Occupational health and safety survey in small-scale clothing enterprises in Gaborone, Botswana

By

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DECLARATION

I declare that this study entitled “Occupational health and safety survey in small-scale clothing enterprises in Gaborone, Botswana” is my own work; that it has not been submitted for any degree or examination in any other university and that all the sources I have used or quoted have been indicated and acknowledged as complete references.

Dr S. G. Gabe

DEDICATION

I dedicate this dissertation to my wife and children on whose relentless support and endless encouragements I relied in order to accomplish the very exacting demands of my studies.

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ABSTRACT

Small-scale enterprises and the informal sector constitute the fastest growing economic sectors and represent the most realistic form of employment creation. In Botswana, the number of informal businesses increased by 72% from 1999 to 2007, an important proportion involved in clothing manufacture. These businesses are vulnerable and prone to concern themselves with survival rather than improving health and safety and as such health risks remain high in their

workplaces. The aim of this study was to assess the extent to which small-scale clothing industries in the Gaborone area of Botswana comply with occupational health and safety standards and to make recommendations for the improvement of employee health and safety and productivity.

A quantitative cross-sectional survey of 36 small enterprises was conducted and data was collected using an inspection checklist adapted from the ILO's guidelines on Safety, Health and working Conditions inspections. Results showed that the enterprises employed between 1 – 8 persons with two-thirds (59.4%) employing 1 – 2 persons indicating that small businesses in clothing manufacture comprised mostly self-employed persons. Predominantly females (2 – 1 female to male ratio) were employed thus confirming the findings of the 2007 informal sector survey in Botswana which showed that 67.6% informal businesses were owned by females. However, females are most at risk from health problems inherent in clothing manufacture particularly as studies show that musculoskeletal disorders that cause long-term disabilities and absenteeism are more common among them than males.

Work processes in small-scale clothing manufacture was found to be labour-intensive, involving long hours of standing particularly for workers designing, cutting and ironing, and sitting for machinists who do sewing. Work also involved lifting of heavy loads, was repetitive with sustained use of force and high-paced. Workers operated for 5 hours in the morning and 3-5 hours in the afternoon continuously with only a 1-hour lunch break without short breaks to rest thus increasing fatigue, risk of injuries and musculoskeletal disorders. Workbenches and chairs were not appropriate for the nature and type of work, causing workers to adopt awkward postures.

The businesses were generally complying with requirements for cleanliness and provision of sanitary conveniences but ventilation and lighting were inadequate. None of the workplaces provided localized lighting and in most cases windows were too small to provide natural lighting and ventilation for normal airflow. Most workplaces were not complying with electrical installation standards. 63.9% of the workplaces had entangled wire connections and live wire terminals in the work area living workers exposed to serious injuries electrocution and burns from possible fire.

Emergency preparedness of the workplaces was also poor as non had a first aid kit; only 8.3% had fire extinguishers and most had no emergency exit but only one door serving as entrance and exit. In addition workplaces were not complying with standards for the use of protective clothing and equipment and the maintenance and guarding of machines. Moreover, employers were not complying with their legal obligation to identify, remove or mitigate hazards in the workplace and did not train nor supervise employees in safe work procedures and use of workstations and machinery.

This survey revealed that small-scale clothing manufacture enterprises in the Gaborone area of Botswana were in the most not complying with universal occupational health and safety standards leading to a precarious state of workplace health and safety conditions. These findings justify the need to implement such improvements as reorientation of the factories inspection system, redesign of workbenches and chairs, granting employees short breaks to rest and grouping of businesses into small regional committees to facilitate training in occupational health and safety procedures and their use, and the identification and implementation of simple solutions for workplace health and safety problems.

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CHAPTER 1

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

Small-scale enterprises and the informal sector constitute one of the fastest growing economic sectors in every country as they represent the most realistic form of employment creation (Wai-On Phoon, 2003). These enterprises are versatile since they are able to operate in both rural and urban areas and generally utilize local resources and materials for their operations and are more ready to provide much needed and inexpensive apprenticeship to workers (Muchiri, 1995). And whereas the labour force is constantly growing at a very rapid pace, only few jobs are being created thus pushing more and more school leavers and graduates into the informal sector employment.

During the last few decades the Government of Botswana has shown recognition of the importance of small enterprises in fostering economic growth and job creation through small, medium and micro enterprise policies such as the Botswana Enterprise Development Programme, the financial assistance policy (Gov't Paper No. 1, 1999) in its effort towards poverty eradication, and to encourage manufacturing and self employment. Such policies and initiatives have contributed to the growth of small scale enterprises (SSEs) and the informal sector in textiles, auto repairs, metal works and horticulture industries. Unfortunately statistics on the actual contribution of this sector to the Gross Domestic Product of the country is sparse. Findings from the Labour force survey conducted in 1995/1996 indicated that the informal sector quota of employment was at 17% of the total employment.

The most recent surveys point out that job opportunity in both formal and informal sectors have been growing more rapidly than the labour force over the long term (Reports from the Bank of Botswana, 2006) and the number of informal businesses increased by 72% from 1999 to 2007 according to a 2007 Informal Sector Survey (Budget Speech, 2009). This shows that the SSEs, among which the textile industry constitutes the bulk and the informal sector, do contribute substantially to the economy of Botswana. This is a fact that Regoeng, (2003) succinctly

demonstrated thus emphasizing the need to address the health and safety issues in the ever-growing but largely unregulated sector.

1.2 Background

Though most of the small enterprises manufacturing clothing in the Gaborone area operate from designated industrial zones and are required to be registered, their labour arrangements and work processes remain informal and unorganized, and this is mostly due to the fact that owners are being workers themselves and often employ family members. This renders attribution of responsibility for the provision of occupational health and safety (OHS) difficult. Hence OHS conditions in small industries tend to be poor.

In addition, small businesses in Botswana are exposed to and suffer from the adverse consequences of globalization which opened up local markets with the blessing of the International Monetary Fund (IMF) and the World Bank, bringing competition to local production capacities that were already uncompetitive. Even more significant is the fact that globalization also brought about further challenges such as the international transfer of occupational risks to developing countries with weak legislation and enforcement of compliance to OHS standards (Sana Jawara, 2008). This means that small enterprises now face new emerging risks (Kawakami & Ton That Khai, 2003).

Scholarship on OHS in SSEs often depicted workers in this sector as unskilled, semi-skilled or largely illiterate (Tornberg, Forastieri & Rima,1996); Forastieri, (1999) but most of the Sub-Saharan African countries that have been implementing IMF and World Bank sponsored structural adjustment programmes have left thousands of graduates unemployed and redundant. Most of these graduates have become the backbone of SSEs and informal businesses.

Schemes such as Citizen Entrepreneurial Development Agency (CEDA) that have been put up in Botswana are meant to encourage graduate self-employment by providing soft loans and financial assistance to set up small businesses in agriculture, manufacturing and service industries. The expectation is that uptake of literacy levels among those engaged in SSEs and informal sector would facilitate improvement of OHS in their work environments.

1.3 Problem statement

With limited resources, SSEs are most vulnerable and are prone to concern themselves with survival rather than improving health and safety conditions and as such health risks are high in their workplaces, often at the detriment of the health of the large number of people working in those businesses. Salter (1998) emphasized that workers in the small and informal businesses have low awareness of the acute OHS problems they have as well as the ways to improve their working conditions. Therefore, protecting the health of this substantial portion of the working population becomes not only a public health challenge, but a problem which calls for more specialized studies that can contribute to unraveling more about their occupational health and safety (OHS) practices and suggest strategies for appropriate interventions and improvement.

In his editorial "Globalization and its effects on occupational health and safety", Harri Holskeri (2001) then president of the 55th General Assembly of the UN, emphasized the need to explore ways in which changes in the global economy affect workers and working conditions. This is supported by the WHO/ILO joint effort to promote OHS in vulnerable groups such as the informal sector workers, women and children (Eijkmans, 2004). In addition, the ILO is concerned about the need to improve the conditions of workers most vulnerable to inhumane or abusive conditions of work, not least through its system of International Labour Standards (ILO-OSH, 2001).

According to the Factories Act of Botswana Cap (43:01) of 1979, factory inspections should be conducted in order to ensure good working conditions, safeguard against occupational accidents, diseases and injuries and identify occupational hazards and related risks so as to enable control measures to be put in place. But little attention is accorded to the health and safety conditions of small enterprises and their compliance with statutory safety requirements. Regoeng, (2003) cites shortage of staff in the inspectorate of factories as the plausible explanation. In Canada for example, small businesses employed about 48% of the total labour force in the private sector in 2006 and accident fatalities were higher among them (MacEachen et al, 2008) thus raising important questions regarding the OHS conditions in their workplaces.

In the absence of any report systems the health and safety conditions remain uninvestigated and accidents, injuries and the prevalence of work-related diseases in these workplaces become difficult to measure or quantify. Wai-On Phoon (2003) has expressed a similar view that a plethora of anecdotal information on OHS problems in small enterprises exist but accurate and quantitative information about them are seriously lacking.

1.4 Research questions

- What is the nature and type of work processes involved in small scale clothing manufacturing enterprises in Gaborone?
- What is the general status of the physical working environment and conditions in these enterprises?
- What are the ergonomic and psychosocial conditions of health and safety in small scale clothing enterprises?
- What is the level of compliance to occupational health and safety standards/requirements (as per the WHO/ILO standards) of these enterprises?

1.5 Aim of the study

The aim of this survey is to assess the extent of compliance with universal occupational health standards (i.e. as per OHSAS 18001) among the small scale clothing industries located in the Gaborone areas of Botswana.

1.6 Research objectives

- To identify and describe the nature and type of work processes involved in small scale clothing manufacturing enterprises in Gaborone?
- To investigate the general status of the physical working environment and conditions in these enterprises
- To ascertain the ergonomic and psychosocial conditions of health and safety in small scale enterprises in the Gaborone Area.
- To assess the level of compliance to occupational health and safety standards/requirements (as per the WHO/ILO standards) of these enterprises.

1.7 Significance of the study

The researcher hopes that this study will provide a first insight into the status of health and safety in the small- scale clothing industries in the Gaborone area of Botswana and will produce an in-depth analysis of the work environment in these enterprises. It is also hoped that the interventions proposed based on the findings of the inspections carried out will be useful in promoting the health and safety and decent general working conditions in these industries, thus contributing significantly to productivity and eradication of poverty.

The results of the study could also serve as the basis for larger and more detailed studies to identify the root causes of occupational diseases and injuries, their extent and distribution among workers in small scale enterprises and design an appropriate framework for the management thereof.

1.8 Definition of terms

1.8.1 *Small-scale enterprise*

There is no clear definition as to what constitutes a small-scale enterprise. Regoeng, (2003) suggested that the size would depend on annual turnover or number of persons employed including the directors or owners. Based on number employed, SSE would consist of more than

six but less than 20 people while micro enterprises have less than six (workers and directors or owners). Informal enterprises would have five people or less per firm. In practice however, most SSEs would have between one and five and will be distinguished from informal by virtue of registration with the registrar of companies and compliance with the Factories Act Cap 43:01. The Botswana Government classifies them as micro enterprises employing between 1 and 6 (Government Paper No. 1, 1999). In this study, SSE is defined as a firm employing from one to twenty persons and the fact of registration will not be a criterion for recruitment.

1.8.2 Occupational health and safety

In this study the term occupational health and safety will refer to all factors and conditions that affect or could affect health and safety in the workplace (OHSAS 18001, 2007).

CHAPTER 2

2. LITERATURE REVIEW

2.1 Introduction

In this chapter findings of a review of literature on occupational health and safety in small-scale enterprises are presented. In particular findings characterizing the general physical and environmental conditions of health and safety are discussed. The ergonomic and psychosocial conditions of health and safety and the level of compliance by these businesses with health and safety standards as explored in existing literature are also examined.

2.2 General physical and environmental conditions of health and safety in small enterprises

In-depth and sector-oriented analytic studies on occupational health and safety (OHS) as relates to small-scale enterprises and informal sector in Africa are scant. Most available literature focused on general condition of OHS in these enterprises (Loewensen, 1995; Tornberg et al. 1996; Forastieri, 1999; Karanja, 2003), but was not sector-oriented while there was very little on the garment or clothing manufacturing industry (Jonathan, 1999). In his brief overview of OHS in small scale firms and informal sectors in Botswana, Regoeng, (2003) described the OHS in the textile industry as precarious.

Most of the studies reviewed showed that workplace physical and environmental conditions in small-scale enterprises and the informal sector are poor and hazardous and these businesses find it particularly difficult to practice OHS. They operate in structures in markets, cluster areas, along busy traffic streets and in homes or small attachments in residential premises. Windows are often too small to provide adequate ventilation while in most cases a small entrance door would also serve as the emergency exit. Loewenson (1995) stated that workers in small-scale enterprises are confronted with the same types of physical, chemical, ergonomic and biological hazards that are experienced by larger firms but do not have the capacity to deal with them. As a result of capital constraints, small firms purchase cheaper raw materials, low-cost secondhand

equipment and machinery which are noisy and unsafe, and employ shortcut production methods thereby exposing workers to injuries and health problems such as musculoskeletal diseases (MSDs).

Most authors sought to show that these sectors may not even recognize that these problems exist (Champoux & Jean-Pierre Brun, 2003; Torberg, et. al. 1996; Forastieri, 1999; Karanja et a.2003; Regoeng, 2003) and are not even aware of the benefits that could accrue from adopting an OHS culture (Muchiri, 2003). Authors further argued that the difficulties encountered by SSEs in practicing OHS are related to their small sizes, absence of formal employer/employee relationship in the sense that employers are often workers themselves, relying on family members and close social relationships with employees thus rendering it difficult to apportion OHS responsibilities. Moreover workers in the small-scale and informal sector are not organized in the form of unions and so do not know and are unable to articulate their rights pertaining to occupational health and safety vis-à-vis their employers.

