

Effectiveness of workplace wellness programmes on Accident prevention in the Mining Industry. A case of Pretoria Portland Cement, Colleen Bawn Mine, Zimbabwe

BY

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Dissertation submitted to the Department of Geography and Environmental Studies in partial fulfillment of the requirement of Masters of Science in Safety, Health and Environmental studies

MIDLANDS STATE UNIVERSITY

MAY 2017

Our Hands Our Minds Our Destiny

APPROVAL FORM

I **R0331768**, declare that this dissertation is my original piece of work and has been prepared in accordance with the guidelines of the Masters in Safety, Health and Environmental Management programme, Midlands State University. I also affirm that, this work has not been submitted elsewhere in part or in full for any other degree at any University.

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Chairman of the Department of Geography and Environmental Studies, Midlands State University _____

Signature _____

Date: _____

External Examiner

Signature _____

Date: _____

DEDICATION

I dedicate this research to my entire family the dead and the living, and to My Wife my kids Valentine Munashe Jnr, Godknows Junior Munashe, Tadiswanashe and all the inspiration your father gives you. I dedicate this to my fellow friend and workmates. Special dedication goes to my research assistant Wilfred Sithole for the courage and inspiration to take part in research in a completely new field.

ACKNOWLEDGEMENT

I acknowledge everything first to God, the Almighty. I would like to thank Mr Ollie Iverson, my entire family, PPC Management and members of the employees for the support, all my lectures, my research assistant (Wilfred Sithole) my supervisor Mr Murewi, my colleagues and friends for the financial, technical and emotional support given during the project and entire study.

ABSTRACT

Mine accidents are one of the major contributors to occupational health problems faced world over. Various initiatives have been rolled out to deal with mine accidents including implementation of workplace wellness programs as a way to reduce and prevent accidents. This study assessed the effectiveness of the workplace wellness programs in accident prevention. The researcher identified wellness programs implement at PPC and analyzed the trend and differences in accident levels between groups with and without wellness program. Employees' perception about wellness programmes towards accident prevention was also assessed. The study employed a triangulation methodology for data collection. This included both qualitative and quantitative data collection instruments to achieve the study objectives. Study findings revealed that employees perceive workplace wellness programs effective in accident prevention. The results also revealed that there are significant differences in accidents between clusters which were subjected to wellness programs and those which were not. The research thus concluded that wellness programs are effective in accident prevention.

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CHAPTER ONE

1.0 Introduction

Wellness programmes have been talked of as the final missing link or approach in occupational accident prevention through the promotion of the well-being of employees Chapman (2007). The programs are thought to eliminate the weaknesses of the physical, chemical, biological risk factors and then consider comprehensive psychological risks and human factors in accident reduction ComCare Report (2012).

Workplace wellness programs involve a set of comprehensive facilities set to improve employee wellness. The programs include a range of facilities such as health protection facilities put in place at workplaces (Bill, 1976). Wellness programmes are also explained as the ongoing and varied strategies that are meant to make employees understand the importance of promoting their own wellness (Horwitz et al, 2013). It includes learning new life skills that address both the positive and negative aspects of human existence, in order to prevent accidents. The Center for Disease Control (CDC) defines a workplace wellness program as “a health promotion activity or organization-wide policy designed to support healthy behavior and improve health outcomes while at work”. CDC went on to state that, workplace wellness programs can be both lifestyle, illness management and control strategies and may be implemented through group health plans or directed distinctly by the company. The wellness facilities can consist of a wide range of activities in the form of education and coaching on health issues, weight management, and guidelines envisioned to promote employee health, such as lunch and learn, providing on-site kitchens, healthy food options in vending, and offering incentives for participation.

(Mattke, et al, 2014) went on to support the CDC definition by bringing the health risk assessment (HRA) concept which he said, are the cornerstone of many wellness programs. The Hazard and Risk Assessment is a questionnaire that addresses activities and individualities, such as physical activities, diet, weight, smoking, blood pressure, and cholesterol levels, then gives the employer an opportunity to identify risk factors to target within a wellness program.

Over the past decade, the concept of wellness has expanded into seven dimensions and four major strategies or interventions. These dimensions are illustrated in the SPECIES model (that is Social, Physical, Emotional, Career, Intellectual, Environmental and Spiritual) (Bill, 1976), ILO

and WHO concurred with this putting more emphasis on emotional, intellectual and spiritual dimensions, with the view to reduce accidents

1.1 Background to the study

According to ILO, work related accidents includes accidents occurring while an employee is engaged in an economic activity, or at work, or carrying on the business of the employer leading to physical or mental occupational injury. Statistics provided by ILO show that on average, more than 337 million accidents happen at the workplace each year, resulting, together with occupational accidents, in more than 2.3 million deaths annually. Of the total work related mortalities occupational accidents contribute about 15%. Occupational accidents cost the world financially and non-financially (through serious effects of accidents on families and friends of the victim, change in behaviour, change in the quality of life and other psychological effects (ILO, 2016).

According to OSHA (2012) occupational accidents costs employers more than US\$1 billion per week through direct (including employee compensation, medical expenses and legal services) and indirect (including accident investigation and implementation of remedial measures, reduced productivity, training replacement workers, repairs and or replacement of damaged equipment, and costs allied to lower employee morale and absenteeism. This transcends to an economic loss of more than 6% of the world gross domestic product.

The unendurable costs of work related accidents have led to the responsible organizations to come up with measures and strategies to reduce the incidence of occupational accidents. World over training and awareness programmes, followed by SHEQ management systems implementation, have been at the center of accident prevention (Carrington, et al 2013). The strategies however were not effective enough as the number of occupational accidents continued to be high the world over.

The ineffectiveness of these strategies was attributed to narrow focus on the causes of workplace accidents. The measures only focused on safety from machines or equipment and prevention of hazards or danger arising from physical, chemical and biological agents and did not focus on human factors (that is psychological factors, stress and lifestyle as enshrined in the WHO/ILO

definitions of wellness.) and environmental factors (that is conditions caused by noise, vibration, temperature extremes and/or illumination) that have a bearing on the frequency of accidents.

