pesticide users in sub- Saharan Africa [20].

Data on the range, types of pesticide used in Kenyan flower farms are not available. However flower farms are known to use various types of pesticides. For example, according to a study in flower farms in Mexico's state of Morelos, thirty-six different pesticides were found to be in use including persistent organochlorines DDT, aldrin and dieldrin.[21]

**b) Safety measures**

Presence and adherence to an established code of safely measures in flower farms is an important factor in influencing the health status of the workers. Failure to adhere to these codes either by the employer or workers or both has been noted. A study done in Kenya found out that, the mandatory rotation for the sprayers of pesticides is not observed by the management leading to prolonged exposure to pesticides.[6]

A study done in floriculture industry in Tanzania revealed shortage or lack of materials safety data sheets and instructional manuals, workers ignorance of the identity and hazards of chemicals, improper storage of chemicals, lack of emergency treatment for accidental poisoning, no training for workers to recognize early signs of poisoning, inadequate supply and improper use of personal protective equipment and inadequate safe disposal of waste.[22]

These same findings were obtained in a study in Ecuador's floriculture industry.[23]

**c) Greenhouse effects**

Most of flower growing is done in greenhouses. Some effect of greenhouse has been shown to affect the health of those workers working there.

A study done in flower farms in Naivasha, Kenya by Catherine Dolan and others found the intensity of heat and humidity in the greenhouses to be too high[6] . This greenhouse condition increases and potentiates the hazards of pesticides to the workers either by breathing or through skin absorption.

Due to shortage of housing facilities, workers in most flower farms live in shanties; some built using pesticide-saturated greenhouse plastics. This has health adverse effects to those living in these shelters. Greenhouse conditions have also been shown to increase prevalence of respiratory disorders.[24]

**d) Prolonged Exposure to low temperatures**

Storage, sorting and packing of flowers is done in cold rooms. Workers in these cold rooms are therefore exposed to low temperature for excessive period of time. This has increased risk of respiration health problems, rheumatisms among other musculo-skeletal disorders.

**e) Ergonomic hazards**

This is brought about by working for long hours in uncomfortable positions or postures often doing repetitive tasks.

Most of the workers in horticultural industry work for long hours than recommended.

A study done in flower farms in Tanzania found that these farms had between 10 – 12 working hours per day with weekends and holiday, being working days.[22]

Another study done in flower farms in Kenya found that most workers had to work up to midnight even when not on night duty .[6]

**2.2 Workers' factors**

There are also factors inherent to the workers in the flower farms, which influence and affect their health and morbidity pattern. Some of these include migration effects, education, age sex and duration of employment.

**a) Migration effects**

Most of the workers in the flower farms are migrant workers. Migration has significant effect on health status of the population. It has been shown that migrant workers take with then a range of background characteristics, and because poverty and the need to search for better economic opportunities is one of the main push factors, migrant workers tend to come from poor background, bringing with them the disease profiles typical of their backgrounds.[25]

A study done in South Africa found that general health of migrant workers was poorer than that of the general population in the reception area[26] as they were not immune to the prevailing diseases of their new area.

In addition to communicable diseases, accidental injuries, thermo-related illness, chemical poisoning are highly prevalent among migrant farm workers.[27]

**b) Education level**

Education level of the worker plays a role as it affects workers capacity to understand and observe safety code of conduct, recognize early signs of ill health and act appropriately as well as influencing the skills and expertise levels of task performance.

Core activities in the flower farms tend to be given to workers with primary school education who form the majority, above 68% according to a study in Tanzania flower farms.[22]

**c) Age, sex and duration of employment**

Age is a universal variable in health. It has been shown that injury rate at place of work decrease with increase in age.[28]

As for sex, it has been shown that women are more vulnerable than men at place of work.[29] Sickness absence has also been found to be higher among women.[30]

Accident frequencies at work place also tend to decrease with increase in age and duration / length of employment.[31]

**2.3 Health problems in flower farms**

Health problems reported or found among workers in floriculture industry tend to be varied, their predominance being determined by the combination of factors at play.

Some of these health conditions include:

**a) Symptoms of pesticide poisoning**

These symptoms vary depending on the type of pesticide and degree of the poisoning.[17]

A study done by Mitoko among workers in flower farms in Naivasha found that 36% of these workers had acetyl cholinesterase inhibition – a form of poisoning by organophosphate group of pesticides.[32]

Another study done in flower farms in Costa Rica found that 50% of the workers had at least one symptom of pesticide poisoning while in Ecuador, nearly 60% of workers surveyed showed pesticide-poisoning symptoms.[33]

**b) Respiratory problems**

Conditions in floriculture industry, such as greenhouse effects, exposure to pollen and other allergen predispose workers to respiratory problems.

A study done in Kenyan agricultural industry showed that 71% of workers handling pesticides experienced some respiratory problems.[32]

**c) Gastro intestinal symptoms**

Gastrointestinal symptoms are very common signs of agrochemical poisoning. In the above study done in Naivasha, 50% of the workers were found with stomach problems.[32] Similar finding were obtained from a study in Costa Rica where 50% of the surveyed flower farm workers had symptoms of nausea or diarrhea.[33]

**d) Skin problems**

This is another reported problem among workers those handling chemicals such as sprays or those working in greenhouses. The study of Naivasha[32] found out that 84% of workers surveyed had skin problems such as itching or irritation.

**e) Reproduction Problems**

Workers working in floriculture industry have also been found to have reproduction disorders from studies done elsewhere as none has been done in Kenya.

A study done in Colombia found moderate increase in prevalence of abortion, prematurity and congenital-malformations among children conceived after either parent started working in floriculture industry.[23]

Another study done by Annette Abell and others in Denmark in the year 2000 found out that female workers in flower greenhouse have reduced fecundity (ability to become pregnant) and that the median sperm concentration among flower green house workers was 40% lower among men with more that ten years of green house experience than among men with less than five years experience.[23]

Despite the magnitude of the public health issues involved, relatively little attention has been given to the occupational health of the floriculture industry workers and its role in epidemiological profile to their communities. Even less attention has been paid to conditions possibly linked to poor health in the context of flower farming.

The range of health issues that can be associated with floriculture is inevitably broad. These can be debilitating to flower farm workers and their families.

They can also have serious consequences for societies and communities into which these workers and their families live.

In view of the rapid growth nature of the floriculture industry, and given the symbiosis that is inheritably created between the health of floriculture workers and their populations, this is an area that calls for much greater attention than it has been given to date. More need to be done to systematically gather and share health and healthcare statistics concerning workers in floriculture industry. There is also an urgent need to include and involve these workers in local healthcare and disease prevention.

## CHAPTER THREE: PROBLEM STATEMENT, JUSTIFICATION AND OBJECTIVES

### 3.1 STATEMENT OF THE PROBLEM

Over the last decade or so, there has been a phenomenal growth in horticultural farming in Kenya, especially in the cut flower sector.

This sector has become a major source of employment to thousands of labourers. Like in any other industry, basic rights of these workers in this flower industry should be given the due attention they deserve. This is of great importance and particularly the health status of these workers and occupational risks.

Unlike other agricultural sectors, the cut flower sector comes out uniquely as far as workers' health status in general and their occupational health and safety is concerned. This is due to various factors associated with the workers themselves, for example majority of them are migrant workers and therefore as expected they bring with them diseases from their various areas of origin to these farms, while at the same time being susceptible to the prevailing diseases at the areas where these flower farms are.

Moreover their low or no education levels, low earnings, disruption of their social life and family ties may also be important in influencing the health status of this population.

Secondly, the conditions at the flower farms will greatly influence the health status of the workers. For example, exposure to agro-chemicals, prolonged exposure to low temperatures in cold rooms, exposure to green house conditions as well as other physical and other ergonomic hazards may affect the health of this population. Thirdly, there are factors of access to health care by this population, which ranges from physical availability, access, and affordability of health services. It is also a known fact that most of these flower farms do not provide health services to their workers, and the few that provide only provide the very minimum in form of first aid services [6].

The public health facilities in these areas are not able to meet the demand of the workers from flower farms since this population was not taken into account when planning for supplies and composition of drugs kits to these facilities was done [10].

As such, these health facilities more frequently run short of supplies before the expected time and most of conditions that the flower farm workers present with are not adequately addressed since the drug kits do not contain the required medicines [10].

Due to the magnitude of public health issues involved, more attention need to be given on health of the ever increasing population of workers in the cut flower industry in this country. There is therefore an urgent need to pay more attention to the health of this unique population as far as their health status and needs are concerned.

There is a need to plan the delivery of health services to this population. To do this, more studies need to be done to systemically gather and share health and health care statistics and other information concerning these workers.

It is with this in mind that this study aimed at gathering information on morbidity patterns and their determinants among these flower farm workers. It is hoped that this information will be useful in planning and re-planning of health services to this population in flower growing areas in particular and the entire country in general.

### 3.2 JUSTIFICATION AND SIGNIFICANCE

Occupational health is gaining more importance each day and most employers including those in the flower farms are beginning to take seriously the health needs of their workers. There is renewed interest and commitment among employers to provide health services to their employees. For them to do so effectively, proper information on health needs is required.