Review findings showed that workers in the garment industry who are involved in the cutting and sewing sections are exposed to chemicals and dangerous substances. For example, they are exposed to fabric dust and dyes which can cause them respiratory and long-term health problems. Jonathan (1999) surveyed the levels of exposure to cotton fabric dust in a garment factory in Lesotho and found exposure levels well above the recommended limits. A similar survey on small industries in homes in Thailand also found that workers were exposed to dyes, dusts and worked without protective clothing or equipment (Chavalitnitikul, 2003).

2.3 Findings describing the ergonomic and psychosocial conditions

Studies reviewed revealed a low knowledge of ergonomic principles in small-scale businesses. For example, L.M.B Rongo (2005) assessed the awareness of ergonomic principles in small industries in Dar es Salaam and found a very low level of awareness of major areas of ergonomics even when owners had received vocational training. Similarly, Parimalam et al, 2006 investigated ergonomic conditions in 18 garment production factories in Manduria City, India and found that the work environment was not only generally unhealthy and unsafe for workers

but that poorly designed sewing stations were used and firms could not afford height adjustable sewing tables and chairs. The authors also found that in cases where these were available, workers and even owners either were not aware for instance that machine tables were height adjustable or did not know how to use them. The consequence is that workers suffered from injuries, neural problems such as head ache, hearing problems, dermatological, respiratory and musculoskeletal disorders such as lower back pain, shoulder and neck pains (Parimalam et al, 2007; Metgud et al, 2008).

The work pace in garment manufacturing is fast but small-scale clothing industries employ very few workers. Literature review findings showed that small businesses tend to have swings of too few workers for too much workload during peak months of business and workers with very little to do in low months resulting in low pay and job insecurity thus providing a potential source of stress for workers and the owners themselves. In addition, studies depict small garment industries as operating in small confined workplaces with inadequate ventilation, lighting and excessive noise, overcrowding and poor housekeeping (Parimalam et al, 2007).

Nguyen Thi Hong Tu et al, 2003 investigated the conditions of health and safety in small, medium-sized and informal sector enterprises in Vietnam and found that often these businesses lacked rest and eating rooms for workers who either ate in the workplace or outdoors without shelter from harsh weather conditions. The authors also highlighted the improper storage of flammable materials and the absence of firefighting equipment, first aid kits and emergency arrangements exposing workers to serious injuries in case of fire.

2.4 Compliance with health and safety standards

Review findings pointed to the absence of standards on which to base compliance of any SSE to OHS given that there are often no statutory OHS provisions applicable to small firms and informal sectors, especially in countries that have health and safety legislation obliging medium and large-scale enterprises to adopt health and safety programmes (Forastieri, 1999; Karanja et al., 2003). Regoeng (2003) however showed that such regulations imposing standards on SSEs

and informal sector exist in Botswana as provided for under the Factories Act Cap 43:01 This gives rise to a legal dilemma: how could coverage and enforcement be extended to SSEs and the informal sector without endangering their capacities to generate employment in this sector, especially if they close down due to inability to meet statutory requirements?

Studies conducted in the 1990s (Loewensen, 1995; Tornberg et al, 1996; Forastieri, 1999) also suggested that the practice of OHS in small firms and in the informal sector was non-existent largely due to illiteracy and lack of knowledge of OHS. Recent and more systematic KAP studies reviewed showed a consistent divergence between employers' (Champoux & Jean-Pierre Brun, 2003) and workers' knowledge of occupational hazards and risks in SSEs and informal sector and practice of OHS (van Niftrik et al, (2003); Paramalam et al, (2007).

Champoux & Jean-Pierre Brun (2003) discovered that although managers felt they knew about hazards and risks in their workplaces, safety audits revealed extremely hazardous workplaces. The authors suggested that OHS practices is not a priority for these firms and knowledge may not always lead to effective practice of OHS, and other factors such as infrequency of accidents, lack of economic incentives to invest in health and safety may explain the gap.

With regards to clothing manufacturing, Parimalam et al, (2007) stated that workers engaged in garment manufacturing sectors had high knowledge of health problems related to their occupation, had good knowledge of the importance of the use of personal protective equipments (PPE) and their benefits but very few workers demonstrated compliance to such measures. A study on SSEs in Sheffield, UK also found that workers were provided with PPE but these were not used (Bradshaw, et. al. 2001), thus raising the problem of education in the workplace.

Small businesses do not consider health and safety as a priority. This suggests that safe practice does not depend on knowledge and attitude but is positively associated with being informed about safety precautions and being supplied with safety gear coupled with adequate and proper supervision for their use.

2.5 Summary of literature review

Overall, the literature rview revealed that:

- There is a gap in health and safety conditions in small scale clothing enterprises with regard to regulatory requirements
- There is a dilemma whether to regulate OHS in SSEs as is done for medium and large scale enterprises and risk their collapse and disappearance of an important source of employment.
- The relative size of the enterprise is important in determining the status of occupational health and safety among small scale enterprises.
- Safe practice of OHS does not depend on knowledge and attitude but is positively related to availability of protective clothing and equipment, information and effective supervision.

CHAPTER 3

3. METHODOLOGY

3.1 Introduction

In this chapter the study design and setting are described. The reasons for selecting the study design are also presented. The study population and sample, data collection tool and process are described. Procedures for ensuring the reliability and validity of the study as well as the elimination of bias and ethical considerations are provided. Procedures used in data management and analysis are also described.

3.2 The study design

This study used a quantitative descriptive cross-sectional design to investigate the occupational health and safety conditions in small-scale clothing industries in Gaborone, Botswana. Due to the small nature of the study and the volatility of small businesses, it was felt that selecting firms at a point in time for the study would be most appropriate, simple to carry out and inexpensive. P. Jonathan (1999) used the cross-sectional design to investigate cotton fabric dust exposure in a garment factory in Lesotho and Nguyen Thi Hong Tu et al, 2003 used the same design to survey the occupational health and safety conditions in small, medium-sized and informal sector enterprises in Vietnam.

A retrospective review of records was used and practices of OHS and physical conditions in each enterprise were observed.

3.3 Study setting

The study setting included small-scale clothing enterprises that manufacture various textile products like school uniforms, protective clothing, fashion garments, bedding and knitwear in Gaborone. Prior to the survey, their exact number was not known as there was no evidence of valid statistics available. Their location is varied, the larger number are concentrated in cluster areas namely the Gaborone city council workshops in Ginger market Broadhurst, Extension 14 and Gaborone West workshops and in the villages in the Gaborone area including Tlokweng and Mogoditshane.

In all there are about forty enterprises in the designated clusters, and their concentration made them easy to access. Other industries are located in industrial zones (Broadhurst, Gaborone west, old Lobatse road) and others in residential premises. Industrial zones are expensive in terms of rent and are remote from customers so only a handful of small firms are located there. The same is true of mall areas. The more widely spread are businesses in residential areas and may not be easily accessed. This study therefore focused on all those small-scale enterprises that are situated

in cluster zones (i.e. city council, industrial and mall areas and the commercial areas of Tlokweng and Mogoditshane.

3.4 Target population and sample

The target population included all small scale enterprises engaged in manufacturing clothing in the Gaborone areas of Tlokweng and Mogoditshane. There was no reliable list of SSE engaged in clothing manufacture from which the study sample will be randomly drawn. Firms in the city council clusters could be accessed from the rates payment register at the city council but the name on the register may not necessarily be the actual occupier and above all the business activity would not be indicated and could also have changed over time.

Most of the SSEs are not incorporated in terms of the Companies Act Cap 39:01 and those that register as factories as is required by the Factories Act Cap 43:01 may not be accessed if they have moved or been liquidated. Using a purposive sampling the researcher identified and compiled a list of 36 small clothing manufacture units in the designated city Council and industrial zones and in commercial areas of Tlokweng and Mogoditshane. All 36 units were included in this study and surveyed so as to promote adequate sample size that will be representative of the total study population.

3.4.1 Inclusion criteria

- All small-scale clothing manufacturing enterprises designated in the city Council, industrial zones and in commercial areas of Tlokweng and Mogoditshane,
- All small-scale enterprises operating at the time of the study and whose owners/managers gave informed consent and/or permission to conduct the inspection.

Exclusion criteria

- All small-scale enterprises not consenting or willing to participate in the survey.
- Small-scale enterprises operating from home and those operating in residential premises were excluded from the study due to difficulty to access them.

3.5 Data collection tool

A workplace health and safety checklist (adapted from the ILO's guidelines on Safety-Health and Working Conditions inspections) was used for conducting the inspection of each enterprise. The use of a checklist is prescribed in the ILO Work Improvement in Small enterprises (WISE) method as a practical instrument for investigating and improving policy and workplace health and safety (Tsuyoshi, 2003; Kogi, 2003).

The checklist is ideal for rapid risk assessment when inspecting the important areas of a workplace for the purpose of determining the improvements that can be planned. Such a checklist is standardized and ideal for identifying and determining compliance to set standards in OHS.

Observation of records was also made during the inspection of facilities and employees available in the departments were requested to give some information where required for clarification purposes and especially when they initiated suggestions for improvements.

The overall compliance with OHS control measures was scored using the ratings from observations and inspection of the relevant documents and indicated by means of *"Yes, No* or *Not Applicable"*

The checklist was divided into six sections, namely:

A. General information
B. General workplace conditions
C. Physical and environmental conditions
D. Ergonomic and psychosocial conditions
E. Provision of Personal protective clothing and equipment.
F. Compliance to OHS standards

3.6 Data collection process

The researcher chose the period between the months of November and December to collect data because the peak business period for small scale clothing manufacture and tailoring coincides with Christmas and reopening of schools in January when demand for clothing and school uniforms peaks. During this time, machines are in full operation and owners and workers are more accessible and the most prevalent OHS conditions can be assessed.

One of the challenges of studying businesses that may consist of 1 – 2 persons is that they are volatile and hard to get. This has been found to be a common characteristic of small businesses in developing as well as developed countries (Rinehart R.D, 2004; Leviton and Sheeley, 1996). For MacEachen et al, 2008 small businesses are hard to recruit for a study because they are overstretched and may consider research as non-essential. The researcher accordingly adopted two strategies to facilitate recruitment and co-operation of employers/owners. A trained research assistant distributed letters to businesses included in the study requesting permission for workplace inspection and made appropriate arrangements for inspection.

Using the first strategy only five letters requesting permission to conduct inspection were initially distributed and appointments arranged for inspection. Only 3 out of 5 workplaces were inspected on the scheduled dates and time while 2 rescheduled inspections and manifested less enthusiasm compared with the interest and eagerness expressed during initial introductions of study purpose and written request for permission. In both cases, there was no evidence of increased work pressure.

A second strategy was adopted in which the researcher and the assistant presented themselves to each remaining sampled unit prepared for inspection. They introduced themselves and the study, presented their written request for permission and expressed the intention to conduct inspection immediately if possible since vital production time would not be taken away from either the employer or employees. This strategy worked and all 36 units sampled were inspected. On average each inspection took one hour and three inspections were completed daily and conducted only during the morning shift to avoid any disruption of production and when work processes

and machinery were in full operation. All the inspections were completed over a period of one month.

3.7 Reliability and validity of the study

Using a standardized checklist adapted from the International Labour Organization for conducting safety, health and working conditions inspections enhanced the reliability and validity of the instrument. Measurements of table heights were checked against standardized scales. In addition, including all SSE that met the study criteria also promoted the validity of the findings of the survey.

3.8 Elimination of bias

Selection bias was reduced by including all small enterprises that met the study criteria. The risk of bias was also minimized by validating the observed practices with employees who were present during the inspections.

3.9 Ethical considerations

Ethical approval was obtained from the Medunsa Research Ethics Committee prior to the execution of the study. Permission to conduct the study was requested and obtained from the management of the various small scale enterprises that met the inclusion criteria of this study.

Even though observations using a checklist were done, confidentiality and anonymity of all records to be studied were maintained by assigning study numbers to the inspection findings of each enterprise (e.g. from number 01, 02, 03, etc) and not recording identifying details such as the real names and addresses of the enterprises.

3.10 Data management and analysis

3.10.1 Cleaning data

A checklist of variables was used with dichotomous answers yes=1 no=0 and not applicable =3 (coded as missing data). There were no blank responses and all 36 units sampled were inspected making the data complete.

3.10.2 Grouping of variables

All questions corresponded with the variables to be measured and were grouped into seven indexes in order to simplify the data analysis process. These indexes are presented in Tables 1A, 1B and 1C. The general and demographic information index comprised general information variables such as the main products and production process in the sampled units surveyed (questions Q102 – Q103); demographic characteristics: number of employees in each unit, their age range and sex ratio (questions Q104 – Q106), and the size of the work space inspected (question Q1101). This index is shown in Table 1A below.

Table 1A: Index of variables to record general and demographic characteristics

General & demographic information	Question range	Questions	Purpose of measurement
General Information Main products & work processes	0 – 2	Q102 – Q103	To Measure types of products manufactured and work processes used
Demographic information Number, age range and sex ratio of employees	0 - 3	Q104 – Q106	Measure demographic data of employees & enterprise size
Size of work area	0 - 1	Q 1101	Measure workplace size

The general working conditions index grouped 7 questions (Q201 – Q207) to measure the prevailing general working conditions in the sampled enterprises. The physical and environmental conditions index consisted of 13 variables grouped as questions Q301 – Q313 to measure the number of positive responses.

Similarly, the ergonomic and psychosocial conditions index comprising 16 questions (Q401 – Q416) measured the number of positive responses with regard to those conditions in each sampled unit. In order to establish the number of positive responses as concerns the use of personal protective clothing and equipment, a protective clothing and equipment index was also created grouping 4 questions (Q501 – Q504).