As a result of the narrow focus of physical measures and consequently their ineffectiveness, labour organizations and other responsible institutions took into consideration human factors in a bid to reduce the number of occupational accidents and consequently to cut on the financial and non-financial costs of work related accidents. An example of strategies used included use of medical surveillance to ensure early detection of employee exposure to occupational related illnesses, which in some instance will result in accidents.

Most companies world over have implemented pre-employment, periodic and exit medical surveillance, depending on the occupational risk employees will be exposed to. The medical surveillance helped to a greater extent in trying to identify people who would have been affected by occupational diseases and in a way helped preventing accidents. However no much attention is being given to other illnesses that are not occupational illnesses but with potential to cause accidents if a person gets affected while at work, which the wellness programme can address (Carrington et al, 2013).

Like the physical measures, the consideration of human factors was not effective enough and the number of accidents continued to be high despite use of medical surveillance, training and awareness programmes, motivational theories, risk assessment, hazard identification and mitigation of risks. The ineffectiveness of these measures and strategies steered the search for new and better alternative approaches to occupational accidents reduction leading to the birth of workplace wellness programmes as another dimension of a comprehensive approach to augment the preceding programmes in trying to prevent accidents and enhance productivity at work places as well as giving the population or workforce a safe, health, quality and longer life (Bill, 1976).

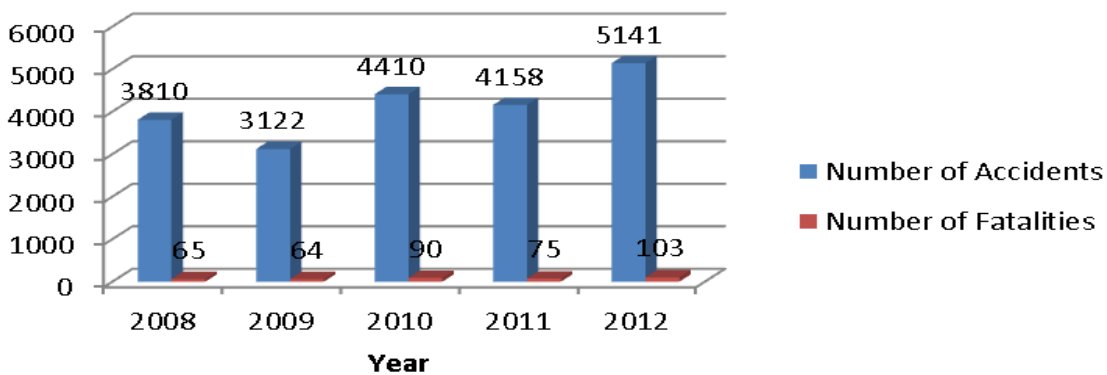
Workplace wellness programmes are coming in, to address gaps left by the aforementioned measures as they look at other conditions that can affect a person at work and result in accidents for example heart problems, cancer, smoking habits, drinking habits, epileptics, obesity, diabetic and other Liu et al (2013). Operation of machinery under the influence of alcohol and other narcotic drugs as well as stress all has bearing in causing work related accidents. Ignoring these issues by most countries' legislations often result in accidents. For example sudden shooting of

sugar levels can result in one falling from the ladder and cause fatal accident. This research is going to promulgate workplace wellness framework and laws that will enable workers to be screened for all other wellness conditions that are not work related and improve job placement criteria (Mattke et al, 2013).

Zimbabwe like all other countries has been faced with the challenge of high incidence of accidents mainly in the mining, construction and manufacturing sector. The number accidents show no sign of diminishing. In the year 2012, of the total number of accidents, 88% are attributable to human errors, 6% are attributable to machines and their design whilst ergonomical and environmental factors, such as poor visibility, heat, noise, dust and wet conditions, are responsible for four percent of accidents at the workplace and 2% is attributed to unavoidable natural events (NSSA OHS Report, 2012).

The high occurrence of accidents has cost companies and the economy a lot of million dollars on top of social costs to the country's nationals. For the years 2008 to 2012 the trend in work related accidents and fatalities were as shown in the figure 1.1.

FIG 1.1: Number of Occupational Accidents and Fatalities in Zimbabwe: 2008-2012



Source: NSSA OHS Reports 2008-2012

This study will focus on Zimbabwe's mining industry as it has recorded the most occupational accidents recently (year) due to the increased number of operational small mining companies

which are failing to meet safety and health standards due to economic challenges. In Zimbabwe there are more than 40 different minerals mined by more than approximately 800 mines. (CoM Report 2015). The sector employed about 70 000 people and contributed 17.8% to GDP in Zimbabwe in the year 2015. The industry had the highest projected growth rate in Zimbabwe pegged at 19.2%. From the foregoing it can be concluded that the mining industry has had a massive positive contribution to the country. However, the sector has had a negative impact through its contribution to occupational accidents in Zimbabwe of about 18% (ZIMSTAT 2015,).

According to a publication by the University of Zimbabwe (1998), the injury rate among mining workers in Zimbabwe was 131 per 1000 exposed workers per year as of 1997. This figure rose to 789/1000 workers in 2008 (NSSA OHS Reports, 2008).

As a result of the high incidence of accidents in the Zimbabwean mining industries, measures and strategies to reduce occupational accidents in the mining sector in Zimbabwe have also evolved in line with the changes that have been happening in the global industry specifically the mining industry. Work place wellness programmes have been implemented in some of the big companies in a bid to reduce the occurrence of occupational accidents. This study thus seeks to assess the effectiveness of these work place wellness programmes on accident prevention in the Zimbabwe Mining Industry through a case study approach with PPC Collen Bawn mine as the study population.