Considering the deplorable working conditions cut flower farms operate in and the absence of empirical data for evidence-based decision making on this sector in Kenya, this study aimed at filling this void.

It is therefore hoped that management of flower farms may use data obtained from this study to institute occupational health services at the farms with both preventive and curative components. With improved health services, the workers' productivity will increase and in turn boost the earnings from the flower farms in particular and the floriculture industry in general while on the other hand it is hoped that this study will identify areas for further research.

## 3.3 OBJECTIVES

### Broad objective

To assess the common health problems and their determinants among flower farm workers in Timau.

### Specific objectives

1. To describe the socio-demographic characteristics of the flower farm workers;
2. To determine the prevalence of occupational health problems among the workers ;
3. To describe the safety of working practices on the farms;

## CHAPTER FOUR: METHODOLOGY

### 4.1 Study Design

This was an analytical cross-sectional study employing quantitative methods of data collection and analysis to assess morbidity patterns and their determinants among workers in flower farms in Timau.

### 4.2 Study area

This was conducted in six sampled flower farms in Timau division of Imenti North district in Eastern province of Kenya.

Selection of Timau area among other areas where floriculture is done in Kenya was by purposive sampling for the following reasons:

i. The area has many big flower farms with big work force and the farms are close to each other. No other study had been done on health issues in Timau farms.

The ministry of health in Imenti North district had various health programs targeted to these flower farms which formed the entry point to these farms.

### 4.3 Study Population

The study population was 372 workers working in the six sampled flower farms.

Also 400 health record entries of workers seen at health facilities within these farms during the three weeks preceding the study were reviewed.

### 4.4 Inclusion and exclusion criteria

*4.4.1 Inclusion Criteria:*

1. Workers who had worked at the flower farms in Timau for a minimum of one month at the time of this study.
2. Those who were willing to participate in the study.
3. Workers' health records for the three weeks proceeding the time of this study which were complete for age, sex and health problems.

*4.4.2 Exclusion criteria:*

1. Those not working in the flower farms or had worked for less than a month.
2. Workers who were not willing to participate in the study.

3. Health records of workers seen at the dispensaries earlier than three weeks preceding this study.
4. Records with incomplete data.

**4.5 Sample size**

Since the prevalence of most health problems among the study population was unknown, a prevalence rate of acetyl cholinesterase inhibition of 36% that was found by Mitoko in a study among flower farm workers in Naivasha, Kenya was used in this study[32].

The formula used in the estimation of sample size is one recommended by Kiikwood[34] which is outlined below:

$$n = \frac{z^2 p(1-p)}{d^2}$$

Where

n = sample size

z = z – value at confidence level of 0.05 (= 1.96 )

d = Degree of precision ( set at ± 5% )

p =Estimated prevalence of morbidity in the population (= 36 % in this case)

Therefore

$$\text{Sample size } n = \frac{1.96^2 \times 0.36 \times 0.64}{0.05^2} = 354.$$

A total of 372 workers were randomly sampled and interviewed, the extra 18 respondents were recruited to cater for possible non responses. A random sample of 420 health records entries of workers seen in the farms dispensaries during the three weeks preceding 20th August 2006 were examined of which 400 were analyzed . The other 20 entries were discarded as age indicated as only "adult" and so added no value. .

### 4.6 Sampling

Multi-stage sampling method was used. A list of all the twenty-three flower farms was obtained from Timau District Officer's office. The farms were then put into three clusters based on which location among the four administrative locations the farm was. Three farms were randomly selected from each cluster. From each of the selected farms, a list of the workers in the four sections- cold rooms, greenhouse, spraying, building and maintenance- of the selected farms was obtained from the human resource managers and using these lists as sampling frame, study subjects were randomly selected proportionally from each of the four sections of the farm.

In the second approach, the health records of all workers seen and attended at the farms dispensaries during the period of three weeks preceding this study was obtained. This was because the interview based on the workers health experience in the three weeks preceding the time of interview.

From this, 420 entries were randomly selected although the minimum sample size was 384 to take care of possible incomplete entries. 400 were found to be complete and were then analyzed for the age sex and the health problems of the workers as this was the only information recorded.

### 4.7 Data collection methods and instruments

Collection of data was done between 16th August and 20th September 2006. Trained research assistants assisted in the collection of data .These research assistants were two nurses and two public health officers. They were first trained on what data to collect and were closely supervised by the principal investigator.

Data was collected using semi-structured questionnaires administered to the 372 study subjects. The data was on various variables such as socio-demographic characteristics including age, sex, marital status, education and in-migration status as well as occupational data on working history, work practices and safety knowledge and data on workers morbidity.

The other method was by review of workers health records at the farms dispensaries. This involved review of randomly selected 400 records entries of the workers attended in these dispensaries during the three weeks proceeding 20th August 2006.

### 4.8 Data Processing, analysis and presentation

Data were cleaned and coded before entering into the computer for analysis by the investigator. Descriptive statistical analysis was carried out in accordance with the study objectives.

The quantitative data were analyzed by computer using statistical package for social sciences (SPSS).

The data was then organized and summarized according to the stated epidemiological variables- common health conditions, risk factors such as sex, age, level of education, migration status, marital status, and the workers' safety knowledge and practices.

The measures of central tendency (mean and mode) and measures of dispersion (range and standard deviation) were calculated for age and duration of stay in Timau.

Chi- Square test of significance was done to determine if there was any association between the selected risk factors and workers' morbidity.

Summarized results were presented in tables, pie charts, graphs as indicated in chapter five.

### 4.9 Minimizing biases and Errors

The biases and potential errors were minimized as per the following numbers 1- 4 statements

1. Training and close supervision of all research assistants by the investigator;
2. Pre- testing the instruments of data collection in one of the flower farms in Timau (Lobela Farm), but which was excluded from the main study. modification of the questionnaire was then done prior to data collection;
3. The same structured and pre tested questionnaire was used to collect data from all the sampled workers;
4. The filled questionnaires were edited on daily basis for completeness and to make sure that the entries were accurate.

### 4.10 Ethical Considerations.

Research approval was sought and obtained from the Ministry of Education Science and Technology and the Kenyatta National Hospital and College of Health Sciences University of Nairobi Research and Ethics Committees.

Clearance was sought from provincial administration of Meru Central District.

Permission and consent was obtained from the management of the flower farms included in this study.

Explanation of the study was done to the respondents and informed consent obtained from them before administering questionnaires to ensure participation was voluntary. Respondents were assured of confidentiality as serial numbers and not names or employment numbers were used on the questionnaires.

## CHAPTER FIVE: RESULTS

At the time of this study, Timau division had twenty-three flower farms, which were large-scale farms. Majority of them belong to Homegrown company. Each farm employed on average 400-1600 casual workers

A total of 372 questionnaires administered to the sampled workers were analyzed.

A total of 400 health records entries for workers who attended the health facilities within these farms during the three weeks preceding this study (preceding 20th August 2006) were reviewed. These records contained data only on age, sex and health problems of the workers and the summarized results are presented in the age, sex and morbidity sections for comparison with what was directly reported by the interviewed workers.

### 5.1 Demographic characteristics

#### 5.1.1 Age

Among the respondents, the youngest worker was 16 years while the oldest was 61 years, both of whom were males. About 30% of the respondents fell in the 25 to 29 years age bracket. The workers mean age was 30.3 years (30.5 years for males and 30.2 years for females) while the mode was 24 years. (Table 5.1).

Upon review of randomly selected records of 400 workers seen at the health facilities in these farms during three weeks preceding this study, the youngest worker was fifteen (15) years old while the oldest was seventy (70) years old. About 24 % of the workers were in the 25- 29years age bracket (Table 5.1).

### 5.1.2 Sex

Although the jobs were open to both sexes, 60.2% of the sampled workers were females while 39.8% were males. From records review, it was found that females were more at 59% while males accounted for 41% of the workers (Table 5.1). There was no significant difference found between the morbidity and the sex of the Workers ($p>0.05$) from both interviews and records review.

Table 5.1a Distribution of the study subjects by their demographic characteristics as Obtained by interviews.

| | | (n=372) | |
|---|---|---|---|
| | | Number | Percentage |
| Age (years) | 15-19 | 9 | 2.4 |
| | 20-24 | 86 | 23.1 |
| | 25-29 | 110 | 29.6 |
| | 30-34 | 74 | 19.9 |
| | 35-39 | 42 | 11.3 |
| | 40-44 | 25 | 6.7 |
| | 45-49 | 16 | 4.3 |
| | 50-54 | 6 | 1.6 |
| | 55 and above | 4 | 1.1 |
| | **Total** | **372** | **100** |
| Sex | Males | 148 | 39.8 |
| | Females | 224 | 60.2 |
| | **Total** | **372** | **100** |
| Marital status | Never married | 137 | 36.8 |
| | Married | 169 | 45.4 |
| | Separated/divorced | 47 | 12.6 |
| | widowed | 2 | 0.5 |
| | cohabiting | 17 | 4.6 |
| | **Total** | **372** | **100** |
| Education level | None | 9 | 2.4 |
| | Primary | 203 | 54.6 |
| | Secondary | 144 | 38.7 |
| | Post Secondary | 16 | 4.3 |
| | **Total** | **372** | **100** |

Table 5.1b Distribution of the study subjects by their demographic characteristics as obtained by review of records.

| | n= 400 | |
|---|---|---|
| | Number | Percentage |
| Age (years) | | |
| 15-19 | 28 | 7.0 |
| 20-24 | 91 | 22.8 |
| 25-29 | 97 | 24.3 |
| 30-34 | 91 | 22.8 |
| 35-39 | 36 | 9.0 |
| 40-44 | 21 | 5.3 |
| 45-49 | 10 | 2.5 |
| 50-54 | 12 | 3.0 |
| 55 and above | 14 | 3.5 |
| **Total** | **400** | **100** |
| Sex | | |
| Males | 164 | 41 |
| Females | 236 | 59 |
| **Total** | **400** | **100** |

### 5.1.3 Ethnicity

Majority of the workers were Merus (76.1%), 15.1% were Kikuyus, 3.2, Embus,2.2% Turkanas, 1.3% Kisiis, 1.1% Kambas , 0.8% Luos and 0.3% Samburus (Table 5.2).