The general working conditions and ergonomic and psychosocial conditions indexes are shown in Table 1B.

Table 1B: Index of variables

Index	Range	Questions	Purpose of measurement.
General working conditions	0 – 7	Q201-Q207	To measure positive responses relating to working conditions.
Physical & environmental conditions	0 – 13	Q301-Q313	To measure positive responses with regard to the physical and environmental factors.
Ergonomic & psychosocial conditions	0 - 16	Q401-Q416	To measure positive responses pertaining to ergonomic & psychosocial factors.
Protective clothing and equipment	0 – 4	Q501-Q504	To measure number of positive responses in the use of protective clothing

Variables measuring compliance (shown in Table 1C) with regulations and OHS standards were grouped into a general compliance index. In this group, the number of positive responses indicating compliance by employers with their OHS obligations towards their employees was

measured (questions Q601 – Q610). The availability of OHS regulations, fire precautions and condition of firefighting equipment was also recorded (questions Q801 – Q812 and Q901 – Q904 respectively).

Table 1C: Compliance with OHS index

Duties of employers to their employees	0 - 10	Q601-Q610	To measure positive responses to comply with OHS standards
Availability of OHS Act	0 - 1	Q701	To measure availability of OHS regulations at the workplace
Fire and firefighting compliance Fire precautions Maintenance of firefighting equipment	 0 – 12 0 – 4	 Q801-Q812 Q901-Q904	 To measure number of positive responses in compliance with regulatory requirements.

To assess the overall performance of businesses in compliance to OHS standards, the positive responses obtained by the businesses in the measured variables were totaled and scored.

3.10.3 Statistical analysis

The statistical software SPSS version 16 was used to analyze the data. Data was summarized using descriptive statistics that included percentages mean and variability measured in variance

and standard deviation and then presented in the form of frequency distribution displayed in tables, graphs and charts.

CHAPTER 4

4. STUDY RESULTS

4.1 Introduction

In this chapter, the main findings of the survey in relation to the study objectives are presented in the form of descriptive and comparative statistics. Thus a report on the response rate of the inspection survey by checklist is given as well as results pertaining to the demographic characteristics of and production processes in small-scale clothing industries. Results describe the general workplace conditions, the physical and environmental conditions as well as the ergonomic and psychosocial conditions of OHS in the enterprises surveyed. This chapter also presents results of an overall assessment of the level of compliance to general OHS standards.

4.2 Response rate of the checklist inspection

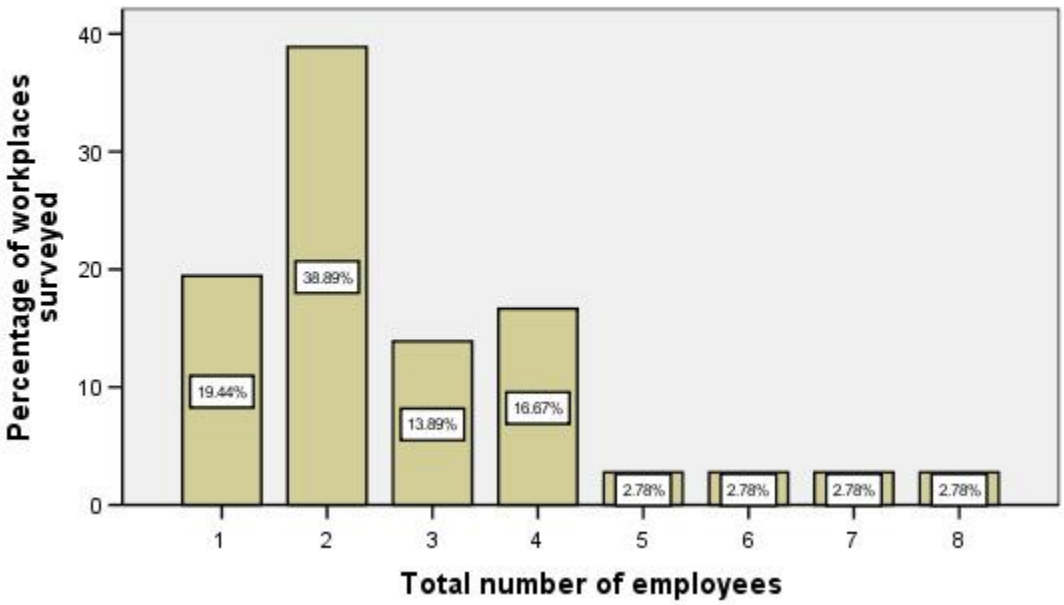
All the 36 small businesses that were included in the study sample agreed to the study and were duly inspected.

4.3 Socio-demographic characteristics and production processes

4.3.1 Socio-demographic characteristics

The socio-demographic characteristics of the businesses sampled were measured as variables pertaining to their size (the total number of persons employed), the gender and age range of employees. The summary statistics are presented in Table 1 (Appendix 2). As shown in Fig 1, the number of persons employed ranged between 1 and 8. 59.4% of the firms employed between 1 – 2 persons, while only 2.8% employed 8. On average each enterprise had about 3 employees with a standard deviation of 1.7 and the mean age of the youngest persons employed in the industry was 28 years compared with the mean age of approximately 43 for the oldest, while females were dominant in the industry as the results reveal a 2 to 1 female to male ratio.

Fig 1: Distribution of the number of employees per enterprise

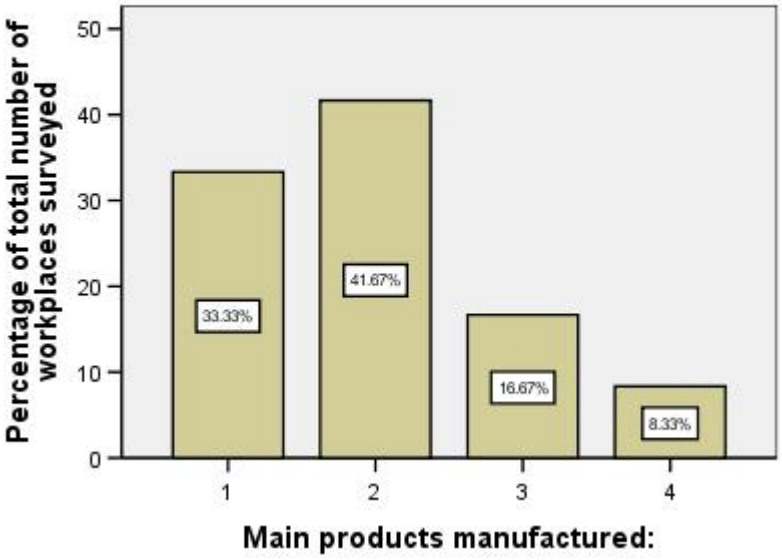


4.3.2 Types of products and production processes

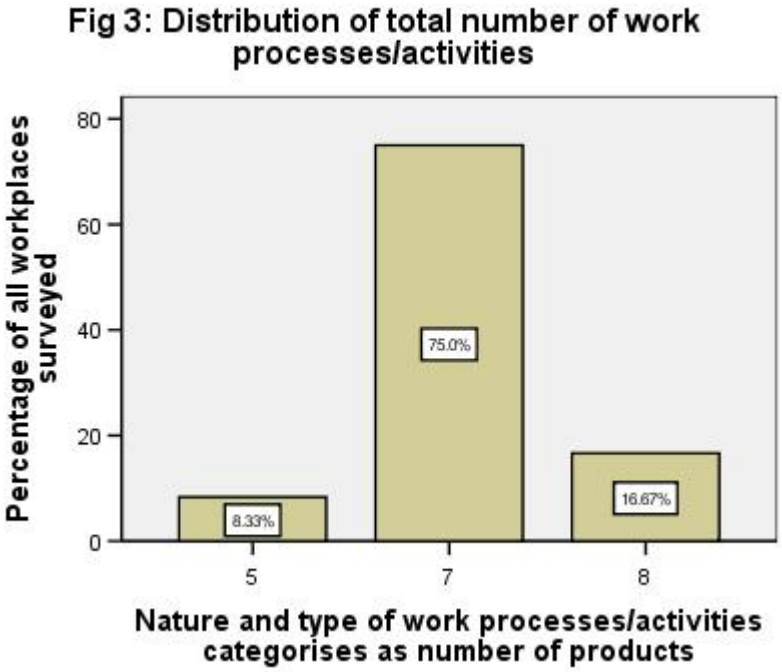
The number of products manufactured by each enterprise was quantified under the variable "main products manufactured" which grouped the various types of clothing products manufactured into four categories and counted them: fashion garments; school uniforms and accessories; protective clothing; seat covers, pillows and curtains. Some enterprises combined upholstery with sewing of uniforms and protective clothing. Only details on clothing were included in categorizing the products. If a business made only fashion garments, this was classified as 1 product whereas if uniforms were included, this was counted as 2, and so on.

The survey found that the sampled units had a product range of 1 to 4. As shown in Fig: 2, about 42% of the enterprises surveyed produced 2 categories of clothing while 33% produced 1 category. Only 8.3% produced 4 and on average a firm produced 2 product variants.

Fig 2: Showing the distribution of main products manufactured



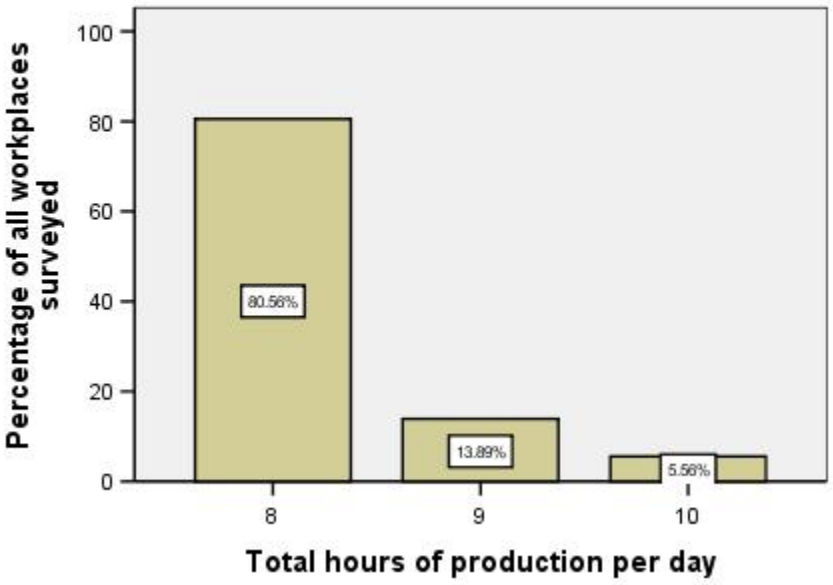
For the purpose of quantification, the production process was grouped into 8 basic categories: pattern drafting, cutting, stitching, needle work, pillow and cushion stuffing, pressing, general finishing and delivery. These processes were counted as existed in each enterprise. Fig 3 shows that 75% of the 36 enterprises studied utilized 7 processes, while 16.7% used all 8 processes and only 8.3% used only 5 processes. Firms used between 5 to 8 processes and on average 7 processes were used (SD= 0.7 see Table 1 Appendix 2).



4.3.3 Production time, work shifts and size of workplace

Production time, work shifts and size of the work areas were deemed to constitute part of the work processes in the enterprises surveyed and were therefore measured. Employers were requested to supply details about the total number of hours their businesses operated daily, the number of shifts, the length of lunch breaks and whether more breaks were given to workers in-between meals. As shown in Table 2 (Appendix 2) and Fig 4 below, overall the businesses surveyed did not overwork as 80.6% of them worked the required 8 hours daily, while 13.9% did 9 hours and only 5.6% put in 10 hours yielding a mean daily hours of production of 8.25 (SD = 0.554).

Fig 4: Showing hours of production put in per day



All the enterprises inspected worked a five-hour morning shift and generally from 8 am to 1pm with a lunch break of 1 hour. As noted in Table 3, the majority of enterprises (75%) worked for 3 hours during the afternoon shift from 2 to 5 pm compared with 19.4% and 5.6% which put in 4 and 5 hours respectively.

Table 3: Distribution of Afternoon Shift: From 2 pm to 5/8 pm

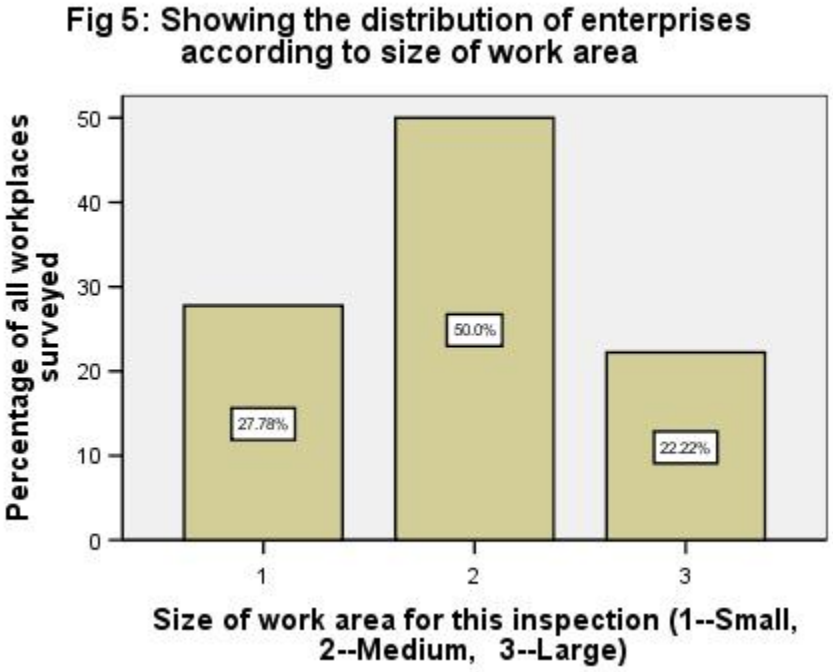
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	27	75.0	75.0	75.0
	4	7	19.4	19.4	94.4
	5	2	5.6	5.6	100.0
	Total	36	100.0	100.0	

None of the businesses surveyed reported night shift. The enterprises generally operated without offering workers short breaks to stretch and rest their muscles. Table 4 below indicates that only 8.3% of the small businesses offered their workers a 15-minute short break in the morning before the normal break for lunch. None of them offered a short in-between break during the afternoon shift (also see Table 2 Appendix 2).