1.2 Statement of the Problem

A number of strategies (mainly the advent of workplace wellness programs) meant to restraint the occurrence of occupational accidents have been put in place in most companies. The advent of workplace wellness programs is generally believed to be a pertinent strategy that will go a long way in reducing the occurrence of work related accidents. The marginal contribution of workplace wellness programmes has not yet been clearly established as still there is still high incidence of work related accidents leading to substantial financial and social costs. A lot of questions have been asked by stakeholders, particularly workers concerning workplace wellness programs. To date the contribution of workplace wellness programmes on accident prevention has not yet been clearly established as there is no study ever done at PPC Collen Bawn, Zimbabwe and the world at large. Therefore it is against the stated challenges that the current

study seeks to understand the contribution of workplace wellness programmes to accident prevention at PPC Collen Bawn taking into account exposures groups (that is the group with wellness programmes and the group without wellness programmes)

1.3 Objectives of the study

1.3.1 Main objective

To assess the effectiveness of workplace wellness programmes towards accident prevention

1.3.2 Specific objectives

1. To identify the wellness programmes in place at PPC Collen Bawn
2. To analyze the trend in accidents between groups with and without wellness programs.
3. To determine the employees' perception towards wellness programmes for accident prevention.

1.4 Research Hypothesis

1.4.1 Main Hypothesis

H_0 = Workplace wellness programs are effective in accident prevention

H_1 = Workplace wellness programs are not effective in accident prevention

1.4.2 Specific Hypotheses

- H_0 = Employees perceive wellness programs as effective in accident prevention
 H_1 = Employees do not perceive wellness programs as effective in accident prevention
- H_0 = There are differences in the accident levels between clusters with and without wellness programs in place
 H_1 = There are no differences in accident levels between groups with and without wellness programs

1.5 Justification of the study

Studies have been done to determine effects of wellness programmes on reduction of costs in health insurance, stress levels, sick days, absenteeism, boosting worker's morale, increasing productivity but there have not been researches to determine the effects of wellness programmes on accident prevention and or its effectiveness. The research is going to fill in the knowledge gap on how workplace wellness programs contribute to accident prevention. The research is also going to determine the contribution of wellness issues to accident prevention. Therefore, this research is going to establish the framework for a comprehensive workplace wellness programme and implementation. The study will promulgate formulation of policies and laws that will enforce implementation of wellness programmes in Zimbabwe. It can also prompt ILO to look into coming up with a convention on workplace wellness.

1.6 Study area

The research was confirmed to PPC employees without any exclusion. PPC is into limestone mining and cement manufacturing; the study organization is situated in Matabeleland South province approximately 20km South East of Gwanda town see image 1. The company employees 179 people, with 9 on managerial level and 170 on non-managerial. The company implemented the wellness programme in the year 2004. The programme was allowed to run for 3 years and was temporarily suspended in the year 2007. The programme was later revisited in 2011, and the researcher started monitoring the programme in 2016 to determine the program's effectiveness in accident prevention. The researcher then produce analyzed results and recommendations for the benefit of the organization and the nation at large.



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CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter aims to review and discuss the theoretical concepts and propositions as well as the empirical literature in a bid to lay bare the issues surrounding work related accidents and the use of corporate wellness programs in preventing accidents.

2.1 Causes of Occupational Accidents

OECD (2002) defines an occupational accident as an unpredicted and unintended event, as well as acts of violence, arising out of or in association with work which results in a worker(s) suffering a personal injury, disease or death occurs in the course of a person's employment. Thus the accident should have arisen out of or in the course of work that is while engaged in an economic activity, or at work, or executing the business of the employer.

According to Gyekye (2010), occupational accidents are a result of two factors. These are the worker him or herself (that is individualities of the worker) and the external environment. SORM (2014), grouped work related accidents into three factors. These are human factors, situational work factors, and environmental factors. This study follows the classification by SORM (2014), in outlining the causes of occupational accidents.

2.1.1 Human Factors

Human factors causing accidents are those factors directly linked or attributable to the worker, personnel or operator involved in an accident. Studies show that human factors are responsible for a large number of accidents that occur in the workplace. In the case of Zimbabwe in the year 2011, of the total number of accidents, 88% were attributable to human errors (NSSA OHS Report, 2011).

2.1.1.1 Fatigue

Taylor (2000) suggested that, sources of fatigue include psychological stresses, and social stresses, and problems at work. According to HSE (1999) if workers have high levels of fatigue

as a result of straining workloads, errors by the workers are more likely to follow thereby resulting in accidents.

According to AHRM (2004) workers who sleep for less than 5 hours or have been awake for more than 16 hours, have higher chances of making errors at work due to fatigue and are consequently susceptible to accidents. In a study on relationship between length of driving and fatigue, Hakkanen and Summala (2000) revealed that, long distance drivers have high fatigue levels and often experience near misses and fatal accidents than those drivers who only drive for short times.

Results of a study by Dembe et al (2016), in the United States of America found out that working in jobs with overtime schedules was associated with a 61% higher injury hazard rate compared to jobs without overtime. The study also showed that working at least 12 hours per day was associated with a 37% and working at least 60 hours per week was associated with a 23% increased hazard rate in the USA.

2.1.1.2 Stress

The HSE's (2004), defines stress as “the adverse reaction a person has to excessive pressure or other types of demand placed upon them”. According to an EASHW (2011) observatory report it is estimated that over 400 000 people in the EU suffer from high levels of work-related stress.

In a study on the relationship between job stress and work related accidents, Trimpop et al., (2010), found out that as stress levels increase chances of getting involved in an accident also increases. These results are also supported by a study by Dimmer (1999), which shows a positive impact stress has on accident levels. The study results specifically showed that in cases where employees felt rushed and had lower life satisfaction levels, accident rates increased. Thus as Norris et al., (2000) also articulates, stress levels can be an unbiased predictor of future accident involvement.