In terms of province of origin, all the provinces except Nairobi were represented.

Table 5.2: Percentage distribution of respondents by ethnicity (n=372)

| ETHINICITY | FREQUENCY | PERCENTAGE |
|---|---|---|
| Meru | 283 | 76.1 |
| Kikuyu | 56 | 15.1 |
| Embu | 12 | 3.2 |
| Kamba | 4 | 1.1 |
| Samburu | 1 | 0.3 |
| Kisii | 5 | 1.3 |
| Luo | 3 | 0.8 |
| Turkana | 8 | 2.2 |
| **Total** | **372** | **100** |

### 5.1.4 Marital status

Of all the workers who were interviewed , 45.4 % were married, 36.8% had never been married, 12.6% were separated/divorced while 4.6% were cohabiting(Table 5.1) Most females (88%) were not married compared to 49% males who were unmarried.

### 5.1.5 Education level

Education of the respondents was assessed by the highest level attained. This ranged from no formal education to post secondary school level. Only 6.7% of the workers had no formal education, 50.8% were of primary school level, and 37.9% secondary school level and only 4.6% had post secondary school level of education. (Table 5.1).

### 5.1.6 In-migration status

Majority of the respondents (82.1%) were in-migrants while only 15.9% original residents of Timau.

Majority of the in-migrant workers (84.7%) were from Eastern province 7.7% from Central, 6.1% Rift valley, 2.2% Nyanza, 1.0% North Eastern, 0.6% Coast and 0.3% from Weastern province. (Figure 5.2)

For the in-migrant workers, the minimum duration of stay in Timau was 0.5 years while maximum stay period was 30 years with a mean of 4.6 years (Figure 5.1) with about 59.4% of them having stayed in Timau for duration period ranging from one year to four years.

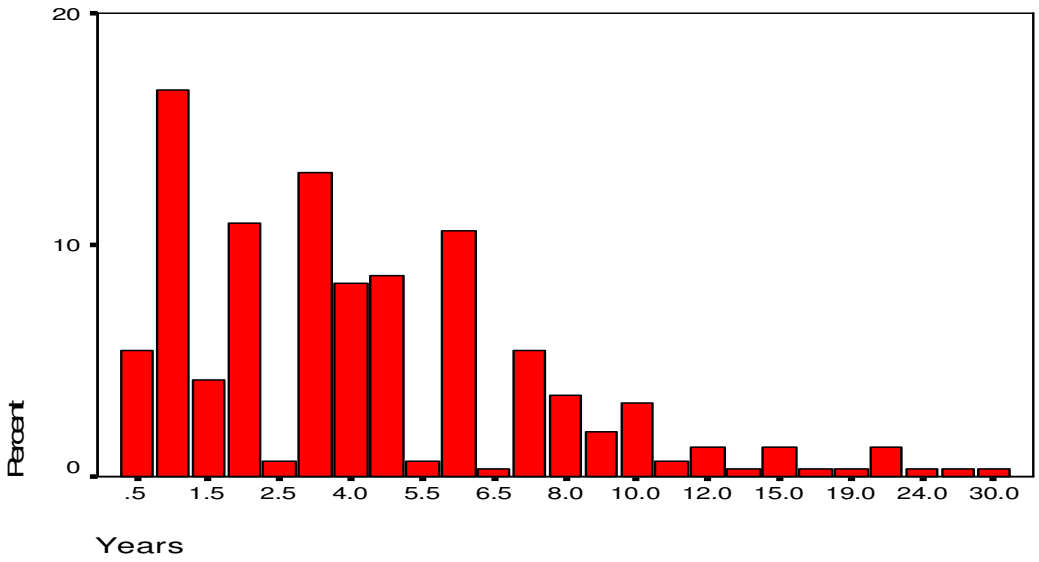


Figure 5.1: Duration of stay of in-migrant workers at Timau (n=311)

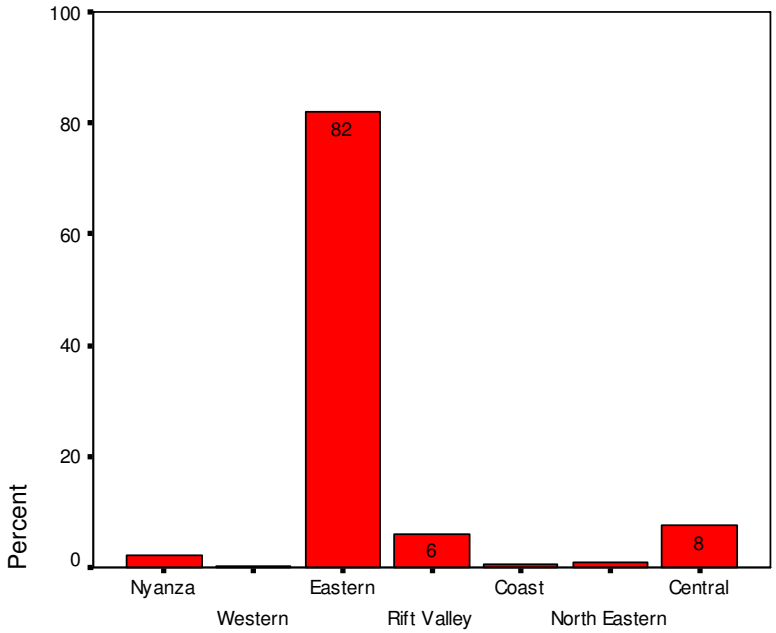


Figure 5.2: In-migrant respondents' province of origin (n=311)

**5.2 Distribution of workers by their job categories in the farms**.

There were mainly four areas or departments where the workers interviewed were deployed;

i. Those in cold rooms who were involved in sorting and packing the flowers;
ii. Those in construction and maintenance section to construct and maintain green house and other physical structures;
iii. Those who spraying the flowers in the green houses;
iv. Those working in green houses involved in weeding, sticking and cutting the flowers who were the majority.

The workers in these four sections were proportionally sampled and green house attendants were 69.4%; pack house attendants 15.9%, chemical sprayers 10.2% and those in building and maintenance department were 4.6% (Figure 5.3).

The minimum duration of time in years the workers had been in their current jobs was 0.25 years and maximum was 26 years with a mean of 2.7 years and Std. deviation of 2.56 years.

Only 27.4% of the workers reported having regular job rotations and the frequency of these rotations was quarterly (35.3%) and semi annually (24.5%).

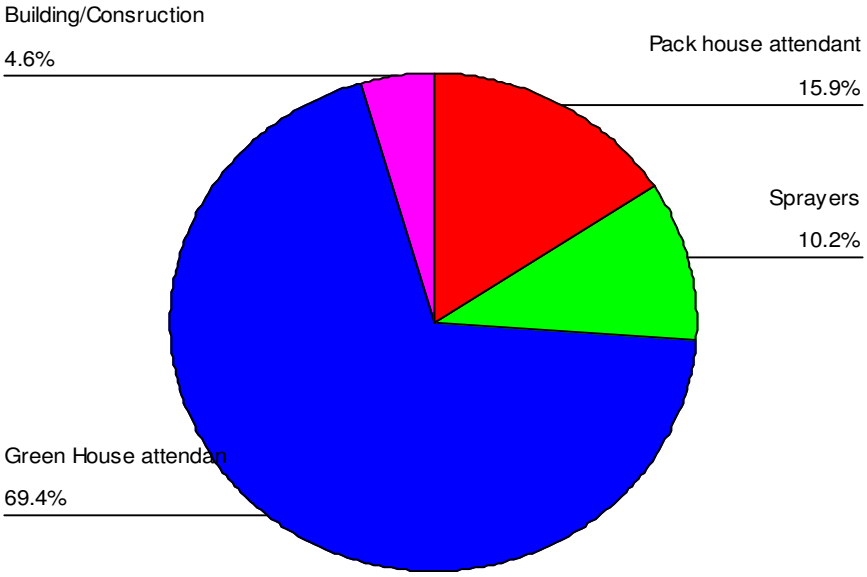


Figure 5.3 Distribution of respondents by type of job in the farms (n=372)

### 5.2.1 Training of workers

In respect to training, 41.1% of the workers had initial training in their job while 58.9% had not received any training. Only 20.4% of them reported having had a refresher / periodic training in the job they were doing.