Table 4: Distribution of morning Break in minutes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	33	91.7	91.7	91.7
	15	3	8.3	8.3	100.0
	Total	36	100.0	100.0	

In measuring the size of the work areas in the workplaces inspected, three categories were used. Workplaces between 10 – 19m^2 were indicated as small = 1; 20 – 39m^2 as medium = 2 and 40 – 60m^2 as large = 3. Sizes were fairly standard in the workshops constructed by the Gaborone city Council (15m^2, 20m^2 and 40m^2). Fig 5 shows that 50% of the workplaces



inspected had a medium-size work area compared with only 22.2% that were large and 27.8% classified as small. The results also reflect the fact that most of the study workplaces are operating in the standard market structures constructed by the Gaborone City Council.

4.4 General workplace conditions

The general workplace conditions were evaluated using seven basic measure variables with dichotomous responses Yes=1, No=0 and Not applicable. A yes was indicative that the measure was in place and that it was acceptable and in good working condition, whereas a No meant that the measure was not in place, was needed and required improvement. If measures were not needed or not relevant, these were recorded with "not applicable"=3 or as a missing value. All seven variables describing the general working conditions were assessed and the compiled results are presented in Table 5.

Table 5: Distribution of results for General workplace conditions

General workplace conditions	N	Yes (%)	No (%)	N/A %
Provided at least 2 emergency exits with visible emergency signs	36	(5.6)	(94.4)	
Escape ways are free of obstacles	36	(33.3)	(66.7)	
Adequate clearance to or accessibility for performing tasks	36	(66.7)	(33.3)	
Floors and walk ways are even and not obstructed	36	(63.9)	(36.1)	
Ceiling adequately raised to reduce noise reflection	36	(75.0)	(25.0)	
Provided enough appropriate fire extinguishers	36	(8.3)	(91.7)	
Provided First Aid Kit and first aiders	36		(100.0)	

As shown, some positive results were obtained. 66.7% of the businesses surveyed freed their escape ways of any obstacles to permit quick and easy entry and exit and also properly kept their workplaces cleared to allow for free movement of workers while performing their tasks. Ceilings in 75% of the units inspected were of the appropriate height and sufficiently elevated to reduce noise, while 63.9% had even floors and walkways to prevent trips and fall of workers and all persons visiting the workplaces. However, results were poor in other areas. Hence, only 5.6% of the businesses surveyed had two emergency exits with visible emergency signs. None of the enterprises inspected had a first aid kit or a first aider and only 8.3% had a fire extinguisher.

For comparative analysis, the positive responses to all the measure variables describing the general workplace conditions were scored for each enterprise and then ranked from lowest score to highest. A shown in Table 5 the overall workplace conditions in these workplaces were poor. Only a combined 25% of workplaces inspected had between 4 and 5 positive responses out of the

7 variable measures compared with 75% who obtained between 0 to 3 (that is, less than half of the 7 positive responses possible).

Table 6 Distribution of general Workplace condition score

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	2.8	2.8	2.8
	1	8	22.2	22.2	25.0
	2	9	25.0	25.0	50.0
	3	9	25.0	25.0	75.0
	4	7	19.4	19.4	94.4
	5	2	5.6	5.6	100.0
	Total	36	100.0	100.0	

4.5 Physical and Environmental conditions

Thirteen measure variables were used to assess the physical and environmental conditions in the workplaces inspected. The results are presented in Table 7. There were some positive efforts to provide acceptable physical and environmental conditions of OHS in the workplace. There was overall proper waste water drainage (72.2%) and good storage of tools, materials and finished products (69.4%). In addition, an acceptable proportion of enterprises ensured that machinery and equipment were properly maintained to reduce noise and had adequate waste bins (55.6%); there was proper housekeeping by cleaning and removing wastes from the workrooms in 64% of the workplaces inspected.

However, results for the other measure variables were mitigated. Hence, the use of artificial lighting, ventilators and local exhausts were found to be low. Of the 18 businesses where local exhaust to extract dust was judged to be a priority, only 5.6% had a local exhaust fitted as a built-in engineering control in the commercial premises in which they were located. While 61.1% mainly utilized daylight conditions as lighting for work operations, 63.9% did not improve lighting by providing artificial or spot lighting on sewing machines given that workers performed fine and detailed sewing tasks and hand needlework. Up to 63.9% had inadequate ventilation and

hence poor circulation of air due to small size windows and single doors and as many as 69.4% did not provide fans or air conditioners to mitigate excessive heat conditions in very tight workplaces. In addition, up to 63.9% of the workplaces had entangled electric wire connections and importantly, up to 56% of workplaces were unable to exert any pressure on owners whose operations presented hazards to neighbours.

Table 7: Distribution of results for physical and environmental conditions

Physical and environmental conditions	N	Yes (%)	No (%)	N/A (%)
Convenient storage for tools, raw materials and products provided	36	(69.4)	(30.6)	
Wastes and other unnecessary materials are cleared from workroom	36	(36.1)	(63.9)	
Adequate waste bins for different types of wastes are provided	36	(55.6)	(44.4)	
Proper drainage for waste water provided	36	(72.2)		(22.8)
Entangled electrical wiring connections prevented	36	(36.1)	(63.9)	
Switch boxes are covered	36	(97.2)	(2.8)	
Increased natural ventilation by having more windows or doors	36	(63.9)	(36.1)	
Provided artificial ventilators, electric fans, or air conditioners to have good airflow	36	(30.6)	(69.4)	
Properly located machines or skylight positions to improve daylight conditions	36	(61.1)	(38.9)	
Improved general artificial lighting or provided spot lighting	36	(36.1)	(63.9)	
Maintain and adjust machines and tools to reduce noise	36	(55.6)	(44.4)	
Control hazards from neighboring sites	36	(2.8)	(55.6)	(41.7)
Remove dust using local exhaust	36	(44.4)	(55.6)	(50.0)

The physical and environmental conditions score for each enterprise inspected was compiled for comparison. As Table 8 shows, the scores obtained indicate that the physical and environmental conditions in the workplaces inspected were overall poor given that 55.6% of them scored less than half of the positive responses to the 13 measure variables and only 44.4% above (between 7 and 11).

Table 8: Physical and Environmental conditions score

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	2	5.6	5.6	5.6
	3	6	16.7	16.7	22.2
	4	2	5.6	5.6	27.8
	5	4	11.1	11.1	38.9
	6	6	16.7	16.7	55.6
	7	3	8.3	8.3	63.9
	8	5	13.9	13.9	77.8
	9	5	13.9	13.9	91.7
	10	1	2.8	2.8	94.4
	11	2	5.6	5.6	100.0
	Total	36	100.0	100.0	

4.6 Ergonomic and Psychosocial conditions

The ergonomic and psychosocial conditions in the workplaces surveyed were assessed using 16 measure variables. The inspection measured their presence or acceptability and recorded this as Yes=1 when the condition was available or No=0 when absent or in poor condition and "not applicable" when condition was not necessary and classified as a missing value = 3. For comparative statistics, study workplaces were also scored for all positive or acceptable conditions present and ranked. Table 9 shows all the results for the 16 conditions checked.

Enterprises performed well in only two of the conditions checked. Thus about 56% worked normal hours and the same proportion of workplaces ensured adequate maintenance of machinery and equipment to facilitate operation and mitigate over-exertion by machinists. However, results showed an overall poor performance in the provision of adequate ergonomic conditions in the workplaces surveyed. Machinists used mostly poor seating. 86% of the workplaces did not provide height adjustable seats; chairs did not have back rest to support the lower back (91.7%), while almost 81% did not make efforts to avoid bending postures for standing workers. Up to 67% of the workplaces did not provide cutting and pressing work tables of appropriate height to avoid strain from too high or too low hand positions.

Table 9: Distribution of results for Ergonomic and psychosocial conditions

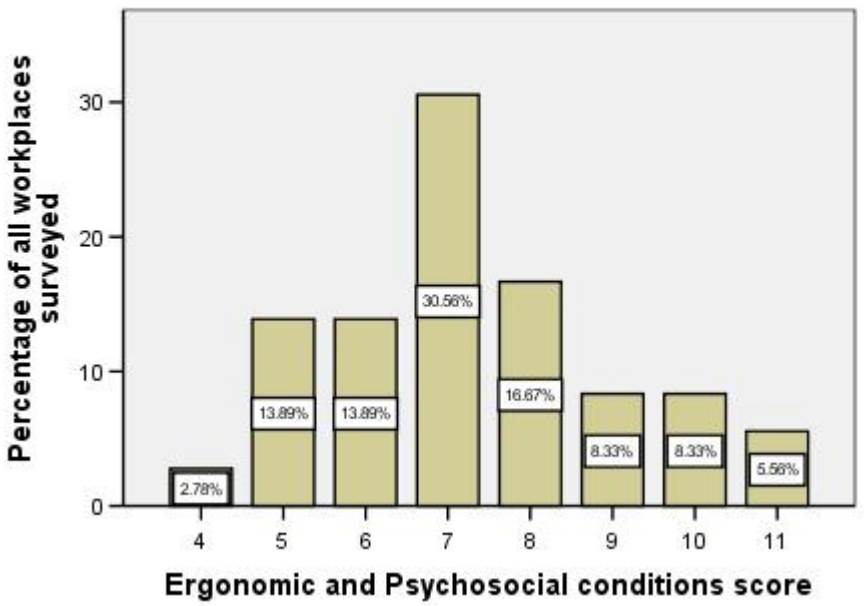
Ergonomic and psychosocial Conditions	N	Yes (%)	No (%)	N/A (%)
Avoid bending postures for standing workers by raising height of equipment controls or work surfaces	36	(19.4)	(80.6)	
Avoid work requiring high hand positions for standing workers by providing foot stands or platforms	36	(2.8)		(97.2)
Provided work tables of suitable height for seated workers to avoid too high or low hand positions	36	(33.3)	(66.7)	
Provided chairs of correct height or make seat height adjustable	36	(13.9)	(86.1)	
Chose seat surface and cushion for comfort and support	36	(16.7)	(83.3)	
Provided chairs with back rest of proper size to support lower back	36	(8.3)	(91.7)	
Placed frequently used materials and tools at easy reach of workers	36	(94.4)	(5.6)	
Make sure machines & tools are maintained and repaired properly and no worn-out tools are used	36	(55.6)	(44.4)	
Change workstations to allow workers opportunity to get ahead of schedules and take short pauses	36	(2.8)	(22.2)	(75.0)
Enable workers to talk with each other while working to avoid isolation	36	(83.3)	(2.8)	(13.9)
Avoid too long daily working hours	36	(55.6)	(11.1)	(33.3)
Consider inserting short breaks in addition to a long break for meals	36	(11.1)	(33.3)	(55.6)
Provided comfortable room for workers to eat, and clean drinking water	36	(38.2)	(61.8)	(5.6)
Provided adequate toilet facilities close to the work area	36	(97.2)	(2.8)	
Ensure toilet facilities are regularly cleaned and are in good sanitary condition	36	(100.0)		
Chose tools of appropriate size & shape for easy and safe use	3	(100.0		

	6	)		

While 83.3%% of the workplaces enabled workers to engage in conversations in the course of their work to mitigate isolation and stress and 97.2% had adequate toilet facilities in good sanitary condition. Of the 16 workplaces inspected where the inspector felt additional short breaks were required only 11% provided a 15-minute break in addition to a long break for meals for long-seating workers to stretch themselves, take short rests from sustained repetitive work and awkward seating positions while sewing. A considerable proportion of the workplaces inspected did not provide room or facilities for workers to eat and rest (62%).

Ranked scores for the ergonomic and psychosocial conditions for all the workplaces inspected as shown in Fig 6 show that 61% of the workplaces scored less than ½ of the 16 possible positive responses for the 16 measured variables. Only 38.9% scored 8 and above. Overall, therefore, the ergonomic and psychosocial conditions in these workplaces were inadequate and hence a health problem.

Fig 6: Showing the distribution of scores obtained for Ergonomic and Psychosocial conditions



4.7 Protective clothing and equipment

Four measure variables were used to evaluate the utilization of protective clothing and equipment to maintain and improve health and safety. Assessment was made by indicating the conditions that were present or acceptable (Yes=1) or not present or acceptable (No=0) or whether they were not available or did not apply to the workplace ("not applicable" = 3 and shown as a missing value for statistical analysis).