Other human factors that lead to occupational accidents include individual characteristics (anger, temper, curiosity and the like), risk perception levels, attitude (negligence, arrogance, boldness, overconfidence and the like), personality, skills level, judgment and reasoning power and many more. These factors can result in human activities that highly that move off from hazard control

procedures that employees are expected to follow (Dimmer, 1999). This thus can result in high incidence of workplace accidents and this call for incorporation of programs or facilities meant to manage these human factors.

2.1.2 Situational Work Factors

Situational work factors relate to tools, machinery and ergonomical design of the workplace as well as training procedures.

2.1.2.1 Work Equipment

Machines and tools of types are commonly used in various workplaces, be it food processing plants, heavy mining equipment, heavy duty trucks or scaffolds in the construction sector. Work equipment accidents comprise of accidents caused by faulty or unsafe equipment, falls from height due to defective ladders, working platforms or scaffolding, accidents caused by sharp edges or broken parts of work equipment, use of equipment without protective gear, lack of proper training to use work equipment, unsafe use or use of unsuitable work equipment. In the united kingdom, the HSE (2005b) reports that workplace vehicles , machinery and equipment are the second highest causal factor of accidents in the workplace, resulting in approximately 70 workplace deaths each year in the UK. According to NSSA OHS 2011 report, in Zimbabwe in the year 2011, of the total number of accidents, 6% were attributable to machines and their layout.

2.1.2.2 Work Place Design

How the workplace is designed has a bearing on the occurrence of accidents. Williams and Priestley (1980) are of the view that the design of the workplace is the key contributor to high accidents rates since most of the occupational accidents occur to non-drivers. Thus they view the design of the place of work as a leading causal factor of workplace accidents. Williams and Pate et al (1995) in their study on occupational accidents pointed out that the design of the workplace is a common causal factor of occupational accidents.

According to Beasley (2011), the age of buildings and materials used in construction can cause accidents. For example ancient are roofed by asbestos, which in turn affect occupants, electrical wires and faulty wiring may lead to electric shock to office bearers. Beasley (2011) indicated

that, the main challenge is the creation of a dangerous workplace which is difficult to correct than initially designing a good workplace. It is therefore imperative that special attention is given to the design and economical working environment.

2.1.2.3 Training procedures

Poorly trained employees are a danger to themselves and those who they are working with, and this is not because they choose to be or act in a willfully negligent manner. The creation of workplace safety environment entirely depends on management support (Male, 2003) particularly in addressing the importance of training needs. Studies have indicated that many workplace accidents are associated with poor training practices. Steemson (2000) cited that case studies have proved that adequate training has an impact in reducing injuries sustained in lift truck accidents.

The importance accorded to training, development and continually improving competence led to significant reduction of accidents at workplaces. Accordingly employee training and development has received much attention in the accident prevention literature (Shannon et. al., 1997).

2.1.3 Environmental Factors

These are the third causal factor of accidents apart from human factors and situational work factors. They relate to causes of accidents that stem or arise from the close by environment that an employee works in such as visibility, temperature and the various sources of pollution. In Zimbabwe in the year 2011, of the total number of work related accidents, environmental factors, like poor visibility, heat, noise, dust and wet conditions, are responsible for 4 % of accidents at workplace accidents and 2% is attributed to natural unavoidable natural causes (NSSA OHS Report, 2011).

2.2 Costs of Occupational Accidents

Occupational accidents cost the world financially and non-financially (through serious effects of accidents on families and friends of the victim, change in behaviour, change in the quality of life and other psychological effects). According to OSHA (2012) occupational accidents costs

employers more than US\$1 billion per week through direct (including employee compensation, medical expenses and legal services) and indirect (including accident investigation and implementation of remedial measures, reduced productivity, training replacement workers, repairs and or replacement of damaged equipment, and costs allied to lower employee morale and absenteeism. This transcends to an economic loss of more than 6% of the world gross domestic product.

Occupational accidents cost the company, the accident victim, the victim's family, relatives and friends, the society and the whole nation. Most literature classifies costs of occupational accidents as direct costs (tangible and intangible) and indirect costs (tangible and intangible) (Mattke et al, 2013).

2.2.1 Direct Costs

Direct costs are directly related to the injury. They are a sum of costs associated with treatment and repair as well as costs of accidents like property damage, medical costs and production lost related costs. The cost of health care insurance in United States continues to rise as companies in the country struggle to contain the cost of health coverage. Mattke et al, (2013) noted that workplace wellness programs may be a way of mitigating the rising cost of insurance by improving employee health, reducing medical expenses through reducing demand for medical services, reduce insurance costs, and by increasing productivity, efficiency and absenteeism.

2.2.1.1 Damage on Property, Plant and Equipment

This direct cost refers to damages to company property and equipment (Access Economics, 2006). The financial expenses include equipment repairs, destroyed goods, clean ups, follow ups and legal fees.

2.2.1.2 Medical Costs

Most studies pointed out hospitalization, medical costs, and rehabilitation costs as the commonly incurred direct medical costs. These costs include all the incurred and projected costs for medical care to an accident victim and sick worker alongside the funds incurred medication and other accident related expenses (Optum Report, 2015).

2.2.1.3 Funeral Costs

Some work related injuries and occupational illnesses may be fatal. This result in a cost associated with organising a funeral earlier than what would have been normally the case (Optum Report, 2015).

2.2.2 Indirect costs

Indirect cost according to Andreoni (1986) refers to those costs not directly spent on treatment of the accident victim. These includes opportunity costs to the injured personnel and their families, production time, and society at large.

2.2.2.1 Productivity Losses

Accidents at the workplace have a significant negative impact on the productivity levels of the company. Thus occupational accidents lead to huge productivity losses (Andreoni, 1986). This is a result of reduced employee morale, absenteeism of the accident victims, damage to equipment and many more factors that leads to stoppage in normal production (Horwitz et al, 2013).

2.2.2.2 Reputation

Work related accidents, especially those that result in fatalities or significant damage to equipment, negatively affect the employee and the employer at large through bad personal and corporate image respectively as may be presented by the media. This has a negative bearing on the organisation's ability to secure new contracts/ tenders and recruitment of new skilled employees. To the accident victims it might have a bearing on promotions, training funding, and securing new jobs (Horwitz et al, 2013).