The periodic trainings were conducted quarterly ( 35.5% ), annually (35.5%) 14.5% , semi-annually (14.5% ) monthly (14.5%) while 3.9% were erratic with no specific period interval.

### 5.3 Workers safety knowledge and attitude

Most of the workers(70.2% ) reported that they had some knowledge on safety practices at place of work while 28.8% of them said they had no knowledge on safety. Another 1.1% of these workers did not know if they had or did not have safety knowledge.

On source of safety knowledge , majority of the workers ( 60.5%) got it from training by farms management, 19.2% from colleagues, 16.5% from school and 3.8% from reading safety manuals.

On the adequacy of knowledge on safety, 46.8% of the workers felt that their safety knowledge was adequate while 52.2% said theirs was not adequate.

Of those who felt that their knowledge was inadequate, they gave various ways on how it could be improved. Majority (93.4%) suggested more training, 6.1% suggested being provided with personal protective equipment while 0.5% of them had no idea on how they could improve their safety knowledge.

#### 5.3.1 Workers' knowledge on what to do in case of accident

Majority (81.1%) of the workers interviewed said they knew what to do in case of an accident or injury at their place of work while 18.3% of them did not know what to do. Of those who said they knew what to do, 45.4% said that they would go to the dispensary or look for the nurse, 34.5% will seek or administer first aid while 20.1% would report to the farm management.

On attitude of workers towards their own safety and that of their workmates, 87.1% of them felt they had a responsibility in ensuring their own safety and that of their workmates while 12.9% said they had no responsibility at all.

About 51.3% of the workers felt that the farms management had done their best to ensure their safety while 47.6% felt that the management had not done enough to ensure their safety. Another 1.1% of them did not know if the management had done anything towards their safety at work place. The 47.6% of the respondents who felt that management of the farms had not done enough to ensure their safety; they gave various recommendations on what they want the management to do. (Table 5.3). About 52.5%recommended provision of adequate personal protective equipment while 23.2% recommended more training.

Table 5.3 Workers' suggestions on how the farms management can improve their safety (n=177)

| **Workers suggestion on improving their safety** | **Number** | **Percentage** |
|---|---|---|
| Provision o adequate PPEs | 93 | 52.5 |
| More trainings | 41 | 23.2 |
| Adhering to re-entry time to green house after spraying | 3 | 1.7 |
| Addition of more first aide's | 13 | 7.3 |
| Provision vehicle/ ambulance for sick workers | 4 | 2.3 |
| Regular medical check-ups for the workers | 5 | 2.8 |
| Establishment of workers welfare team | 3 | 1.7 |
| Reduction of the number of working hours | 6 | 3.4 |
| Increase workers' pay | 9 | 5.1 |
| Total | 177 | 100 |

### 5.3.2 Risk perception by workers

About 35% of the workers felt that they were at minimal risk, 23% at high risk, 22% at moderate risk and 20% of them did not perceive themselves to be at any risk. Among green house attendants, 18.6% felt that they were at no risk, while 33.7% felt they were at minimal risk, 19.8% and 27.9% at moderate and at high risk respectively. Among the sprayers, 13.3% of them did not perceive any risk in the job they were doing while 26.3% thought they were at high risk. 35.6% of pack house attendants felt that they were at minimal risk (Table 5.4). However there was no statistically significant risk perception and workers morbidity ($p>0.05$) Table 5.12.

Table 5.4 Risk perception in relation to the type of job (n=372)

| Type of job | Risk perception ( % of the workers) | | | | Total |
|---|---|---|---|---|---|
| | No risk | Minimal risk | Moderate risk | High risk | |
| Pack house attendants | 27.1 | 35.6 | 32.2 | 5.1 | 100 |
| Sprayers | 13.2 | 36.8 | 23.7 | 26.3 | 100 |
| Green House attendants | 18.6 | 33.7 | 19.8 | 27.9 | 100 |
| Building/Construction | 35.3 | 41.2 | 17.6 | 5.9 | 100 |
| TOTAL | 20.2 | 34.7 | 22.0 | 23.1 | 100 |

### 5.3.3 Safety practices of the workers

Table 5.5 Distribution of workers by their degree of adherence to use of PPEs (n=372)

| Degree of adherence to safety practices | Number | Percentage |
|---|---|---|
| Always adhered | 261 | 70.1 |
| Adhered most of the times | 37 | 9.7 |
| Occasionally adhered | 16 | 4.3 |
| Rarely adhered | 38 | 9.9 |
| Never adhered | 20 | 5.4 |
| TOTAL | 372 | 100 |

The degree to which the workers reported adherence to the safety practices at their place of work in general is depicted by Table 5.5. Exactly 70.7% of all the workers said that they always adhered to the laid down safety practices while 5.4% reported that they never adhered to these practices.

There was a difference in the level of adherence to safety practices between the two sexes of workers with 62.4% of the respondents always adhering to these practices being females.

On the practice of reading safety manuals and written instruction, 36.8% of the workers said that they always read these manuals and written instructions while 33.6% of them reported never reading these manuals and instructions. Most of the workers (73%) who never read the manuals on safety and instructions were those with no education or were primary school drop outs.

On the use of personal protective equipment (PPEs) at place of worker, 52.7% of the workers reported that they always used PPEs, while 34.4% of them reported that they never used personal protective equipment. The reasons given by those who never used the personal protective equipment are unavailability (94.6%), discomfort 94.2%) and being not necessary (1.2%).

On observation of rules governing eating of food while at work place, 88.4% of the interviewed worker said they observed these rules, while only 11.6% did not.

Majority of the workers (92.7%) never used their working garments outside work place while 7.3% of them said that they used the same clothes they used at work place even at home. There was statistically significance difference between the morbidity of workers who were using personal protective equipment (PPEs) and those who did not with those using PPEs being less likely to report health problem ($p<0.01$).

## 5.4 Occupational health and safety services

### 5.4.1 Medical examinations

Majority (90.1%) of the workers did not have any periodic medical examinations

For the 9.9% of the workers who reported to have periodic medical examinations, the frequency of these examinations was mainly done on quarterly basis.

### 5.4.2 Source of health care services

Slightly more than half (53.8% ) of the workers sought health services first at the dispensaries within the farms, 32.8% from government health facilities, 10.5% from private facilities while 3.0% resulted to self medication(Figure 5.4).

All sampled farms had a functioning dispensary within them.

This physical accessibility of health services was important in saving workers time thereby not affecting their productivity as well as solving health problems early to avoid complications and detect epidemics.

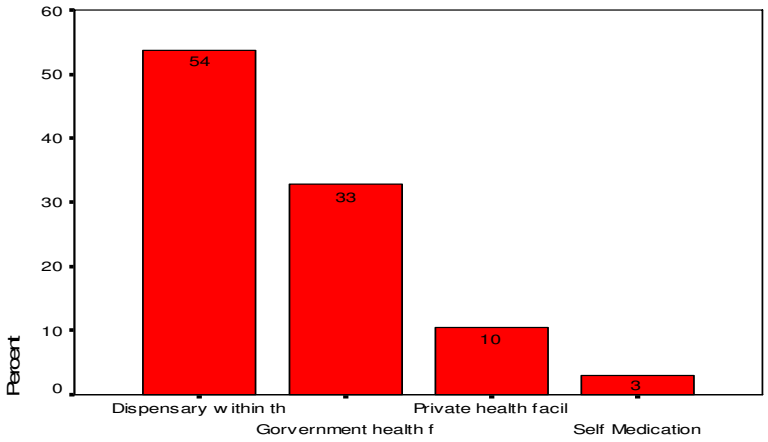


Figure 5.4 Sought source of health care

### 5.4.3 Availability of sick-offs and healthcare financing schemes

The availability of sick offs for sick workers and a health scheme to assist workers in financing health care was sought. About 69.4% of the workers said they were given sick - off when sick.

Only 49.2% of the workers had a scheme to assist in financing their healthcare and this was the national Hospital insurance fund (NHIF), while 50.8% of the workers were not members of any scheme.

## 5.5 Morbidity of the workers

### 5.5.1 Profile overview

The morbidity profile among the flower farm workers in Timau were obtained by two approaches;

One was by interviewing 372 randomly sampled workers using a semi-structured questionnaire.

Out of the 372 workers interviewed, about 98.1% reported illness during the last three weeks preceding the time of study. About 43.3% reported problems of respiratory system, 17 % gastrointestinal problems, 15% Malaria (clinical), 9% rheumatism, 6.6 % skin problems. 6.6% accidents / injuries and 2.5% eye problems (Table 5.6).
The second approach was by reviewing records of randomly selected 400 workers seen at the farm clinics during the same three weeks preceding the study.
On review of randomly selected 400 entries of records of workers seen at the farm facilities in these farm during the same period, that is during the three weeks preceding the study, it was found out that respiratory problems accounted for about 35.7% of cases, followed by malaria(clinical) (26.0%). The other problems were; gastrointestinal problems (17.3%) rheumatism (8.7%) skin problems (5.5%) urinary tract infections (4.0%) eye problems (1.3%) injuries and accidents (1.0%) and ear problems (0.5%) (Table 5.6).

Using Chi- Squire Test of significance, the results of morbidity obtained by the two methods were compared and there was no statistically significant difference ($p>0.05$).