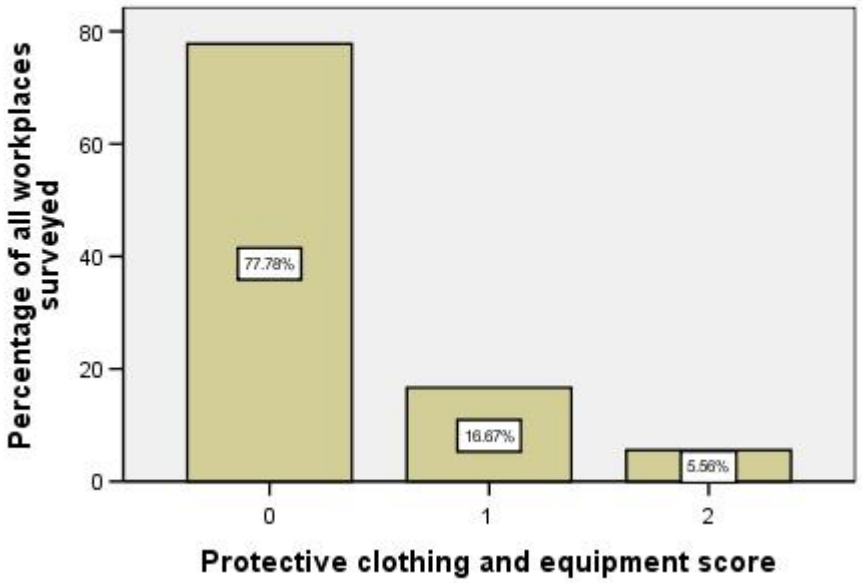
Table 10 shows that there was generally a very poor use of PPE. Most workplaces did not provide protective overcoats or aprons (94.4%), dust masks, ear plugs, thimble and gloves (100%), while up to 94.4% did not maintain and replace PPE regularly and 63.9% did not use built-in guards or built-in hazard controls on their machines and equipment as a replacement for PPE.

Table 10: Distribution of results for Protective clothing and equipment

Protective clothing and equipment	N	Yes (%)	No (%)	N/A (%)
Provided protective overcoats and aprons	36	(5.6)	(94.4)	
Provided masks, ear plugs, thimble and gloves	36	(0.0)	(100.0)	
Maintained and replaced protective equipment regularly	36	(5.6)	(94.4)	
Used built-in guards or other built-in hazard reduction controls wherever possible to replace personal protective equipment	36	(16.7)	(63.9)	(19.4)

The performance of all the workplaces inspected for use of protective clothing and equipment was scored for comparison and is presented in Fig 7. Not a single positive response was scored for almost 78% of the workplaces, while two measure variable conditions were present in only 5.6% of the workplaces.

Fig 7: Showing the distribution of scores obtained for the use of PPE



4.8 Compliance to occupational health and safety (OHS) standards

This section assessed the overall level of compliance of the enterprises surveyed to prescribed OHS standards. The section is divided into four sub-sections to facilitate scoring and comparison. The inspector indicated with a yes=1 or No=0 whether the measure was present or absent and "not applicable" if it was not required.

4.8.1 Duties of the employers to their employees

The researcher evaluated the level of compliance by employers to OHS duties towards their employers by checking the positive entries to 10 sets of measure variables and the results are shown in Table 11 below.

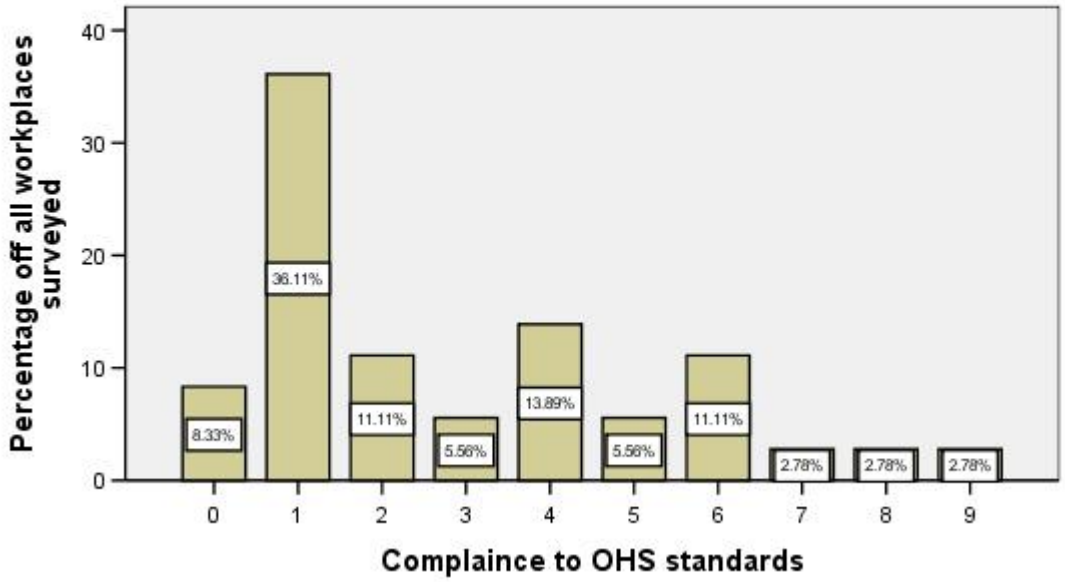
Table 11: Distribution of results for overall compliance to OHS Standards

A: Duties of employers to their employees	N	Yes (%)	No (%)	N/A (%)
Provided a work environment that is safe without risk and is maintained	36	(30.6)	(69.4)	
Provided plant, machinery and systems of work that are safe and without risk	36	(50.0)	(50.0)	
The employer eliminated, mitigated and managed hazards	36	(33.3)	(66.7)	
Attempts were first made to eliminate hazards before resorting to PPE	36	(30.6)	(69.4)	
Hazards were identified, evaluated and controlled	36	(0.0)	(100.0)	
All measures were taken to ensure compliance by persons on the premises under the control of the employer	36	(11.1)	(88.9)	
The employer provided safe working procedures	36	(27.8)	(66.7)	(5.6)
The employer provides instructions in respect of the use of plant, machinery and substances	36	(11.1)	(83.3)	(5.6)
The employer provides training	36	(16.7)	(75.0)	(8.3)
The employer provides supervision	36	(80.6)	(11.1)	(8.3)
B: A copy of OHS Act (Factories Act) is provided and available for anyone wishing to view it	36	(0.0)	(100.0)	

There was generally a poor compliance to OHS standards. All workplaces did not conduct risk assessment. Most (88.2%) did not instruct their employees in the use of machinery and equipment and 75% did not train their workers. In addition, 88.9% of the workplaces failed to take measures to ensure that persons visiting or present for contract purposes in the workplace also complied with OHS requirements. The employers showed particular interest in supervising mostly the output and not the work procedures to ensure safety and proper use of machinery and equipment (80.6%).

When the scores on duties of employers to their employees under the label "compliance to OHS standards" were computed, 75% of the enterprises had positive scores in less than ½ of the 10 measure variables compared with only 25% which had between 5 and 9 positive scores, thus confirming the overall low level of compliance. These results are shown in Fig 8 below.

Fig 8: Distribution of scores obtained for complaince to OHS standards



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Related to the duties of employers to their employees is the administrative requirement to keep a copy of the Occupational Health and Safety Act (OHSA) readily available for everyone in the workplace. Section 62 of the Botswana Factories Act Cap 43:01 requires that an abstract of the Act must be posted in the workplace, but none of the enterprises inspected (100%) had a copy of the Factories Act.

4.8.2 Fire and emergency compliance

Twelve measure variables were checked to assess compliance with fire and emergency requirements by the workplaces under survey. Table 12 shows that there were some adequate engineering controls to facilitate fire-fighting during emergency in the workplaces. Thus escape doors are constructed in such a way that they can open outwards (94.4%) and can be opened easily from the inside to ensure quick and easy evacuation of employees (91.7%).

Table 12: Distribution of results for fire and emergency compliance

Fire precautions and maintenance of Fire-fighting equipment	N	Yes (%)	No (%)	N/A (%)
Adequate precautions are taken to prevent the outbreak of fires	36	(33.3)	(66.7)	
All equipment and machinery are installed, operated and maintained to prevent an outbreak of fire	36	(36.1)	(63.9)	
Adequate fire-fighting equipment has been provided	36	(13.9)	(80.6)	(5.6)
Escape doors constructed to open outwards	36	(94.4)	(5.6)	
Escape doors are kept clear	36	(36.1)	(63.9)	
Escape doors are easily opened from the inside for quick and easy evacuation	36	(91.7)	(8.3)	
All staircases and steps leading from one floor to another or to the ground provided with substantial handrails	36	(8.3)	(5.6)	(86.1)
Staircases used as fire escapes are constructed of non-combustible material	36	(2.8)	(11.1)	(86.1)
Staircases used as fire escapes kept clear of any material or obstruction	36	(5.6)	(8.3)	(86.1)
Staircases used as fire escapes do not terminate in an enclosed area	36			(100)
Staircases, passages and exits for escape purposes are of width and gradient to facilitate quick egress	36	(75.0)	(22.2)	(2.8)
All relevant rooms are provided with at least two means of egress situated as far apart as possible	36	(2.8)	(38.9)	(58.3)
All fire-fighting equipment are maintained and inspected at least once every three month	36		(22.2)	(77.8)
There is an appointed person to ensure fire-fighting equipment is maintained in good working condition	36		(16.7)	(83.3)

However, fire and emergency preparedness was generally poor. Adequate fire-fighting equipment was not provided (up to 85.3% of enterprises inspected), while escape doors when available were not kept clear of obstacles (63.9%) and up to 93.3% did not provide two means of egress as most workplaces had only one door serving as entrance and exit.

The fire and emergency positive responses for the workplaces were computed into aggregate scores as shown in Table 13. The scores consolidate the poor fire and emergency preparedness of the businesses inspected. More than 80% scored less than ½ of the total positive responses for the measure variables and only about 16.2% had some acceptable level of preparedness.

Table 13: Fire and emergency compliance score

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	2.8	2.8	2.8
	2	4	11.1	11.1	13.9
	3	14	38.9	38.9	52.8
	4	6	16.7	16.7	69.4
	5	4	11.1	11.1	80.6
	6	3	8.3	8.3	88.9
	7	2	5.6	5.6	94.4
	8	1	2.8	2.8	97.2
	9	1	2.8	2.8	100.0
	Total	36	100.0	100.0	

4.8.3 Maintenance of fire-fighting equipment

Fire-fighting equipment was overall absent in the businesses inspected. Hence all enterprises that had not equipment were classified as "not applicable" for maintenance purposes. Those who indicated they had sent their equipment for maintenance were counted but the general results as presented in Table 14 there were no inspections of fire-fighting equipment and for the 1 (2.8%) who confirmed inspection, this was not marked on the fire extinguisher and there was no register. None of the workplaces inspected had anyone trained to use and maintain the fire-fighting equipment where available in good working condition.

Table 14: Distribution of results for maintenance of fire-fighting equipment

Maintenance of fire-fighting equipment	N	Yes (%)	No (%)	N/A (%)
All fire-fighting equipment inspected at least once every 3 months	36	(0.0)	(22.2)	(77.8)
A person is appointed to ensure fire-fighting equipment is maintained and in good working condition	36	(0.0)	(16.7)	(83.3)
All fire-fighting equipment being serviced at least once every 9 months	36	(2.8)	(13.9)	(83.3)
Each fire-extinguisher clearly marked with date of last inspection	36	(0.0)	(16.7)	(83.3)

CHAPTER 5

5. DISCUSSION OF FINDINGS

5.1. Introduction

The objectives of this study were:

- To identify and describe the nature and type of work processes involved in small-scale clothing manufacturing enterprises in Gaborone.
- To investigate the general status of the physical working environment and conditions in these enterprises.
- To ascertain the ergonomic and psychosocial conditions of health and safety in small-scale clothing enterprises in the Gaborone area
- To assess the level of compliance to occupational health and safety standards/requirements (as per the WHO/ILO standards) of these enterprises.

5.2 Findings relating to some socio-demographic characteristics of study workplaces

The findings obtained from the 36 units inspected reveal that the sizes of small-scale businesses in the clothing manufacturing industry in the Gaborone area are very small. The number of persons employed in each enterprise ranged from 1-8 compared with the 1-20 as stipulated in the initial definition of small-scale enterprise adopted in this study. Up to two-thirds or 59.4% of the units inspected employed between 1 – 2 persons and on average firms employed only 3. Even though this finding fits well with the initial definition of small-scale enterprise based on the number of persons employed (Glass, 1998) and adopted in this study, it also adds another dimension that small businesses in clothing manufacturing in the Gaborone Area of Botswana consist mainly of self-employed persons who operate informally without the organizational

characteristics of formally run enterprises and this characteristic is important in defining the extent to which they are concerned with OHS issues.

According to the results, the gender distribution in the enterprises studied is disproportionate. Results show an overall 2 – 1 ratio of female to male persons employed. The predominance of females in the small-scale clothing manufacturing industry is consistent with the findings of the 2007 Informal Sector survey which showed that 67.6% of informal businesses in Botswana were owned by females (Budget Speech, 2009:8). This is also significant in terms of occupational exposures. According to Dr Takala (2002), household surveys conducted in several countries showed that musculoskeletal disorders which cause long-term disabilities and absenteeism are more common among females than males.

In addition, findings reported in the present study show an average age of the youngest employee of 28 years and the oldest employee of 43 years. A positive implication emerges from this finding. Businesses involved in the clothing industry in the Gaborone area did not utilize child-labour, a problem highlighted by Muchiri (2008) when he stated that over 30% (> 80 million) of the working children in the world are in Sub-Saharan Africa and do their work in very hazardous conditions. Dr Takala (2002) also showed that exposure to psychosocial and stress-related problems and musculoskeletal disorders (MSDs) at earlier age leads to a 14% shortening of the life time working capacity of workers.

5.3 Findings relating to the nature and type of work processes in study workplaces

The businesses studied manufacture a wide variety of clothing products including fashion garments for men, women and children; school uniforms and accessories such as ties and woven belts; protective clothing and household items including seat covers, pillows, sofas and curtains. This study revealed that the small enterprises are less likely to specialize in one line of production but rather take on several products for example fashion garments together with school uniforms and protective clothing at the same time or alternate depending on market conditions. Combining a wide range of products and switching products require constant changes in work organization and also mean that workers do not benefit from specialization and most changes

imply new work process accompanied with a heavier workload exposing workers to fatigue, stress, accidents and injuries and increased risk of MSDs.