2.2.2.3 Administrative costs

Dealing with aftermath of the accident has many administrative costs. The costs are mainly borne by companies. The costs include investigation, recruitment, insurance, training of new employees until they perfectly match the injured person's skills (Optum Report, 2015).

2.2.2.4 Salary costs

For the employer, salary costs can take two forms that is training and making the recruited employee competent, duplication of roles by the trainer, overtime by the skilled workers, pay increase on the double shift workers, high insurance premiums among others. (Access Economics, 2006). Government liability on supporting the injured worker through allowances and workers compensation benefits. (Access Economics, 2006).

Salary costs can also be in the form of government financial assistance to workers who are unable to support themselves in the form of an accident victim assistance allowance or employee insurance benefits (Optum Report, 2015).

2.2.2.5 Human costs

Human costs are costs estimated cost value of occupational injuries. These human/intangible expenses take the form of reduced quality of life due to deterioration of health, limitation of psychological well-being of the accident victim and family as well as disturbance of social interactions as a result of the injury. Human costs can also go beyond the aforementioned costs to incorporate the burden imposed on the victim by feelings of hopelessness, rage, agony arising from limited working ability as a result of fact that one has been an accident victim (World Economic Forum, 2008).

2.3 Evolution of Measures Meant to Reduce Incidence of Accidents

The unendurable costs of work related accidents have led to the responsible organizations to come up with measures and strategies to reduce the incidence of occupational accidents. World over training and awareness programmes, followed by SHEQ management systems implementation, have been at the center of accident prevention (Carrington et al 2013). The strategies however were not effective enough as the number of occupational accidents continued to be high the world over.

The ineffectiveness of these strategies was attributed to narrow focus on the causes of workplace accidents. The measures only focused on safety from machines or equipment and prevention of hazards or danger arising from physical, chemical and biological agents and did not focus on

human factors (that is psychological factors, stress and lifestyle as enshrined in the WHO/ILO definitions of wellness.) and environmental factors (that is conditions caused by noise, vibration, temperature extremes and/or illumination) that have a bearing on the incidence of accidents.

As a result of the narrow focus of physical measures and consequently their ineffectiveness, labour organizations and other responsible institutions took into consideration human factors in a bid to reduce the number of occupational accidents and consequently to cut on the financial and non-financial costs of work related accidents. An example of strategies used included use of medical surveillance to ensure early detection of employee exposure to occupational related illnesses, which in some instance will result in accidents.

Most companies world over have implemented pre-employment, periodic and exit medical surveillance, depending on the occupational risk employees will be exposed to. The medical surveillance helped to a greater extent in trying to identify people who would have been affected by occupational diseases and in a way helped preventing accidents. However no much attention is being given to other illnesses that are not occupational illnesses but with potential to cause accidents if a person gets affected while at work, which the wellness programme can address.

Like the physical measures, the consideration of human factors was not effective enough and the number of accidents continued to be high despite use of medical surveillance, training and awareness programmes, motivational theories, risk assessment, hazard identification and mitigation of risks. The ineffectiveness of these measures and strategies steered the search for new and better alternative approaches to occupational accidents reduction leading to the birth of workplace wellness programmes as another dimension of a comprehensive approach to augment the preceding programmes in trying to prevent accidents and enhance productivity at work places as well as giving the population or workforce a safe, health, quality and longer life (Bill, 1976).

According to the Towers (2013), companies initially started to give assistance to their employees with respect to their health or wellness issues like alcoholism and mental health, in the 1950s in form of employee assistance programs (EAPs). From then, EAPs have developed into a significant package for workers in addressing their health issues. To complement employee assistance programs in the field of work, wellness programs have received attention.

On top of addressing the individual issues of employees that affect their performance at work, wellness programs involve facilities put in place to improve employees and their respective dependents' health status. The occupational safety and health movement of the 1970s and the worksite health promotion are cited by Dejoy and Southern (1993) as the driving forces behind workplace wellness programs.

Workplace wellness programmes are coming in, to address gaps left by the aforementioned measures as they look at other conditions that can affect a person at work and result in accidents for example heart problems, cancer, smoking habits, drinking habits, epileptics, obesity, diabetic and other.

2.4 Categories of Workplace Wellness Programs

Companies have come up with a number of workplace wellness programs. The programs can be in the form of and covering the aspects of nutrition, general health, physical fitness activities, the mental health as well as personal growth, challenges and contests, productivity, rejuvenation and cool perks. These are explained in detail below.

2.4.1 Nutrition and General Health

Eating a healthy diet is the most impactful lifestyle change a person can make to improve their health and wellness. Nutrition and general health can be promoted through selling healthy food at the workplace. Companies can come up with a number of nutrition and health programs in a bid to promote employee health (Chau, 2009).

Companies goes own to higher specialists who offer biometric screenings and health assessments, and more importantly, can provide a roadmap in improved health. Holding wellness programs through inviting vendors and other organisation day talks about nutrition and wellness activities also play a role in making employees aware of the importance a healthy lifestyle (Chau, 2009).

A healthy lifestyle amongst a company's employees can also be promoted through incentivizing those who smoke to quit. In a research by The University of Pennsylvania School of Medicine and Wharton School, the results show that workers who were offered financial incentives

managed to quit smoking 3 times more than those not given any financial incentive (www.snacknation.com).

2.4.2 Fitness and Physical Activity

Physical fitness activities can be promoted through incentivizing employees to participate in sports. Employees can form different sports teams be it soccer, basketball, tennis, hockey, cricket and many more. The teams can also be made to join local sports leagues and participate in long distance runs (Chau, 2009). Also, rather than having a meeting where people are seated, meetings can be turned into walking meetings. Meetings which are expected to take more time can be started with some physical activity. This not only helps in boosting fitness but also makes people creative, research has suggested. Companies can also hold weekly fitness challenges within the workplace (www.snacknation.com).