Table 5.6 Morbidity profile among the study subjects

| **Illnesses** | **Obtained by interview n=365** | | **Obtained by records review (n = 400)** | |
|---|---|---|---|---|
| | **Frequency** | **Percentage** | **Frequency** | **Percentage** |
| Respiratory problems | 158 | 43.3 | 143 | 5.73 |
| Gastro intestinal problems | 62 | 17.0 | 69 | 17.3 |
| Skin Problems | 24 | 6.6 | 22 | 5.5 |
| Eye problems | 9 | 2.5 | 5 | 1.3 |
| Injuries/Accidents | 24 | 6.6 | 4 | 1.0 |
| Rheumatisms | 33 | 9.0 | 35 | 8.7 |
| Malaria(clinical) | 55 | 15.0 | 104 | 26.0 |
| Ear problems | 0 | 0 | 2 | 0.5 |
| Urinary tract infection | 0 | 0 | 16 | 4.0 |
| **Total** | **365** | **100** | **400** | **100** |

**$X^2$ =1.18127 p- value >0.05**

### 5.5.2 Health problems of the workers by their age, sex and job type

The distribution of the two sets of morbidity profiles that is reported morbidity profile and the one obtained by records review and by age, sex were done and results are as presented in tables 5.7 and 5.8. Also the distribution of the reported health problems and job type was done but it was not possible to do the same with health problems from the records since job type was not recorded in the health records of the workers.

**a) Morbidity by Age**

From both the interviews and review of records , all the health problems affected mainly those in the ages 20 – 34years while malaria and accidents / injuries were uniformly distributed across all ages. However, there was no statistically significant difference between workers morbidity profile obtained by the methods and their age ($p>0.05$) (Tables 5.7 and 5.8). Using multinomial logistic regression, age was found to be a significant predictor for presence of musculo skeletal problems where an increase of age by five years increased the likelihood of musculo skeletal problems by a factor of 1.015

Table 5.7 Morbidity of the workers based on review of records by age strata (n=400)

| Type of morbidity | Percentage proportion of workers by age in years | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 15-19 | 20-24 | 25-29 | 30-35 | 35-39 | 40-44 | 45-49 | 50-54 | 55 & above | Total |
| Respiratory problems | 5.6 | 19.6 | 29.4 | 20.3 | 10.5 | 5.6 | 0.7 | 3.5 | 4.9 | 100 |
| Gastrointestinal problems | 11.6 | 20.3 | 23.2 | 26.1 | 7.2 | 7.2 | 1.4 | 1.4 | 1.4 | 100 |
| Malaria(clinical) | 6.7 | 26 | 24 | 25 | 5.8 | 1.9 | 3.8 | 4.8 | 1.9 | 100 |
| Rheumatism | 5.7 | 25.7 | 5.7 | 25.7 | 11.4 | 14.3 | 2.9 | 0.0 | 8.6 | 100 |
| Skin problems | 4.5 | 22.7 | 27.3 | 22.7 | 13.6 | 0.0 | 9.1 | 0.0 | 0 | 100 |
| Urinary tract infections | 6.3 | 37.5 | 18.8 | 18.8 | 6.3 | 6.3 | 6.3 | 0.0 | 0 | 100 |
| Eye problems | 20.0 | 40. | 20 | 0.0 | 20.0 | 0.0 | 0.0 | 0.0 | 20.0 | 100 |
| Injuries | 0.0 | 0. | 50.0 | 0.0 | 25.0 | 0.0 | 0.0 | 25 | 0 | 100 |
| Ear problems | 0.0 | 0.0 | 0.0 | 50 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 100 |
| TOTAL | 7.0 | 22.8 | 24.3 | 22.8 | 9.0 | 5.3 | 2.5 | 3.0 | 3.5 | 100 |

**$X^2$=6.97802 p- value >0.05**

Table 5.8 Distribution of reported types of morbidity among study subjects based on age strata (n=365)

| **Type of morbidity** | Percentage proportion of workers by age in years | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 15-19 | 20-24 | 25-29 | 30-35 | 35-39 | 40-44 | 45-49 | 50-54 | 55 & above | Total |
| Respiratory problems | 2.5 | 21.5 | 29.1 | 17.7 | 13.3 | 8.2 | 5.7 | 1.9 | 0.0 | 100 |
| GIT problems | 33.3 | 17.7 | 33.9 | 33.9 | 22.6 | 12.9 | 4.8 | 0.0 | 0.0 | 100 |
| Malaria(clinical) | 1.8 | 1.8 | 29.1 | 14.5 | 10.9 | 5.5 | 5.5 | 0.0 | 0.0 | 100 |
| Rheumatism | 3.0 | 3.0 | 27.3 | 27.3 | 9.1 | 3.0 | 3.0 | 6.1 | 3.0 | 100 |
| Skin Problems | 0.0 | 33.3 | 37.5 | 8.3 | 8.9 | 4.2 | 4.2 | 4.2 | 0.0 | 100 |
| Eye problems | 0.0 | 22.2 | 22.2 | 44.4 | 0.0 | 11.1 | 0.0 | 0.0 | 0.0 | 100 |
| Accidents | 0.0 | 16.7 | 25 | 29.2 | 4.2 | 12.5 | 8.3 | 0.0 | 4.2 | 100 |
| TOTAL | 2.4 | 23.1 | 29.6 | 19.9 | 11.3 | 6.7 | 4.3 | 1.6 | 1.1 | 100 |

**$X^2$= 4.25844 p- value >0.05**

**b) Morbidity by Sex**

For the reported health problems, with exception of skin problems, eye problems and malaria, all other problems were more common among females than males.

From the records; the recorded health problems were more among males than females with exception of gastrointestinal problems and rheumatism which was more prevalent among the females. However, the differences in morbidity between males and females was not statistically significance (p>0.05) (Table 5.9).

Table 5.9 Distribution of types of morbidity among study subjects based on sex strata

| **Morbidity types** | **Morbidity reported by interviewees (n=365)** | | **Morbidity obtained by review of records (n=400)** | |
|---|---|---|---|---|
| | Males (%) | Females (%) | Females (%) | Males (%) |
| Respiratory Problems | 41.2 | 43.3 | 36.0 | 35.7 |
| Gastro intestinal problem | 12.2 | 19.6 | 15.9 | 17.9 |
| Malaria(clinical) | 16.9 | 13.4 | 29.3 | 23.8 |
| Rheumatism | 7.4 | 9.8 | 6.1 | 10.6 |
| Skin Problems | 9.5 | 4.5 | 5.5 | 5.5 |
| Urinary track Infections | 0.0 | 0.0 | 4.3 | 3.8 |
| Eye problems | 3.4 | 1.8 | 1.8 | 0.9 |
| Injuries / accidents | 6.1 | 6.7 | 1.2 | 0.9 |
| Ear problems | 0.0 | 0.0 | 0.0 | 0.9 |
| TOTAL | 60.2 | 39.8 | 59.0 | 41.0 |

**$X^2$ = 8.8102 p- value >0.05**

**c) Reported Morbidity by type of job**

Respiratory problems were found among 54.2% of pack house workers, 44.7 % of the sprayers and 40.3%.of green house attendants.

Eye problems were only reported by green house attendants.

Accidents / injuries were mainly reported by workers involved in the building , constructing and maintaining the green houses ( 17.6%) and least reported by pack house attendants( 3.4%.).

Skin problems were not reported by workers in building/ maintenance department

Malaria, gastrointestinal problems and rheumatism were uniformly reported by workers in all job types (Table 5.10).

Upon performing Chi-Square test of significance, there was no statistically significant difference between the type of job the workers were doing in the farms and the illnesses they reported meaning that the type of job and morbidity of the workers were not related($p>0.05$) (Table 5.10).

Table 5.10 Distribution of reported morbidity by type of job. (n=372)

| Morbidity | Type of jobs (% of workers) | | | | |
|---|---|---|---|---|---|
| | Pack house attending (n=59) | Spraying (n=38) | Greenhouse attending (n=258) | Building and construction (n=17) | Total (n=372) |
| Respiratory problems | 54.5 | 44.7 | 40.3 | 29.4 | 42.5 |
| Gastrointestinal problems | 16.9 | 13.2 | 17.1 | 17.6 | 16.7 |
| Malaria | 11.9 | 15.8 | 15.5 | 11.8 | 14.8 |
| Rheumatism | 10.2 | 5.3 | 8.50 | 17.6 | 8.9 |
| Skin problems | 1.7 | 5.3 | 8.1 | 0.0 | 6.5 |
| Eye problems | 0.0 | 0.0 | 3.5 | 0.0 | 2.4 |
| Injuries / accidents | 3.4 | 10.5 | 5.8 | 17.6 | 6.5 |
| TOTAL | 100 | 100 | 100 | 100 | 100 |

**$X^2$ = 1.6664 p-value >0.05**

**d) Morbidity by Marital status**

The distribution of the various illnesses reported by respondents in all the five classes of marital status was obtained and Chi- squire test of significant performed. It was found that there was no statistically significant difference between morbidity profile and marital status of the workers ($p>0.05$) (Table 5.11).