The production process in the garment industry is sequential in which fabric is cut to specific patterns, stitched and finished and packaged for distribution. During cutting, fabric is laid on a table and either a paper pattern is placed on it, marked and then cut using hand-held shears or powered cutting knife or the tailor draws the pattern straight on the fabric using chalk before cutting and bundling for sewing. The stitching process consists in a machinist sewing the pieces together, applying embroidery where required using high-speed electric sewing machines. During finishing, workers trim lose threads using trimmers but in most cases small embroidery scissors and hand-sew lose ends and hems with needles. The garments are then ironed, and packaged or hung-out for delivery. In the workplaces studied mostly domestic pressing irons and ironing boards were used. The production process is thus labour-intensive as in ready-made garment factories where the activities are carried out in differentiated sectors including cutting, stitching and finishing (Plattbus & Herbert, 1998; Parimalam et al, 2008).

In their studies, these authors showed that workers in the cutting sector were exposed to hazards such as fabric dust during laying of fabric and cutting, risk of accidents, injuries and bruises from handling shears or using powered cutting machines and MSDs due to prolonged standing and bending especially when the cutting table was not of appropriate height. They also found that machinists were exposed to MSDs because their work was essentially repetitive and they adopted poor postures due to inappropriate seating and table heights whereas, during steam ironing, workers were exposed to formaldehyde vapor, a chemical used in finishing fabrics, burns from the iron and MSDs due to prolonged standing and bending over low tables. Sewing involves a lot of fine detail in sections of the product and so requires adequate lighting.

The results of this study showed that small businesses in Gaborone did not have differentiated processes by virtue of the multiplicity of products each workplace took upon itself. Because of the small number of employees, in most cases each worker combined all the operations required to produce a finished product: some form of cutting, sewing, pressing and hand finishing. This is an indication that overall workers did not exert control over the production process and were exposed to the risk of developing multiple health problems.

Though the findings revealed that these businesses did not adopt night shifts and put in mean daily hours of work of 8.25 hours, this only included the normal five-day working week. Workloads in these enterprises are not predictable and some extend operations to week-ends to include Saturdays and Sundays. Moreover, they operated for 5 hours in the morning and 3-5 hours continuously in the afternoon doing repetitive and high-paced work during the entire period with only a one-hour lunch break without short breaks in between. Only 8.3% of units inspected provided a 15 minute break in the morning and none granted a break in the afternoon period. This can result in fatigue and exacerbate the risk of developing MSDs in line with findings by Plattbus & Herbert (1998) and Parimalam et al, 2007 that highly repetitive and time-pressured work and poor postures resulted in high rates of MSDs among machinists and other workers in the garment industry.

5.4 Findings describing the physical and environmental conditions

Wood et al. (2000) defined environment as the physical, social and temporal surrounds of the individual. And in this sense the environments define the contexts in which people carry out their occupations and environmental factors either facilitate or limit people's engagement in their occupations (Law et al. 1999). According to Daniel Sokols (1998), research has identified the physical and environmental conditions of the workplace as comprising the physical arrangements of the employee's immediate work area, the ambient environmental qualities of the work area (hazardous airborne chemicals, electric and magnetic fields, noise, extreme temperatures, humidity and levels of lighting), the physical organization of the building constituting the workplace and the exterior amenities and their site planning.

The results of the present study show some positive steps taken by small businesses in the clothing manufacture industry in the Gaborone area to maintain and improve the work environment. General hygiene and sanitation was of an acceptable standard. Hence there was good housekeeping in 64% of the workplaces. Even though washing facilities were not provided and almost half of the workplaces did not have appropriate waste bins, sanitation was overall good as there was proper drainage of waste water from the water basins provided in most of the Gaborone City Council workshops (72.2%) and the toilet facilities were kept clean. This

constitutes an improvement compared with previous findings which depicted small enterprises as not having access to clean workplaces, water and toilet facilities (Loewenson, 1995).

But findings show that overall safety conditions in the workplaces were inadequate. Even though an acceptable proportion of businesses provided escape ways free for easy entry and exit and cleared their workplaces to enable free movement of workers during operations (66.7%) and ceilings were high enough to reduce noise from operating machines and tools (75%), this applied only to the City Council market structures but which were constructed with only one door serving as entrance and exit with no additional emergency exit. This engineering defect means that if there were fire, all workers will be trapped in. Hence the 5.6% of the units surveyed which had emergency exits were located only in commercial shopping malls.

In addition, the City Council workshops in the Extension 14 and Gaborone-West clusters had very small windows which meant that workers were unable to adequately utilize daylight conditions to improve lighting during operations, and natural ventilation to improve air circulation in the workplace. Moreover, only 63.9% of the workplaces had even floors and walkways implying that 36% of them did not provide proper conditions to prevent workers and all persons entering or using the premises from tripping and falling and sustaining injury. This is an important gap that needs addressing and is consistent with results in other research. According to Plattbus & Herbert (1998), the major health and safety problems in the clothing industry are related to the general conditions in the work environment whereby businesses operate in poorly designed, inadequately ventilated and maintained buildings in which employees are exposed to excessive heat or cold and very poor lighting.

Results of the present study show very little use of local exhaust to extract dusts produced by handling, cutting and sewing fabrics in addition to the small size of workplaces with inadequate natural ventilation to enable good airflow and a low utilization of artificial ventilators such as electric fans or air conditioners to reduce heat. In the businesses studied, work was carried out in one work area, often overcrowded with inadequate storage. This meant that everyone present in the workplace would be exposed to pollutants. Jonathan (1999) conducted a study on respirable cotton fabric dust in a garment factory in Lesotho and found that powered fabric cutters and sewing machines emit large amounts of fabric dust and dye residues which can cause workers

serious respiratory problems including log-term lung disease, a situation that is exacerbated by poor air quality.

An assessment of the findings of this study revealed improper and poor electrical connections and installations as more than two-thirds (63.9%) of the businesses had entangled electrical wires and live terminals in the work area, exposing workers and visitors not only to burns, electric shock or electrocution but also trips and fall that can occasion serious injury and the risk of fire. This gap can be explained in part by an engineering defect in the Council workshops which were constructed without adequate electric sockets on the walls to accommodate several machines and tools. Most workplaces had only between 1 – 2 power sockets necessitating the use of distribution cables which may not be appropriate or are often not properly installed or maintained. The risk of fire and accidents from electricity are therefore real in these workplaces.

Results have also shown that the emergency preparedness of the study units was very poor as none of them (100%) had a first aid kit or trained first aider and few had a fire extinguisher (8.3%). The risk of fire, accidents and injuries is elevated in clothing manufacture since flammable materials such as fabrics and linings, paper patterns and electrical equipment such as electric irons, powered cutting machines, electric kettles and in some cases electric stoves for cooking food are used. Fingers of workers wrapped with pieces of cotton fabrics observed during inspection represented evidence that injuries were common in that type of work and that the lack of first aid was a serious gap needing to be addressed. And a study by Parimalam (2007) also confirmed that injuries of this type are common among workers in the garment manufacturing industry.

The present study also revealed that workplaces were affected by hazards from neighboring sites and were unable to control them. Twenty-one out of the thirty-six enterprises studied had hazards from neighbouring sites (wood dust form carpenters, lead exposure from battery charging, excessive noise levels from grinders cutting steel, welding fumes and flying particles and sharp steel pieces abandoned in communal areas that could cause serious foot injury) and up to 95% of workplaces could not do anything to obtain control of the hazards by neighbours. In an earlier survey of occupational health and safety in the informal sector Dr Rene Loewenson (1997)

pointed out that hazards spill over into neighbouring workplaces thereby affecting other workers whose work does not involve such hazards.

Upon further evaluation of the findings of this study, it was found that small businesses in the clothing industry do not utilize protective clothing and equipment. Workers were not provided with protective overcoats or even aprons, dust masks and thimbles (94.4%) and were thus exposed to the risk of inhaling fabric dust containing dye residues and chemicals used in finishing fabrics that can cause them respiratory problems and long-term lung disease. Lack of overcoats and aprons meant that workers came into direct contact with chemical dusts during cutting, sewing and handling of textile wastes and would in turn carry this home and thus expose their families to the same health risks.

In one study carried out in Lesotho, Jonathan (1999) reported that cutting and sewing machines produce dye dusts which are inhalable and come into contact with the skin if PPE is not used. A case-control study of textile workers in Egypt conducted by Hafez et al. (1998) found that contact with fabric dyes was associated with an 18% prevalence of eczema among the textile workers in the dyeing section compared to 0.0% among workers in the electrical distribution company taken as the control group.

Sewing by hand (hemming, difficult finishes, fitting buttons, etc) using needles and pins was found to be a major component of work method but workers in all the workplaces did not use thimbles to protect against needle pricks and were thus exposed to injuries as well as the risk of viral transmission of blood-borne diseases as HIV and hepatitis C. The ILO (2008) has been consistent in pointing out that due to the labour-intensive nature of their work and poor health and safety standards, workers in small businesses or informal economy remain more vulnerable to HIV infection than those in the formal sector.

The study also revealed that sewing machines used did not meet the appropriate safety standard. Machines had under bench drive shafts while only 16.7% were adequately guarded to protect workers from sustaining injuries when materials fall under their work benches and they try to pick them up, or when they try to replace broken shaft belts. Needle guards were also not used.

Bettenson (1998) identified the driving mechanism and needle as the main hazards of the sewing machine and these devices are usually fitted to the machines when they are purchased.

5.5 Findings describing the ergonomic and psychosocial conditions

5.5.1 Ergonomic Conditions

One of the objectives of this study was to assess and describe the ergonomic and psychosocial conditions in small businesses involved in clothing manufacture in the Gaborone area. According to M.J. Smith (1998), industrial ergonomics is the science of fitting the work environment and work processes to the capabilities, dimensions and needs of workers and the goal is to increase the fit among employees to the environment in which they work, the machines and tools they use, work methods and tasks.

When ergonomic principles are not applied in the workplace, workers are exposed to health problems which M.A. Ayoub (1990) characterized as ergonomic deficiencies manifesting themselves in extreme posture, excessive force, psychosocial disturbances, static loading, pain, discomfort and high incidence of occupational disorders. Whereas human beings may be able to adjust to less optimal working postures and tolerate physical stress, eventually the cumulative build-up of stresses has a negative physical and mental effect on the worker, work efficiency and output (Scott P.A, 1997).

Furthermore, a study conducted in Zimbabwe found that the most common perceived risks among small enterprises and informal sector workers in both manufacturing and agriculture were loads, chemicals and dusts and work postures (Loewenson, 1994) and workers suffered from respiratory problems, MSDs and injuries as a result. Hence the ergonomic and psychosocial conditions assessed in the present study related to the workstation design, seating, use of machinery and tools, manual material handling and storage and the provision of facilities to enhance the well-being of workers.

Results have shown that work in the businesses studied is labour-intensive and workers perform multiple and repetitive tasks including pattern-making, cutting fabric, over locking and sewing,

finishing, packaging and delivery to customers. There are also manual handling tasks requiring workers to bend and lift rolls of fabric for cutting, lifting and shifting heavy machine tables to allow for clean-up and maintenance. The cutting and ironing jobs involve long hours of standing and bending especially if work tables are not of appropriate height. Findings of this study show that most of the workplaces (80.6%) used low cutting and ironing tables which caused workers to bend while working.

Though a tailor occasionally did some sewing which eased off the strain of standing, much of the working day was spent standing and doing pattern drafting and cutting assuming awkward bending postures. Standing for long periods of time while working can cause back pain, leg swelling, blood circulation problems, sore feet and tired muscles (ILO: Your Health and Safety at work: Ergonomics).

According to ILO ergonomic standards, work surface height should be at or below elbow height so that the worker can work with the upper arms at his sides and without excessively bending or twisting the back to perform task 20-30 cm in front of the body. Where the table is not height-adjustable, a pedestal can be used to raise the working height or a platform can be provided on which shorter workers can stand. There should also be a stool to sit and rest when tired and a footrest under the table to enable the worker to change positions and shift his weight frequently to reduce strain on legs and back (ILO: Your Health and Safety at work: Ergonomics).

Though the majority of the sewing machines used in the workplaces inspected were on height adjustable tables and therefore acceptable, most workers and owners neither knew this nor used them as such. An evaluation of the types and design of the chairs used showed that they were not suitable for the prolonged sitting work of a machinist. The chairs were not height adjustable and in some workplaces plastic garden chairs on which pillows were stacked to increase height and comfort were used. Chair seats had neither cushions nor back rest. Hence, lack of knowledge to adjust tables and awkward postures due to poor seats elevated exposure of workers to the risk of developing MSDs such as lower back pain, shoulder and neck pain.

To fit the worker, the machine table height must be adjusted for the work surface to be just at or below elbow height so that the arms can rest and work on it without strain. The chair height

should be adjusted to fit the worker's leg length and the work table so that when seated, the work surface is approximately at the same level as the elbows while the feet are flat on the floor to provide adequate support. The chair should also have a back rest to support the back of the worker when seated, keep it straight and relax the shoulders. There should also be adequate room under the table so that when seated, the workers can easily move and change leg positions to reduce strain (Juul-Kristensen & Jensen, 2005).

Parimalam et al, 2007; 2008) found that work in the garment industry is highly repetitive, time-pressured and high-paced and inappropriate workstation designs and chairs and poor postures resulted in high rates of MSDs among machinists and other workers in the industry. The seat arrangement with regard to proximity to the electric motors which pull the sewing machines was also found to be important. Studies conducted by Sobel et al. 1995 cited Plattus & Herbert, 1998) have suggested that there may be an association between increased levels of Alzheimer's disease and other chronic diseases found among sewing machine operators and their exposure to high levels of electromagnetic fields (EMFs) generated by electric sewing machine motors.