2.4.3 Mental Health and Personal Growth

To boost the mental health and personal growth of employees, an organization can hire a professional guest speaker regularly to discuss corporate wellness initiatives such as meditation, nutrition, exercise, and personal development. Employees are much more likely to buy it when advised by a specialist. Weekly inspirational speeches also help in boosting mental health. Companies can also host ‘Lunch and Learns’ weekly or monthly. This involves a company’s employees gathering for a company-wide ‘Lunch and Learn’. During these gatherings there is need to allow employees present topics they are interested in (whether work related or not) and as well as using the time to discuss important company updates. This helps in motivating employees and enhancing their personal growth (www.snacknation.com).

Companies can enhance mental and personal health through growing healthy plants in and around offices. There are many health benefits associated with “Green offices”. These include fresh air, improved emotional state, and a reduction of office illnesses and socially habitable environments. There are also other programs which boosts mental health like company sponsored ‘happy hours’ (helps employees unwind) and playing music at the workplace (helps in improving behaviour which in turn boosts creativity and productivity) (www.snacknation.com).

2.4.4 Challenges and Contests

Challenges and contests motivate employees to follow a healthy lifestyle. These can include the ‘mile-a-day’ contest (where employees records days they ran at least 1 mile), the ‘7 hour sleep’ contest (where employees records how many nights they slept at least 7 hours), the ‘8 glasses of water’ consumption (where employees track and record how many days they drank at least 8 glasses of water), the ‘biggest loser’ challenge (where employees track how much weight they lost per given period), monthly and weekly fitness challenges. Winners of these challenges are given prizes to motivate others to participate in healthy activities. Through performing these challenges a company’s workforce will be healthier physically and mentally and helps in the reduction of workplace accidents and enhancement of productivity levels of the company (www.snacknation.com).

2.4.5 Productivity

Productivity programs include encouraging creativity with collaboration spaces (through creation of a group space where employees can meet and collaborate on projects off their office desks), creating flexible work hours (there is need to kick the habit of mandated working hours versus effectiveness since the emphasis is on quality and effectiveness of workmanship and thereby allow employees to structure their daily lifestyle) and scheduled morning huddles for each department (this allows departmental team members to verbalize everyone’s daily main goals and let others know where they are important). Companies can also offer one remote working day each week to responsible and reliable team (www.snacknation.com).

2.4.6 Rejuvenation

Companies can make use of schedule recesses (this can involve making use of a 15 minute-slot daily for employee to move away from the desk and go to socialize and enjoy some fresh air), giving employees a vacation day on their birthday, and encourage employees to scheduled hourly breaks (studies have shown that, frequent 5-10 minutes breaks within 90 minutes increase productivity and helps in rejuvenation) (www.snacknation.com).

2.5 Benefits of Workplace Wellness Programs

Research shows companies invest in wellness for a broad array of indirect benefits, as well as healthcare cost savings (Optum, 2015). According to a research by the American Express, the key success factors of any workplace wellness programs are financial support (that is ensuring senior management understands the wellness program costs, potential financial benefits, and other benefits), philosophy (comprehensive wellness facilities that are allied with corporate cultural values are the more successful), focus on key issues impacting employee health, communication and education to foster participation and understanding of the programs and propagation (that is promotion of work place wellness champions). Consideration of these factors will ensure that a company reaps maximum on its implemented workplace wellness program (Crowther et al, 2004).

Improved performance in terms of efficiency and productivity by employees, lowered costs stemming from absenteeism, accident victims' compensation, and improvement in the organisation's image have been highlighted as some of the key benefits of implementing a workplace wellness program.

2.5.1 Improved Work Performance and Productivity

While it may be a challenge to ascertain the relationship between the implementation of health and wellness programs and company productivity, an indirect positive relationship is expected to exist. Studies on the aforementioned revealed that healthy workers are more productive and vice-versa. This can be so because healthy workers are not absent at work most of the times as compared to workers with wellness issues (Mills, 2005). Australian study revealed that the healthiest workers are almost three times more effective than those with poor health, with the more healthy employees working about 143 effective hours per month compared to 49 effective hours per month by employees with poor health (Medibank Private, 2005).

2.5.2 Reduced Costs Associated with Accidents

Emerging evidence in empirical literature suggests demonstrates that successful wellness programs provide an excellent return on investment. A study by Chapman (2007), on the economic benefits workplace wellness programs in Australia revealed that, on average the said programs reduce sick leave, absenteeism by 25.30%, reduce workers compensation costs by

40.70%, disability management costs by 24.20%, and overallly save \$5.81 for every \$1.00 invested in wellness programs.

A report by the American Journal of Health Promotion (2015), from a research covering 12 countries and 9 different industries, showed that the return on investing in wellness programs amounts to \$2.38 implying that for every dollar invested in corporate wellness programs there is a subsequent saving of \$2.38. These statistics show that workplace wellness programs are worth investing in.

Corporate wellness programs also help in reducing the intangible human costs caused by job related accidents. These costs include reduced quality of life due to ill health, psychological challenges, family and ruination of social life as a result of the injury (American Journal of Health Promotion, 2015).

2.5.3 Enhanced Corporate Image

A company which implements wellness programs will likely have a low incidence of accidents. This helps in the enhancement of a company's reputation which will in turn help the company in retaining its workers and also make the company have an upper hand in recruiting skilled personnel. In addition wellness programs improve the organisation's image through the creation of a strong relationship between the management and workers. Demonstrating a sense of corporate social responsibility can also improve the organisation's image with the public and can help an organisation become an "employer of choice" (Wesley Corporate Health Report, 2006).

2.6 Wellness Programmes and the Mining Industry

Formal workplace wellness programmes in South Africa came into effect in the 1980s. According to Work Well (2012), a research unit for the economic and management sciences at the North-West University in Potchefstroom, the Chamber of Mines was first to put in place a wellness programme after a viability study in the mining industry in 1983 was done. Despite the role, workplace wellness programme could play in the promotion of employee health and wellness as well as in assisting organizations, less than half of top 100 organizations had implemented wellness programmes by the early 2000s in South Africa.