**e) Morbidity by In-migration status**

On performing Chi-square statistical test of significance, there was no statistically significant difference between morbidity profile of in-migrant and non- in-migrant workers ($p>0.05$)(Table 5.11).

**f) Morbidity by Education level and Job training**

There was no statistically significant difference found between the workers' education level and the morbidity(Table 5.11) neither was there any statistically significant difference found between the workers' morbidity and them having been trained or not been trained on their jobs ($p>0.05$) (Table 5.12).

**g) Morbidity by Adherence to Safety Practices (use of protective equipment)**

On general observation of the results, the percentage of workers with each reported health problem generally increased as the level of adherence to safety measures reduced. After performing Chi-square statistical test of significance, there was statistically significance difference between morbidity and the level of adherence to safety measures (use of personal protective equipment) (Table 5.12). This shows that presence of health problems was related to the degree of adherence of safety measures by the workers.

Odds ratio for presence of the health problems among the workers who were using personal protective equipment (PPEs) and those who never used them was estimated by using odds ratio and it was found that using PPEs was protective for respiratory problems (Odds= 0.9) , eye problems (Odds= 0.4), rheumatism/musculo skeletal problems (Odds=0.4) and malaria (Odds= 0.6) .

A multinomial logistic regression was used to predict presence of health problems from the degree of adherence to safety practices. Never adhering to the safety practices was a significant predictor for presence of respiratory and gastrointestinal problems but was not a significant predictor for the other health problems.

**Morbidity and Pre-placement Medical Examinations**

There was no statistically significant difference found between the morbidity profiles of workers who underwent pre-placement medical examinations and those who did not. ($p>0.05$) (Table5.12).

Table 5.11 Respondents morbidity by socio-demographic characteristics (n=372)

| **Demographic characteristics** | Respiratory Problems | Gastro-intestinal problems | Skin problems | Eye problems | Injuries/ Accidents | Rheumatism | Malaria | **Total** | $X^2$ | |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Marital Status*** | | | | | | | | | | |
| Never married | 59 | 22 | 9 | 3 | 4 | 8 | 29 | 134 | | |
| Married | 73 | 25 | 13 | 2 | 17 | 16 | 20 | 156 | | |
| Separated | 17 | 11 | 2 | 2 | 3 | 6 | 5 | 46 | 31.948 | P>0.05 |
| Widowed | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | | |
| Cohabiting | 7 | 4 | 0 | 2 | 0 | 3 | 1 | 17 | | |
| **Total** | 158 | 62 | 24 | 9 | 24 | 33 | 55 | 365 | | |
| ***In-migration Status*** | | | | | | | | | | |
| In-migrants | 22 | 10 | 2 | 0 | 6 | 10 | 10 | 60 | 9.810 | P>0.05 |
| Non-in-migrants | 136 | 52 | 22 | 9 | 18 | 23 | 45 | 305 | | |
| **Total** | 158 | 62 | 24 | 9 | 24 | 33 | 55 | 365 | | |
| ***Sex*** | | | | | | | | | | |
| Male | 61 | 18 | 14 | 5 | 9 | 11 | 25 | 143 | 8.810 | P>0.05 |
| Female | 97 | 44 | 10 | 4 | 15 | 22 | 30 | 222 | | |
| **Total** | 158 | 62 | 24 | 9 | 24 | 33 | 55 | 365 | | |
| ***Age*** | | | | | | | | | | |
| 15-19yrs | 4 | 3 | 0 | 0 | 0 | 1 | 1 | 9 | | |
| 20-24yrs | 34 | 11 | 8 | 2 | 4 | 6 | 18 | 83 | 44.167 | P>0.05 |
| 25-29yrs | 46 | 21 | 9 | 2 | 6 | 9 | 16 | 109 | | |
| 30-34yrs | 28 | 14 | 2 | 4 | 7 | 9 | 8 | 72 | | |
| 35-39yrs | 21 | 8 | 2 | 0 | 1 | 3 | 6 | 41 | | |
| 40-44yrs | 13 | 3 | 1 | 1 | 3 | 1 | 3 | 25 | | |
| 45-49yrs | 9 | 0 | 1 | 0 | 2 | 1 | 3 | 16 | | |
| 50-54 yrs | 3 | 0 | 1 | 0 | 0 | 2 | 0 | 6 | | |
| 55yrs and above | | | | | | | | | | |
| **Total** | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 4 | | |
| | 158 | 62 | 24 | 9 | 24 | 33 | 55 | 365 | | |
| ***Education*** | | | | | | | | | | |
| None | 6 | 4 | 13 | 1 | 1 | 4 | 6 | 25 | 10.806 | P>0.05 |
| Primary | 84 | 33 | 11 | 3 | 11 | 11 | 30 | 186 | | |
| Secondary | 61 | 23 | 9 | 5 | 11 | 13 | 17 | 130 | | |
| Post secondary | 7 | 2 | 1 | 0 | 1 | 2 | 2 | 15 | | |
| **Total** | 158 | 62 | 24 | 9 | 24 | 33 | 55 | 365 | | |

Table 5.12 Distribution of subjects' morbidity by type of job based on knowledge, attitude and practices (n=372)

| Workers characteristics | Respiratory Problems | Gastro-intestinal problems | Skin problems | Eye problems | Injuries | Rheumatism | Malaria | Total | $X^2$ | p-value |
|---|---|---|---|---|---|---|---|---|---|---|
| **Job type** | | | | | | | | | | |
| Pack house attendants | 32 | 10 | 1 | 0 | 2 | 6 | 7 | 58 | 19.946 | P>0.05 |
| Sprayers | 17 | 15 | 2 | 0 | 4 | 2 | 6 | 36 | | |
| Green house attendants | 104 | 44 | 21 | 9 | 15 | 22 | 40 | 255 | | |
| Constructers | 5 | 3 | 0 | 0 | 3 | 3 | 2 | 16 | | |
| Totals | 158 | 62 | 24 | 9 | 24 | 33 | 55 | 365 | | |
| **Training** | | | | | | | | | | |
| Trained | 60 | 27 | 8 | 2 | 13 | 16 | 24 | 150 | 5.296 | *P>0.05* |
| Not trained | 98 | 35 | 16 | 7 | 11 | 17 | 31 | 215 | | |
| Total | 158 | 62 | 24 | 9 | 24 | 33 | 55 | 365 | | |
| **Safety Knowledge** | | | | | | | | | | |
| Have | 110 | 47 | 11 | 5 | 15 | 28 | 40 | 256 | 15.251 | *P>0.05* |
| Don't have | 48 | 15 | 13 | 4 | 9 | 5 | 15 | 109 | | |
| Total | 158 | 62 | 24 | 9 | 24 | 33 | 55 | 365 | | |
| **Risk Perception** | | | | | | | | | | |
| No risk | 26 | 16 | 6 | 1 | 3 | 7 | 14 | 73 | | |
| Minimal risk | 45 | 19 | 7 | 3 | 13 | 12 | 27 | 126 | 26.577 | *P>0.05* |
| Moderate risk | 44 | 16 | 5 | 1 | 2 | 6 | 6 | 80 | | |
| High risk | 43 | 11 | 6 | 4 | 6 | 8 | 8 | 86 | | |
| Total | 158 | 62 | 24 | 9 | 24 | 33 | 55 | 365 | | |
| **Use of PPEs** | | | | | | | | | | |
| Always use | 82 | 39 | 12 | 3 | 14 | 17 | 25 | 192 | 39.834 | *p<0.01* |
| Use most times | 3 | 2 | 1 | 2 | 1 | 0 | 1 | 10 | | |
| Use occasionally | 4 | 3 | 0 | 0 | 1 | 1 | 0 | 9 | | |
| Rarely use | 12 | 6 | 3 | 0 | 2 | 1 | 4 | 28 | | |
| Never use | 57 | 12 | 8 | 4 | 6 | 14 | 25 | 126 | | |
| Total | 158 | 62 | 24 | 9 | 24 | 33 | 55 | 365 | | |
| **Pre-placement medical exam** | | | | | | | | | | |
| Done | 35 | 16 | 3 | 4 | 4 | 5 | 10 | 77 | 6.209 | *P>0.05* |
| Not done | 123 | 46 | 21 | 5 | 20 | 28 | 45 | 288 | | |
| Total | 158 | 62 | 24 | 9 | 24 | 33 | 55 | 365 | | |

## CHAPTER SIX: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

### 6.1 DISCUSSION

**Demographic Characteristics**

From the assessment of age, the youngest worker interviewed was 16 years old and the oldest was 61 years; while from the records review, the youngest was 15 years and the oldest was 70 years. Age did not influence the allocation of jobs to the workers. The 16 and 15 years old workers by the definition as per the Children Act 2001, Chapter 18 of the law of Kenya, were children as they were below the age of 18years, meaning that the farms were involved in child labour[36]. Majority of the workers (76.6%) were aged between 18-35years. This compares with other studies done in flower farms in Tanzania where 75% of workers were aged between 18-35years and another one in Ecuador flower farms where 80% of the flowers were aged between 20 –34 years.[37]This shows that workers in flower farms are generally young and therefore need to be taken care of so that their remaining life is lived comfortably, especially free of illness due to occupational hazards at work place.