5.5.2 Psychosocial conditions

According to Kari Lindstrom (2003), psychosocial factors including time pressure, social interaction at work, worker ability to control his work situation and availability of amenities such as eating rooms, rest corners, toilets kept clean are all sources of stress for workers as they influence their well-being. When not provided optimally, these conditions become psychosocial stressors manifesting themselves in fatigue, depression, irritability, job dissatisfaction and insecurity. An assessment of the results of the present study has shown that small businesses took some positive steps to improve worker well-being by preventing work isolation, providing clean drinking water and access to clean toilets.

However, results also showed that work in small enterprises is highly repetitive, high-paced and monotonous and overall employers do not provide short breaks to rest in addition to one lunch break and workers have no control over this. Workers do not have rest rooms to stretch and relax. All of this elevates the risk of stress, accidents and injuries. Kortum and Ertel (2003) held

that workers find their jobs particularly stressful if they must put up with very fast pace, when the job is repetitive and they are not able to take further breaks on their own. Furthermore, eating rooms are not provided and in some cases workers eat and cook in their workplaces risking contamination of their food with chemical dusts and fibers. ILO (2002) estimates that in Sub-Saharan Africa 1294 persons died of work-related digestive systems diseases in 2002.

5.6 Compliance to occupational health and safety standards

One of the objectives of this study was to investigate and describe the level of compliance by small businesses involved in clothing manufacture with OHS standards as set by ILO convention 155 (1981) and Recommendations 164 and the Factories Act Cap 44:01 (1979) of Botswana and regulations thereof. An evaluation of the study results has revealed that very few employers made efforts to comply with their obligations towards employees to ensure as far as practically possible a health and safe work environment. Only 25% of the study sites scored positively obtaining between 5-9 of the 10 variables measured and scored.

Compliance with general cleanliness was acceptable in so far as housekeeping was good (63.9%), provision of clean sanitary conveniences (97.2%), good water drainage and access to clean water. But there was no compliance with regard to the provision and maintenance of clean washing facilities and accommodation for workers' clothing not worn during work as prescribed by SS 46 – 50 of the Factories Act. These facilities were not available in all workplaces including the Gaborone City Council workshops.

Evaluation of compliance level also showed that there was almost a total absence of fire and emergency preparedness. Results indicated that workplaces lacked fire-fighting equipment, had neither emergency exits nor first aid facilities. There was also a very low level of compliance with the PPE requirement of S. 54 of the Factories Act. These findings are consistent with results reported in earlier studies. A survey of health and safety conditions in the informal sector in Dar es Salaam found that the sampled clusters lacked PPE and also used inappropriate working equipment and tools (Tornberg et al. 1996). Interestingly, Niewohner et al, 2004 cited MacEachen et al, (2008) found that workers may resist the use of PPE if this interfered with work process, for example if gloves make hands sweat and impede handling of garments.

Employers are obliged to comply with standards set by the Factories Act and S. 16 of ILO Convention 155 by checking the workplace and machinery regularly for hazards and any hazardous materials and if possible remove them completely or mitigate their effect. And workers must be trained in safe working procedures, safe use of machinery and equipment and be supervised during operations (S. 29 Factories Act). The researcher assessed compliance level and found that none of the workplaces had a culture of identifying hazards, assessing and managing risks. There was 100% non-compliance. Another 88.2% non-compliance gap was found with regard to training while supervision was shown to be limited only to output and not to work processes.

Research has sought to explain these failures. According to Champoux and Brun (2002), workers and employers in small enterprises may have different interpretations about the sources of hazards in the workplace and their solutions. They may also have a different understanding of their responsibility for OHS in the workplace. Thus, employers may often perceive employees as the cause of accidents or responsible for injuries they incur in the course of their work. In their survey of OHS in the informal urban sector in the Delft in South Africa, Van Niftrik et al. (2003) found that lack of knowledge often made workers to consider hazards not dangerous to their health and not capable of causing disease. Moreover, because workers are not organized in unions and there are no clear employer/employee relationships in these businesses, there is little enthusiasm to provide improved working conditions and for workers to demand them. In addition, workers and employers often entertain personal social relations in the workplace which may lead to reluctance to recognize the hazardous nature of the work environment and to regard the risk management as the sole responsibility of employees (Mac Eachen, 2008).

The findings of the present study also show that all employers were not complying with the administrative requirement stipulated in SS 62 – 63 of the Factories Act to post an abstract of the Act in the workplace to inform everyone of their duties with regard to OHS, and to keep a register containing inter alia the certificate of registration as a factory and details of notification of accidents, dangerous occurrences (S. 57). Aragon et al, 2001 cited MacEachen et al. (2008) were of the view that this gap can be explained by the fact that such small businesses usually

operate without formal work systems such as human resource workers, secretaries to tend to correspondence and records and as a result will also lack systems for OHS.

Other studies show that owners and managers of small businesses may not know or remember rules and regulations relating to OHS. And this may be explained by lack of adequate training in OHS, time and resources to comply with their OHS duties as well as the fact that they often prioritize the need to survive by ensuring maximum output at minimum costs (Rantanen, 1998; Glass, 1998; Eatkin et al. 2003 cited MacEachen, 2008).

From this emerges the question posed in the literature review as to whether OHS rules and regulations should apply to small and informal businesses at all; whether if such application was made, that the employment-creating impetus of this sector will be threatened or lost. The current study shows that this is not the case as the OHS legislation in Botswana applies equally to small enterprises which fall under the interpretation of "factory." In fact these studies show that OHS interventions for small businesses do not worsen their situation.

CHAPTER 6

6. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

In this chapter, the researcher presents a summary of the study, a conclusion reiterating the main results of the study and proposes recommendations that emerged from the results.

6.2 Summary

The aim of this survey was to assess the extent to which small-scale enterprises involved in clothing manufacture in the Gaborone area of Botswana were complying with universal OHS standards so as to provide a first insight into the status of health and safety in these workplaces and propose interventions to improve workplace health and safety, productivity and hence the well-being of both workers and employers.

Small-scale enterprises constitute a sizeable portion of the workforce in Botswana and with limited resources; they remain most vulnerable and prone to concern themselves with sustainability in business rather than the provision of a healthy and safe work environment. This provided an important motivation for the study. Moreover, there was a realization that these workplaces fall within the ambit of the Factories Act Cap.44:01 of 1979 and regulations thereof that constitute the OHS legislation in Botswana but inspections provided for by the Act to enforce compliance as well as reporting systems were limited or absent so that OHS conditions

in the workplaces remained uninvestigated and the extent of accidents, injuries and the prevalence of work diseases also remained unmeasured.

The socio-demographic characteristics of the businesses that were surveyed revealed that their sizes were very small in terms of the number of persons employed (a mean of 3 persons) but well within the definition of small-scale enterprise adopted in this study and the 1-6 persons adopted in Botswana Government Paper No.1 of 1999. Employers in the industry were mostly self-employed and dominated by females who also constituted the bulk of employees, thus raising the problems of exposure of women to MSDs and pregnant women as well as children to the hazards of the industry. The workplaces surveyed did not employ children or persons below the age of twenty. In addition, workers were not organized, had no control over work processes, and exerted little or no influence over employers, a factor that exacerbate the precarious OHS conditions in their workplaces.

The nature and types of work processes among the small business studied were assessed and showed that work in these enterprises is labour-intensive involving long hours of standing for those designing, cutting, ironing and sitting for machinists. These are jobs that expose workers to MSDs. Workers handled various types of fabrics and cutting and sewing produced fabric dusts as well as fabric wastes containing harmful chemicals. In addition, businesses did not specialize in any specific line of production but took on several product ranges in some cases completely switching to upholstery thus constantly changing work procedures and organization and increasing workloads all of which expose workers to fatigue, stress, accidents, injuries and elevated risk of MSDs.

Findings further showed that workplaces generally put in an acceptable 8.25 average hours of daily work but workers operated 5 hours in the morning and 3-5 hours in the afternoon continuously doing repetitive and high-paced work with only a one-hour lunch break without short breaks in between thus significantly augmenting the risk of developing MSDs and sustaining injuries.

The physical and environmental conditions in the workplaces were investigated and assessed and they were found to be generally complying with requirements for cleanliness and provision of

sanitary conveniences. An acceptable proportion of workplaces had good housekeeping and sanitation, all provided toilet facilities that were kept clean. Escape ways were mostly free of obstacles and work areas were to an acceptable extent cleared to enable free movement of workers. However, workplaces were small in area while all operations took place in a single room with inadequate storage leading to overcrowding.

Further, findings also revealed that the workplaces had inadequate ventilation and poor lighting in part due to structural defects as windows were either too few or small and in part because artificial lighting was inappropriate. For example, localized lighting was not used on sewing machines even though work on them involved fine and detailed finishes of garments and feeding needles with thread. This exposed workers to eye strain and headache. In addition, artificial ventilation was generally limited thus exposing workers to excessive heat.

Results of this study show that workplaces used poor electrical connections and had entangled electrical wires in their work areas exacerbating the risk of fire, burns, electrical shock and electrocution. Results also showed a very low level of fire and emergency preparedness as no workplace had a first aid kit and an insignificant number had fire-fighting equipment. Workplaces involved in clothing manufacture were also found to be affected by hazards from neighbouring sites which they were generally unable to control. In the City Council clusters where the majority of sites inspected were concentrated, clothing manufacture was sandwiched between carpenters, battery charging and welding businesses. Workers in these sites were thus exposed to multiple exposures such as welding fumes and particles, wood dust and lead from batteries and excessive noise from steel cutting grinders and woodworking machines.

An evaluation of the findings also came to the conclusion that overall small businesses in clothing manufacture in the Gaborone area did not use protective clothing and equipment. Workers were not provided with overcoats, dust masks, earplugs and thimbles and were thus exposed to fabric dusts, excessive machine noise, needle pricks and other injuries. Moreover, the study also showed that sewing machines were in most cases not guarded exposing workers to injuries and accidents. Employees did not have protective gear against hazards from neighbouring sites.

This study surveyed the ergonomic and psychosocial conditions in the workplaces and the findings show that work was repetitive, high-paced and involved long hour of work standing, sitting or bending. But the workstations and chairs were not of appropriate design for the nature and type of work. Most workplaces used inappropriate and low cutting and ironing tables causing workers to assume awkward bending postures while standing for long hours. Machinists did not know the machine benches they were using were height-adjustable implying lack of training in the use of equipment. The chairs used were low and not height--adjustable, had neither seat cushions nor comfortable back rests and thus was unsuitable for the prolonged sitting work of machinists. The use of inappropriate workstations and chair designs expose workers to a high risk of MSDs.

An evaluation of the results of this study also concluded that workers in the small-scale clothing manufacture may be exposed to psychosocial stressors. While some minimal conditions such as clean water, toilets and freedom of workers to interact with each other were provided to enhance worker job satisfaction and well-being, workers were not organized and did not have the capacity to control their work situation and thus obtain improvements in their workplace health and safety. In addition, they worked without short breaks, lacked eating and rest room or corners and either ate and rested outside under harsh weather conditions or in the workplace. These are psychosocial stressors that often manifest themselves in fatigue, depression, irritability, job dissatisfaction and insecurity.

When businesses were evaluated for their overall levels of compliance with OHS standards prescribed by the ILO and the Factories Act, the results showed an acceptable level of compliance with standards for cleanliness and sanitation. However, employers were generally not complying with fire and emergency standards and requirements for the use of PPE, maintenance and guarding of machines.

There was also non-compliance with the requirement to identify, remove or mitigate hazards in the workplace. Employers did not comply with requirement to train and supervise employees in safe work procedures and use of workstations and machinery. Results revealed that employers were not complying with requirements to display an abstract of the Factories Act in the

workplaces and keep a register of documents and details about accidents and dangerous occurrences and notification of diseases.

In his cross-sectional survey of occupational health and safety in small, medium-sized and informal sector enterprises in Vietnam, Nguyen Thi Hong Tu (2003) compared the number of workers suffering from occupational diseases by industry and found that the garment industry accounted for 17.3% and drew the conclusion that the work environment and working conditions in small enterprises including the garment industry constituted risks to workers' health. Loewenson's study of small-scale enterprises and the informal sector in Zimbabwe (Loewenson, 1995) also concluded that work in these workplaces was unhealthy, unsafe and precarious. Much of the findings of the present study are consistent with these conclusions.

6.3 Conclusion

The gap in compliance with OHS standards as revealed by the results of this study constitutes a significant source of health problems for workers in the small-scale clothing industry in Botswana. This gap also serves to confirm conclusions drawn from the literature review and shows that there is a need to introduce improvements in practically all areas of OHS in these workplaces, beginning with assistance to and training of workplaces in the benefits of OHS and basic OHS culture and organization that will enable them to accept the need to provide first aid kits, fire-fighting equipment, PPE and training in their use; redesign work benches and provide appropriate work chairs and train them in their use. This will ensure a healthy and safe work environment that enhances the physical, mental and social well-being of employees as well as increase productivity and profitability for the employers.