A study by Renaud et al., 2008 in South Africa proved that wellness programmes can reduce accidents in South African mine but he did not go further to how effective are they in reducing accidents. Fewer than half of South Africa's top 100 mining companies have wellness programmes, despite the important roles these programmes can play in promoting employee health and wellness and in assisting organizations and employees in accident prevention, Naidoo & Jano, (2003)

In 2008 Sandvik Zimbabwe implemented a first wellness programme at Zimplats funded by Swedish Workplace HIV and AIDS Programme (SWHAP) but however it was mainly concentrating on HIV and AIDS as a component of wellness. Currently Mimosa Mines, Unki and Zimplats group have wellness programmes in place but no formal studies were done to determine effectiveness of the programmes in preventing accidents by the said companies(Source: Company records).

2.7 Chapter Summary

The chapter documented all the theoretical and empirical literatures explaining the concept of wellness in relation to accidents. The review of literature established that though wellness programs have come up and received wider review recently, no formal empirical study making use of statistical analysis has been conducted to assess if the program has been effective in accident prevention. This study will therefore give empirical and scientifically and statistically tested results. The methods of analysis are as explained in the chapter to follow.

CHAPTER 3

RESEARCH METHODOLOGY

3.0 Introduction

This chapter seeks to outline how the study was carried out. The chapter outlines the research design, the sampling technique used, and the data collection, processing and analyzing techniques that were employed. It also details the variables of the study and how the variables data was collected from the study population. The chapter provides the logic behind the methods employed in the analysis of the relationship between workplace wellness programs and occupational accidents. The chapter also provides justification for the methods used. The methods used also determine the validity and reliability of the research findings.

3.1 Research Paradigm

Paradigms are mental models or frames of references that we use to organize personal reasoning and observations. The present researcher has chosen to conduct this research according to the positivist philosophy founded in the works of Comte (1853), who proposed that there can be no real knowledge but, that which is based on observed facts. This research falls into this category, since it tests a theoretical aspect of wellness programs, and the underlying philosophy of positivism as the researcher is independent. In this case the researcher did not affect the subjects and was not also affected by the subjects.

3.2 Research design

A case design was used in this research to determine the contribution of wellness programmes to accidents prevention at PPC Collen Bawn. A case design allows an in-depth investigation of the research problem by analyzing a real-life environment over an extended period of time.

The design employed both qualitative and quantitative methods (triangulation) of data collection. Triangulation may be defined as the use of two or more methods of data collection in the study (Cohen and Manion 1994). Triangulation uses investigators and research methodologies are combined in an effort to view the research problem from different angles.

The researcher needs to be confident that the data generated are not simple artifacts of one specific method of collection. Cohen and Marion (1994:234): The more the methods contrast each other, the greater the researcher's confidence.

The use of triangular technique helped to overcome the problem of 'method boundedness'. However, it is essential to say that while quantitative elements are used in the study in form of facts and figures to back up certain assertions and findings, the study was predominantly qualitative in nature.

3.3 Population of the Study

The study is specific to the mining industry in Zimbabwe and thus it is the study population. The researcher made use of a case study, the case of interest being PPC Collen Bawn. Thus the mine (its workplace wellness facilities and employees) were the target population of the study. The reasons for selecting PPC Collen Bawn as the study population were;

- The mine has diversified range and established wellness programmes.
- The mine implemented wellness programmes for some time, stopped them and re-implemented them again thus giving a good basis for comparison.
- The mine approved that the research be done at their premises in time.
- The mine is situated close to the researcher.

3.4 Sampling Size Determination

The study, through analysis of percentage of accidents to total number of employees from the year 2000 to 2017, covered all of the PPC Collen Bawn employees. Through investigating the wellness programs and facilities at the mine, thus the study covered the entirety of the mine.

Sampling was applied on qualitative data collection and analysis. The mine has 179 employees and out of the 179, 160 are general workers. Approximately 70 employees work on night shift. Thus the researcher was left with 90 day shift employees to give questionnaires to and to

interview. To determine the sample size, the study used the sample size determination formula developed by Francis et al (2010) stated below.

$$n = N * X / (X + N - 1),$$

where,

$$X = Z_{\alpha/2}^2 * p * (1-p) / (\text{Margin of Error})^2,$$

$Z_{\alpha/2}$ = critical value of the Normal distribution at $\alpha/2$ (for a confidence level of 95%, α is 0.05 and the critical value is 1.96),

p = sample proportion

N = is the population size

Given that $X = 1.96^2 * 0.5(0.5) * 0.05^2 = 196$, the sample size is equal to

$$n = 90 * 196 / (196 + (90 - 1)) = 62$$

Thus 62 questionnaires were distributed to different employees. 9 employees from the 62 were purposively selected, since they were once accident victims. Purposive sampling was used in order for the researcher to get specific details from people who actually were one accident victims. The remaining 53 questionnaires were distributed randomly to the remaining general workers. Simple random sampling was used in order to avoid sampling bias as it gives everyone an equal chance of being selected. 2 different questionnaires were distributed to get detailed information to the Risk Manager and the Occupational Nurse

3.5 Data collection

3.5.1 Primary Data Collection

Primary data collected included the wellness facilities in place and their usage, knowledge of importance of a person's wellness and opinions of employees regarding workplace wellness programs in relation to occupational accident prevention. This was done through observations/inspections, structured questionnaires and face- to-face interviews.

3.5.1.1 Field observations/ inspections

The observation/inspection used involved scouting through the study area to assess the infrastructure concerned with wellness programmes such as the following;

- Alcohol management facilities
- BP management facilities
- Diabetic management facilities and
- Sugar level management facilities among others

However the researcher concentrated the study on these four wellness issues because they were measurable and quantifiable.