About 60.2% of the workers in this study were females. This compares with another study done in Naivasha flower farms where 60% of the workers were females[6] and in Tanzania flower farms were females where 57%.[22] This high female proportion in flower farms is significantly higher than the proportion of women engaged in waged employment in Kenya of 12%.[38]This large proportion of females could be attributed to their efficiency in harvesting, grading and packing of flowers[22].

The multiplicity of ethnic groups found in this study is common in other areas where flower farming is done with the residents of that area dominating.

In this study the *Merus* were dominant since Timau area is a region occupied by this ethnic group. The Naivasha study[32] also found multiple ethnicities of the workers with Kikuyus being dominant.

On marital status, 45.4% of the workers were married. This is almost similar to workers in flower farms in Tanzania where it was found that 40% were married.[22] However there was difference in the sexes of those who were never married with females being 23.6% and males being 13.1% of the total workers interviewed. This could explain the general higher proportion of women in these farms as married women usually look upon their husbands to provide for the family and hence are less likely to seek or be engaged in waged employment. The sex and marital status did not influence the morbidity pattern of the workers ($p>0.05$).

On education, 50.8% of workers had only primary school level of education while 37.9% had secondary school level of education. Only 4.6% of the workers had gone post form secondary school level while 6.7% of the workers had never been to school. There was sex variation of education levels with females being more than males in all the education levels for example, 63.5% of those with primary school education were females compared to 36.5% who were males. The education level of workers had no association with their morbidity pattern.

The education level of workers in this study generally compared to their counterparts in Tanzania where it was found that 60.3% males and 74.3% females had primary school level of education and 19% males and 25.4% females had form four level of education.[22]

On in- migration status of the workers, it was found that 84.1. % of them were in-migrants in respect to the study area. This high population of in-migrant flowers was also found in a study done in Naivasha where 70% male workers and 75% female workers were migrants.[6] The in-migrant workers had stayed in Timau for duration of time ranging from six months to thirty years. They were from all corners of Kenya but mainly from the districts surrounding Timau region, especially Eastern, Central and Rift Valley provinces. Although migration has significant effect on health status of the population it did not influence the morbidity pattern of these workers.

**General characteristics of the workers**

The workers were mainly employed on casual basis and distributed to the four departments of the flower farms as green house attendants, pack house attendants, sprayers and building and maintenance workers.

Most of the workers (69.4%) were green house attendants since attending and harvesting of the flowers was the main activity in these farms.

The workers had been in their current jobs for duration ranging from three months to twenty six years. About 71.2% of them had been working in their current jobs for a period of 3 years or less. This seems to be a shorter duration when compared to flowers farm workers in Tanzania where it was found that 42% of them had been in their current jobs for a period of 5 –10 years.[22]

This short duration in their job for Timau workers could be both beneficial and disadvantageous for them in that they are less likely to accumulate harmful levels of toxic substances due to exposure to hazards at work place while at the same time the

short time duration denies them the adequate experience and avoidance of injuries and accidents, however no such association was found in this study.

Majority (75%) of the workers reported no job rotations. This was also found in the Naivasha flower farms where job rotations for workers did not exist.[32] This lack of rotations is to the detriment of the workers especially on their health. Sprayers should have job rotations frequently as well as depending on the level of their acetyl cholinesterase enzyme inhibition to avoid cumulative effect of pesticide poisoning. However, no statistically significance difference was found between morbidity pattern of the workers who had job rotations and those who did not ($p>0.05$).

Training on the job is vital for both productivity and good health of the workers. Only 41.1% of the workers had received some training on the job they were doing mainly from the farm management. Lack of training was also found in Tanzania farms[22] with only 20.4 % of the workers reporting having received periodic or refresher training. Most of these periodic training were conducted every three months. The frequency of periodic training (quarterly) was better in farms in Timau when compared to frequency of one periodic training every 1-2 years as was found in Tanzanian farms.[22]

On the daily working hours, majority of the workers (85.8%) worked for eight hours per day with a mean of 8.42 hours. This is in line with Kenyan laws that require workers to work for fourty six hours per week with a paid day rest every six working days.[39] It also compares well with working hours of between 9-10 hours found in flower farms of Tanzania.[22]

However, there is bound to be some variations in the number of working hours per day due to the perishable nature of the flowers which means long working hours to complete critical tasks such as harvesting, spraying and packing.

On safety knowledge, 70.2% of the workers had some knowledge on safety. Majority of them (60.5%) getting it from training by farms management.

From interviews with farm managements, it was however found that 16.7% of the sampled farms had not offered safety training to their workers.

However all the farms reported to be providing safety manuals and written instructions to their workers, but 73% of the workers said they did not read these manuals and written instructions on safety. 46.8% of the workers felt that their knowledge on safety practices was adequate while those who felt theirs were inadequate, 95.1% of them requested for more training. This therefore requires initial training incorporating safety component on recruitment of workers.

**Adherence to safety practices**

Generally, 70.7% of the workers said that they always adhered to safe practices and code of conduct at work place. However, the practice of reading safety manuals and written instructions was not common among these workers as most of them (73%) said that they never read them even though all the farms sampled said that they provided these manuals and instructions. The low education level of these workers could also explain the poor practice of reading the safety instructions. This therefore means that there is a need for pictorial safety materials for the illiterate workers.

Another explanation could be due to the fact that most agrochemicals are not accompanied by materials safety data sheet as was found in a study done in Tanzania flower farms.[22]

On use of personal protective equipment, 34.4% of the workers never used them with the main reason (95.2%), being unavailability of these equipments, while 3% of those not using gave the reason of discomfort. This was also found in Naivasha flower farms where 50% of the workers were not using these protective equipments.[32]

Also 60% sprayer men in Nigerian flower farms were also not using protective equipment but their reason was discomfort in those equipments. In this study, there was statistically significance difference between the morbidity of workers who were using personal protective equipment (PPEs) and those who did not. Workers using PPEs were less likely to report health problems compared to workers who were not using PPEs ($p<0.01$).

**Workers request to farm management.**

The workers interviewed in this study gave various suggestions on what the farms management can do to improve their safety. Majority requested more training especially on safety to increase their safety knowledge as well as provision of adequate personal protection equipment.

Another major issue was for the farms management to strictly adhere to the recommended re-entry time for workers to enter the greenhouses following spraying of chemicals. This lack of observance of re-entry time rules by flower farms has been reported also in flower farms in and Naivasha[6] and Tanzania.[22]

Another suggestion from the workers to management was provision of ambulance for the sick workers. This was critical as none of the flower farmers covered in the study had an ambulance or a vehicle on stand by for sick or injured workers.

**Health services for workers**

The *Kenya Employment Act* states that it is the responsibility of the employer to provide appropriate medicine during illness for the workers.[39]

In this study, all the farms covered had a health facility within the farm with a nurse or a doctor to attend to workers.

However the range of services and drugs available was limited as this acted as only the first source of health care for workers after which they could be referred else where if need arises. Among the workers, 69.4% of them reported that they got sick – offs when sick. This compares with 66.1% workers in Naivasha flower farms who reported to be given sick offs.[6] While the *National Hospital Insurance Fund (NHIF) Act* requires that employer should ensure the employees are members of this fund[35], only 49.2% of the workers in the flower farms in Timau are registered and contributing to NHIF. It is therefore important that all workers should be encouraged to join this scheme to assist them to finance their healthcare since it is within their reach as it is a relatively cheap, flexible and comprehensive health care scheme.

Regarding medical examination for workers, only 21.5% of all the workers had undergo pre-placement medical examination while 90.1% of the workers did not undergone periodic medical examinations.

Medical examination especially pre- placement one is vital as it ensures that only medically fit workers get recruited and that vulnerable persons are not exposed to hazards at work place. Routine or periodic examination especially determination of the *acetyl cholinesterase* enzyme inhibition is a requirement for all workers in floriculture industry as per the Kenya flower council code.[40]

However, most of the farms did this only for the sprayers while all the workers were exposed to the agrochemicals. Lack of pre-placement medical examinations was also found in flower farm in Tanzania.[22]

The workers in this study reported various illnesses affecting the various organ systems of the body. Only 1.9% of the workers interviewed reported to have experienced no illness during the tree months preceding this study. Keeping of workers health records by farm management was taken seriously as it is one of the issues checked during the various audits done on these farms by the various regulatory bodies. Even where a worker sought health services outside the farms facility he or she was required to bring the records to the farm dispensary.

Respiratory problem was the main illness affecting the workers accounting for 42.5% for those interviewed and 35.7% from the health records review. This is usually a major health problem in floriculture industry worldwide. A study done among greenhouse workers in four European countries of Denmark, German, Switzerland and Spain found 85.3% of the workers to have respiratory symptoms.[41]

The study in Naivasha flower farms in Kenya found 71% workers to have respiratory symptoms.[32] The second most common illness was gastrointestinal problems at 16.7% and 17.3% from interviews and records review respectively. This ranged from abdominal pains, diarrhea, and dysentery to intestinal worm infestation and

amoebiasis. The high prevalence of gastro intestinal problems among floriculture workers was also found in studies in Naivasha at 50% and in Costa Rica as 50%.[32, 33] While in the Naivasha study 84% of the workers had skin problems, in this study skin problems accounted for 6.5% from interviews and 5.5% from records review. Malaria was another major illness among these workers with 14.8% of them reporting it and 26% 0f recorded cases being malaria.