6.4 Recommendations

Based upon the results of the present survey and the conclusions that emerged, the researcher proposes the following recommendations that will enable businesses involved in clothing manufacture in the Gaborone area of Botswana comply with basic OHS standards:

- The structures in Ginger Market, Extension 14 and Gaborone West accommodating most of the businesses surveyed are provided and maintained by the Gaborone City Council. Structural alterations are required to introduce some engineering controls:
  - All the structures have windows only on one side and these are not of appropriate size. The Council can either enlarge them or open additional windows on the other side without any real damage to the structure. This will improve ventilation and natural lighting.
  - The Council should rearrange the electrical distribution in the workplaces by providing more sockets or outlets appropriately along the walls as a safe way of providing electrical power to machines and tools thus removing the entangled electrical wires hazard. This improvement is also valid for workplaces in commercial areas.
  - The City Council should carry out repairs in the structures to ensure that floors are smooth and of safe condition for work.
  - The City Council should use the ample space available in all the clusters to provide washing facilities and eating/rest room for workers.
  - The Gaborone City Council By-laws prohibit work outside the workshops but given their small sizes welders and carpenters do their work in the front as well as the back areas. To remedy the situation and avoid multiple exposures and facilitate promotion of OHS, the City Council should relocate clothing businesses which are larger in number to two clusters while carpenters and welders retain one cluster for example Extension 14 which should be refurbished to suit the type and nature of their business.
- Enforce compliance to basic OHS regulatory requirements pertaining to the provision of first aid kits and first aider, fire-fighting equipment, protective clothing and equipment and training in and supervision of their use.

- There is need for the adoption of a new more comprehensive OHS legislation that includes provisions adapted to the characteristics and needs of small and informal enterprises and introduction of incentives to induce the adoption of OHS culture in their business practices. Research shows that small enterprises will benefit from multi-faceted workplace interventions such as combining training with safety audits; engineering out of hazards and incorporating incentives into their programmes (MacEachen et al, 2008).

  - There should be provision for small businesses to group themselves into small bodies by sector and create their own health and safety committees with elected members representing employers and workers who are then trained in basic OHS procedures by the Department of OHS of the Ministry of Labour. Training will constitute an incentive to offset the inability of these businesses to finance OHS as well as a relief on the inspection tasks of Factory inspectors since the committees will operate to ensure compliance – a kind of shared responsibility system. This approach has been implemented successfully in Sweden (Antonsson et al, 2002). The Self-employed Women's Union (SEWU) in Durban South Africa is a good example of such grouping.

  - There should be provision for the training of small businesses in the application of ILO-OSH 2001 management systems to small enterprises as well as Work Improvement in Small-Scale Enterprises (WISE) methods of using local materials to introduce simple and low-cost OHS improvements in the workplace. These methods are being applied successfully in Ghana, Kenya, Tanzania, Philippines and Vietnam (Muchiri, 1995; Salter, 1998; Rinehart, 2004). Thus small clothing businesses in Gaborone can use available 50mm steel square tubes and melamine hardboard to make cheap and appropriate height-adjusted cutting and ironing benches fitted with simple and easily removable platforms on which shorter workers can stand. Foot rests can easily be fitted using screws so that they are also adjustable. The same idea can be used to design and make appropriate work chairs. These are ergonomic improvements that are easily arrived at and implemented with the participation of employers and employees. In addition, basic training will empower small businesses to recognize the benefits of adopting OHS culture and induce them to provide basic OHS needs such as first aid kits, fire-fighting equipment, PPE and

supervision in their use and regularly maintain machinery and equipment and provision of additional short breaks for workers to rest.

- Reorient and retrain Factory inspectors in OHS standards to adapt their work to the characteristics and needs of small businesses so that while checking the availability of first aid kits, fire-fighting equipment, they can assess and advise workplaces on the physical, chemical and ergonomic conditions to facilitate improvements.

❖ Promote the use of day-care services for poor people to help working women given that that the owners of businesses surveyed were mostly self-employed women employing mostly women. Thus the Young Women Christian Association (YWCA) and the Botswana Women's Association (BWA) can be assisted by Government to expand their day-care services to poor families and provide reliable and affordable childcare to enable mothers to work. This will lighten financial burden and time constraints and focus mothers on matters such as OHS conditions in their workplaces.

❖ There is a need to further investigate the work-related health problems among workers in the small-scale clothing industries in the Gaborone area.

6.5 Limitations of the study

A limitation of this study is that it concentrated only on small-scale businesses involved in clothing manufacture but most of these businesses were found to be sandwiched between different ones including carpentry, welding, and battery charging with varying types of exposures. The OHS conditions in the latter were left unexplored. A larger all-inclusive survey would have given a more comprehensive picture of OHS conditions in the small-scale and informal industries. In addition, clothing businesses operating from residences were not included in the study due to difficulty in gaining access to them. Even though there is no available estimate of their number, including them in the study would have also provided a more complete picture of OHS conditions within the small-scale clothing industry in the Gaborone area of Botswana.

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APPENDIX 1

Checklist for workplace inspection for improving the health, safety and working conditions

HOW TO USE THE CHECKLIST

Each work area to be checked will be defined and the appropriate measures to be introduced for improvement will also be defined, i.e.

(a) If the measure is *"in place"* (meaning it is acceptable and in good working condition), a tick will be put under the column (Yes).

(b) If the measure is *"not in place"* (meaning it is needed and therefore the improvement is necessary), a tick will be put under the column (No).

(c) If the measure is "*not needed and not relevant"*, a tick will be placed under (Not applicable).

(d) Comments based on observations made and from the available employees for the purposes of clarification will be listed under the column for (comments).

SECTION A. GENERAL INFORMATION

1. Name and address of enterprise: ……
2. Main products manufactured……
3. Nature and type of work processes/activities
   ……
   ……
   ……
4. Total number of employees……...
5. Age ranges for employees (minimum and maximum) …….
6. Ratio or gender distribution of employees……..
7. Total hours of production per day: …….
8. Work schedule

   Office: From……To…….

   Production:

   Day shift from……To……..

   Afternoon shift from……To……..

   Night shift from……To……..

9. Break periods for production workers

   Morning break: ……minutes

   Lunch break: ……minutes

   Afternoon break: ……. minutes

10. Work areas for this inspection……

Name of inspector (researcher)……Date……

SECTION B. GENERAL WORKPLACE CONDITIONS

General workplace conditions **Q 201 – Q 207**	**Yes = 1**	**No = 0**	**N/A = 3**	**Comments**
Provided at least 2 emergency exits with visible emergency signs				
Escape ways are free of obstacles				
Adequate clearance to or accessibility for performing tasks provided				
Floors and walkways are even and not obstructed				
Ceiling adequately raised to reduce noise reflection				
Provided enough appropriate fire extinguishers				
Provided First Aid Kits and first aiders				

SECTION C. PHYSICAL AND ENVIRONMENTAL CONDITIONS

Physical and environmental conditions **Q 301 – Q 313**	**Yes =1**	**No = 0**	**N/A = 3**	**Comments**
Convenient storage for tools, raw materials and products provided				
Wastes and other unnecessary materials are cleared from workroom				
Adequate waste bins for different types of wastes are provided				
Proper drainage of waste water provided				
Entangled electrical wiring connections				
Switch boxes are covered				
Increased natural ventilation by having more windows or doors in good working condition				
Provided artificial ventilators, electric fans, or air conditioners to				

have good air flow				
Properly located machines or skylight positions to improve daylight conditions				
Improved general artificial lighting or provided spot lighting				
Maintain and adjust machines and tools to reduce noise				
Control hazards from neighboring sites				
Remove dust using local exhaust				

SECTION D. ERGONOMIC AND PSYCHOSOCIAL CONDITIONS

Ergonomic and Psychosocial conditions **Q 401 – Q 416**	**Yes = 1**	**No = 0**	**N/A = 3**	**Comments**
Avoid bending postures for standing workers by raising height of equipment controls or work surfaces				
Avoid work requiring high hand positions for standing workers by providing foot stands or platforms				
Provide work tables of suitable height for seated workers to avoid too high or low hand positions				

Provide chairs of correct height or make seat height adjustable				
Chose seat surface and cushion for comfort and support				
Provide chairs with back rest of proper size to support lower back				
Place frequently used materials & tools within reach of workers				
Chose tools of appropriate size & shape for easy and safe use				
Make sure machines & tools are maintained and repaired properly and no worn-out tools are used				
Change workstations to allow workers opportunity to get ahead of schedules and take short pauses				
Enable workers to talk with each other while working to avoid isolation				
Avoid too long daily working hours				
Consider inserting short breaks in addition to a long break for meals				
Provide comfortable room for workers to eat, and provide clean drinking water				
Provide adequate toilet facilities close to the work area				
Ensure toilet facilities are regularly cleaned and are in good				

sanitary condition				

SECTION E. PROTECTIVE CLOTHING AND EQUIPMENT

Protective clothing and equipment **Q 501 – Q 504**	**Yes = 1**	**No = 0**	**N/A = 3**	**Comments**
Provide protective overcoats and aprons				
Provide masks, ear plugs, thimble and gloves				
Maintain and replace protective equipment regularly				
Use built-in guards or other built-in hazard reduction controls wherever possible to replace personal protective equipment				

SECTION F. COMPLIANCE TO OHS STANDARDS

Note: Responses from observations and inspection of the relevant documents will be indicated by means of "**Yes = 1**, **No = 0** or **Not Applicable = 3**"

	DUTIES OF EMPLOYERS TO THEIR EMPLOYEES Q601-Q610	**Yes**	**No**	**N/A**
1	Is a working environment provided which is safe and without risk and is it maintained?			
2	Are plant, machinery and systems of work provided that are safe and without risk?			
3	Has the employer eliminated, mitigated and managed the hazards?			
4	Are attempts made to first eliminate the hazards before resorting to PPE?			
5	Are hazards identified, evaluated and controlled (Risk Assessment)?			
6	Are all measures taken to ensure legal compliance by persons (employees and other persons) on the premises under the control of the employer?			
7	Does the employer provide SWP (Safe Working Procedures)?			
8	Does the employer provide instructions in respect of the use of plant, machinery and substances?			
9	Does the employer provide training?			
10	Does the employer provide supervision?			
	CATEGORY 2: ADMINISTRATIVE COMPLIANCE	**Yes**	**No**	**N/A**
	COPY OF THE ACT (Q 701)			
1	Is there a copy of the Occupational Health and Safety Act readily available for anyone wishing to view it?			

FIRE AND EMERGENCY COMPLIANCE (Q 801 – Q811)		**Yes**	**No**	**N/A**
	FIRE PRECAUTIONS			
1	Have adequate precautions been taken to prevent the outbreak of any fires?			
2	Is all equipment and machinery so installed, operated and maintained to prevent an outbreak of a fire?			
3	Has adequate fire-fighting equipment been provided?			
4	Is every escape door so constructed that it can open outwards?			
5	Are all escape doors kept clear?			
6	Can all escape doors be easily opened from inside so as to ensure quick and easy evacuation?			
7	Are all staircases and steps leading from one floor to another or to the ground provided with substantial hand rails?			
8	Are all staircases intended to be used as fire escapes constructed of non-combustible material?			
9	Are all staircases intended to be used as fire escapes kept clear of any material or other obstruction?			
10	Are all staircases intended to be used as fire escapes so designed that they do			

	not terminate in an enclosed area?			
11	Are all staircases, passages and exits intended for escape purposes of a width and of a gradient which will facilitate the quick and safe egress of the number of persons intended to make use of them?			
12	Where reasonably practicable, are all relevant rooms provided with at least two means of egress situated as far apart as is practicable?			
	MAINTENANCE OF FIRE FIGHTING EQUIPMENT (Q901 – Q 904)	**Yes**	**No**	**N/A**
1	Has all fire-fighting equipment been maintained and inspected at least once every three months?			
2	Has a person been appointed in writing to ensure that fire- fighting equipment is maintained in a good working condition?			
3	Is all fire-fighting equipment being serviced at least once every nine months? (inspect registers)			
5	Has each fire extinguisher been clearly marked with the date of the last inspection?			

Any other relevant information or clarification:

APPENDIX 2 Summary statistics

Table 1 Summary statistics for demographic and production information

		Main products manufactured:	Nature and type of work processes/activities	Total number of employees	Age of youngest employee	Age of oldest employee	Number of Female Employees	Number of Male Employees
N	Valid	36	36	36	36	36	36	36
	Missing	0	0	0	0	0	0	0
Mean		2.00	7.00	2.78	28.19	43.8889	2.06	1.00
Std. Error of Mean		.154	.120	.282	1.715	1.16345	.261	.169
Median		2.00	7.00	2.00	25.00	40.0000	1.50	1.00
Mode		2	7	2	20	40.00	1	1
Std. Deviation		.926	.717	1.692	10.292	6.98070	1.567	1.014
Variance		.857	.514	2.863	105.933	48.730	2.454	1.029
Range		3	3	7	35	25.00	7	5
Minimum		1	5	1	20	30.00	0	0

Maximum	4	8	8	55	55.00	7	5
Sum	72	252	100	1015	1580.00	74	36

Table 2 Summary statistics for production time, work shifts and size of workspace

		Total hours of production per day	Day Shift: From 8 Am To 1 Pm	Afternoon Shift: From 2 pm To 5/8 pm	Night Shift	Morning Break minutes	Lunch Break minutes	Afternoon Break minutes	Size of work area for this inspection (1--Small, 2--Medium, 3--Large)
N	Valid	36	36	36	36	36	36	36	36
	Missing	0	0	0	0	0	0	0	0
Mean		8.25	5.00	3.31	.00	1.25	60.00	.00	1.94
Std. Error of Mean		.092	.000	.096	.000	.701	.000	.000	.119
Median		8.00	5.00	3.00	.00	.00	60.00	.00	2.00

Mode	8	5	3	0	0	60	0	2
Std. Deviation	.554	.000	.577	.000	4.205	.000	.000	.715
Variance	.307	.000	.333	.000	17.679	.000	.000	.511
Range	2	0	2	0	15	0	0	2
Minimum	8	5	3	0	0	60	0	1
Maximum	10	5	5	0	15	60	0	3
Sum	297	180	119	0	45	2160	0	70