Although malaria prevalence in these workers is lower than the National malaria prevalence of about 34% [42], it is higher for Timau area since ecologically Timau is not favourable for malaria vectors. Further studies could therefore be necessary to establish if the relatively high malaria prevalence is in any way associated with the introduction of floriculture in Timau. Adherence to safety practices was found to have an association with morbidity profile of the workers, with not using protective equipments being a significant predictor for respiratory and gastro intestinal problems. Although migration status is known to influence morbidity profile of migrant workers, in this study, no such association was found. This could mean that the disease epidemiology of their respective areas of origin mirrors that of Timau as most of the workers were from eastern province where Timau is and the neighboring central province.

### 6.2 Conclusions

Based on the findings of this study, it is evident that flower farms in Timau mainly engage the labour of young men and women mostly with no education or those of primary school level. Majority of the workers are migrants in respect to Timau area having come from all over Kenya. Majority of the workers lack basic training in the job they are doing and have poor adherence to safety practices at work place.

The workers are at high risk due to lack of personal protective equipment and non compliance of re-entry rules to green houses following spraying. Respiratory problem and gastro intestinal problems top the illness list of these workers like in other areas where floriculture is done. However malaria is also a major problem for these workers.

The various effects of the work and working conditions of floriculture industry on the health of workers were not apparent to these workers in Timau.

There was very low enrollment to health care schemes like National Health Insurance Fund (NHIF) among the workers. Lack of adherence to safety practices especially use of personal protective equipments was associated with presence of various health problems among the workers in floriculture.

### 6.3 Recommendations

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6. The flower farms should recruit workers with moderate level of education especially sprayers for them to be able to read safety instructions and understand their importance.
7. Workers should get initial training and frequent periodic trainings on their jobs and safety and be offered pre-placement and periodic medical examinations.
8. Farms management should ensure provision of adequate personal protective equipment and strictly observe re-entry time rules.
9. There should be provision of safety materials in pictorial form for the illiterate workers while ensuring that most of workers recruited have some education.
10. Workers should be encouraged and recruited to join National Hospital Insurance Fund (NHIF) since it is now open to both the employed and self-employed to increase their accesses to healthcare.

11. Flower farms' health facilities and other health facilities within flower growing areas should be stocked with adequate and relevant medicines especially for respiratory diseases, gastrointestinal problems and malaria.
12. Further studies should be carried out to find out if there exists a relationship between flower farming and malarial as is the case with rice farming and malaria.

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# APPENDICES

**APPENDIX 1 QUESTIONNAIRE**

**SECTION ONE: SOCIO – DEMOGRAPHIC CHARACTERITICS**

1. Subjects serial number: _____

2. Ethnic affiliation:
   1. Meru
   2. Kikuyu
   3. Embu
   4. Kamba
   5. Samburu / Maasai
   6. Kisii
   7. Luo
   8. Turkana/ Boran

3. Age in years _____

4. Sex _____ 1. Male _____ 2. Female

5. Marital status
   1. Never married
   2. Married
   3. Separated
   4. Windowed
   5. Cohabiting
   73. Don't know
   83. No Response

6. Highest number of years of education completed
   - 73 Don't know
   - 83. No response
   - In primary school: _____years
   - In secondary school : _____ years
   - In college / University: _____ years
   - **Total _____years**

7. Migration status

    1. Always has been a resident of Timau (Non-migrant)
    2. Migrated to Timau (Migrant)

8. Duration since migrating to Timau_____ months _____ years.

9. Area of Origin prior to migrating to Timau

    1. Nyanza Province
    2. Western Province
    3. Other parts of Eastern Province
    4. Rift valley Province
    5. Nairobi Province
    6. Coast Province
    7. North eastern province
    8. Central Province
    9. Others_____

**SECTION TWO: NATURE OF WORK**

10. What exactly does your work in the farm involve?

    1. Pack house attendant
    2. Spraying
    3. Green house attendant
    4. Building and maintenance

11. What is the length of duration do you work in a day:

    _____ Hours

12. How long have you been doing your current job:

    ----------years ----------months

13. Do you have rotations in you work

1. Yes
2. No

14. If yes, after what duration of time are you rotated

1. Monthly
2. Quarterly
3. Semi-annually
4. Annually
5. Others ----------

**SECTION THREE: WORKERS KNOWLEDGE AND ATTITUDE**

15. Have you received any specific training for your job ( e.g. spraying, irrigating, machine operating)

1. Yes
2. No

16. Do you receive any periodic/refresher training on your job:

1. Yes
2. No

17. If yes, how often are these periodic/refresher trainings

1. Monthly
2. Quarterly
3. Semi annually
4. Annually
5. No specific period

18. Do you have any knowledge on safety precautions and conduct at place of work?

1. Yes (go to 24)
2. No
73. Don't know

19. Where did you get that knowledge

1. From training by the management
2. From training safety manuals and instructions at work place
3. From my colleagues
4. From school
5. Others

20. Do you feel that you have enough knowledge on safety measures to enable you ensure your own safety and that of your fellow workers?

1. Yes
2. No ( go to 26)
73. Don't know

21. If no, what do you suggest should be done to give you adequate knowledge on safety precaution at your place of work

_____

_____

22. Do you think you are at any risk at your place of work

1. No risk
2. Minimal risk
3. Moderate risk
4. High risk

23. Do you know what to do in case of accident / injury

1. Yes
2. No

24. If yes, what is it? _____

25. Do you think you have a duty as a worker in ensuring your own safety and that of your fellow workers at work place?

2. Yes
3. No

26. Do you feel that the management has played its role in ensuring the safety of the workers

1. Yes
2. No ( go to 29)
73. Don't know

27. What do you suggest the management should do in addition to improve the safety of the worker

---

---

**SECTION FOUR: WORKERS PRACTICE OF SAFETY MEASURES**

28. Do you adherence to the safety measures/practice at place of work?

1. Always adhere to it
2. Most of the times adhere to it
3. Occasionally adhere to it
4. Rarely adhere to it
5. Never adhere to it

29. Do you read the provided manuals and instructions on safety precautions

1. Always
2. Most of the time
3. Occasionally
4. Rarely
5. Never.

30. Do you use personal protective equipment at place of work

1. Always
2. Most of the times
3. Occasionally
4. Rarely
5. Never

31. If not using personal protective equipment why?

1. Not available
2. Not comfortable using them
3. Don't know how to use them
4. Don't think they are necessary
5. Others specify

_____

32. Do you strictly observe the rules governing eating of foods while at your place of work

1. Yes
2. No

33. Do you make use of working garment/clothes when not working e.g. at home

1. Yes
2. No

**SECTION FIVE: HEALTH SERVICES**

34. Prior to employment did you undergo any medical examination(s)

1. Yes
2. No

35. Do you have periodic medical examinations

1. Yes
2. No

36. If yes, how often are these medical examinations

1. Monthly
2. Quarterly
3. Semi-annually
4. Annually

37. Which is the **first place** you seek the health services when you need them

1. Dispensary within the farm
2. Government health facility
3. Private health facility
4. Traditional health providers
5. Self medication
6. Others (specify)_____

38. Are you given offs or leaves on health ground at your place of work

1. Yes
2. No

39. Do you have any health scheme such as insurance to assist you in accessing health services

1. Yes
2. No

**SECTION SIX: MORBIDITY**

40. When was the last time you were sick or injured

1. Currently
2. Last one month
3. Last three months
4. Last six months
5. Over six months ago
6. Cannot remember

*41.* What was the problem:(*Interviewer to also examine for any signs and symptoms)*

1. Respiration problems
2. Gastrointestinal problems
3. Skin conditions
4. Eye problems
5. Injuries / accidents
6. Musculo skeletal problems
7. Malaria

(Signs/Symptoms of ----------present.)

42. Is there any record to confirm the above? (*Interviewer to check Available records if any for confirmation)*

1. Yes
2. No

43. Do you think that your health has been affected by the work you do or by the conditions at place of work?

1. Yes
2. No

73 Don't know

44. If yes to Q 43, in what way has your health been affected?

_____

_____

_____

APPENDIX II

# RECORDS REVIEW SCHEDULE

NAME OF THE RECORDS REVIEWER ----------

DATE OF REVIEWING ……

## DATA FROM RECORDS

Worker's clinic/ file number ----------

Serial Number of the worker ----------

Worker's age ----------

Worker's sex ----------

Worker's type of job in the farm ----------

Worker's Diagnosis ----------

APPENDIX III

CONSENT FORM

**EXPLAINATION**
(To be explained to the respondent by the interviewer in the language the respondent best understands)

We are carrying out a study to assess the health problems among the workers in the flower farms and the possible contributing factors of these problems. This is mainly for academic purpose but information obtained will be shared with the relevant authorities with the hope that it may used in designing interventions to address gaps identified, if any.
Participation in this study is voluntary. Information given will be treated confidentially. You are identity in whatever form is not required.

**DECLARATION BY THE RESPONDENT**

I, after having been explained and understood the purposes of this study do hereby volunteer to take part.

Signed / Left Thumb print ---------- (OPTIONAL)

APPENDIX IV

**MAP OF IMENTI NORTH DISTRICT**