The researcher was carrying visits twice a week throughout the period of the re-introduction of the wellness programme. All the visits were uniformed and were meant to observe uses of the wellness programmes as well as conducting interviews. Observations were done to see who uses the wellness facility against the common accident victims. Photographs and videos were taken during the visits with an informed consent.

Advantages of Observations/ Inspections

- ❖ The researcher had control over the data to be collected for this particular research
- ❖ Observation was one of the main bases of formulating hypothesis. By observing a phenomenon frequently, the researcher got well acquainted with the subjects through knowing their habits, likes, dislikes, problems, perception, different activities and so many other things. All these helped the researcher to form a hypothesis on them.
- ❖ Observations helped in getting information on where subjects were not willing to provide information. Often some respondents do not like to speak about themselves to an outsider. Although observation cannot always overcome such problems, however, it requires less active co-operation and willingness of respondents.
- ❖ Making use of observations also adds on validity and in-depth understanding of the issues at hand as far as the studied wellness programs are concerned.

Disadvantages of Observations/ Inspections

- ❖ Observation were time consuming and costly in terms of travelling twice a week to Collen Bawn.

- ❖ There was observer bias.
- ❖ Some employees would change their behavior because they are being observed.

3.5.1.2 Structured Questionnaires

A structured questionnaire was used to gather data from the accident victims, Occupational health Nurse, and other employees who will be picked randomly. Target population for the questionnaire survey was the accident victims, clinic staff, Safety, health Practitioner (i.e. Occupational health Nurse and Risk Manager). The accident victims were interviewed to determine if they had one of the wellness conditions being considered in this research. The clinic staff as well as safety, health and environment staff (SHE) commonly referred to as Risk Manager at PPC Collen Bawn interviewed for they provide technical information on the accidents and existence of the wellness conditions being considered in this study

Advantages Structured Questionnaires

- ❖ A large volume of information was collected from a large number of people at the mine in a short period of time and in a relatively cost effective way.
- ❖ The results of the questionnaires were quickly and easily quantified by the researcher through the use of Statistical Package for Social Sciences (SPSS).
- ❖ The results were analysed more 'scientifically' and objectively unlike other forms of qualitative research.
- ❖ The data was quantified for the basis of comparing and contrasting as well as measuring change.

Disadvantages Structured Questionnaires

- It was difficult to tell how truthful the respondent is.
- People may encode differently each question thereby affecting the response.
- There is a level of researcher imposition, meaning that when developing the questionnaire, the researcher is making their own decisions and assumptions as to what is and is not important...therefore they may be missing something that is of importance

3.5.2 Secondary Data collection

Secondary data was collected through available company records and these were;

- Accident statistics
- Clinical records

Advantages of Secondary Data

- ❖ It was cheaper since the accident statistics data was easily available, collating it to the wellness was difficult exercise
- ❖ It enabled the researcher to use a larger sample size since every employee was legible to be sampled

Challenges

- ❖ Ethical considerations hindered in releasing of some information by the clinic that is people specific. The clinic only managed to release statistics and the people specific health conditions were obtained from concerned individuals through face to face interviews; however, this again was affected by whether the respondent was objective or not.

3.6 Data Analysis

The study sought to determine the importance of workplace wellness issues on employee safety and on prevention of accidents and to assess whether workplace wellness programs in place at PPC Collen Bawn have been effective in accident prevention. The specific objectives were to identify the range of wellness programmes in place, to find out the employees' perception on wellness programmes in accident prevention, to analyze the trends in accidents across all the clusters in study period and to examine the differences in accident levels between groups with and without wellness programs.

The study employed chart analysis, analysis of variance and simple linear regression. These methods were useful considering the fact that PPC Collen Bawn initially had no wellness programs in place (cluster 1), first implemented them in 2004 up to 2006 (cluster 2), and stopped most of the wellness programs for 4 years from the start of 2007 to 2010 (cluster 3) due to the economic challenges the country was facing, and re-implemented them in 2011 and have been in place to date (cluster 4). To further the analysis these clusters were again used to determine

effectiveness looking at the employees who had the wellness issues in question and were involved in accidents during the study period.

3.6.1 Chart Analysis

The study had the specific objectives to find out the employees' perception on wellness programmes in accident prevention and to analyze the trends in accidents across all the clusters in study period. To do this the study employed chart analysis using bar graphs and pie charts mainly.

To find out the perception of employees regarding workplace wellness facilities in accident prevention, pie charts were used. Using the data from the responded questionnaires, the respondents' perceptions were scaled and the results tabulated using a pie chart. Pie charts enabled primary data analysis through presentation of respondents' evaluation of wellness issues in terms of importance ranking in accident reduction. Pie chart analysis helps to answer whether employees have the knowledge of wellness issues and whether employee health and or wellness have an in impact accident proneness.

Bar graphs were used in trend analysis mainly to inspect the differences in accident levels across all the clusters in the study period. Through use of bar graphs the researcher was able to determine whether there were differences in accident levels across the clusters with and without workplace wellness programmes in place. They were also employed to show the changes in the numbers of employees with BP, Sugar, Diabetes, and employees who take alcohol and were involved in accidents yearly, chart analysis was also done. This enabled the researcher to see average numbers of employees with these wellness issues that were involved in accidents across clusters with and without a wellness program in place.

3.6.2 Analysis Of Variance (ANOVA)

ANOVA was used to test whether workplace wellness programs are effective in accident prevention. ANOVA is a statistical procedure used to test the degree to which two or more groups vary or differ in an experiment. In most experiments, variance (or difference) usually indicates that there was a significant finding from the research. In this case the variance is the differences in the mean accident level across cluster with and without workplace wellness programs in place at the mine.

In this study the researcher sought to determine whether there were significant differences in the average accident rate before implementation of wellness programs, after the first implementation of wellness programs, when wellness program was suspended except for a few and when the program was fully implemented again to date. The ANOVA test was done between each and every pair of clusters.

The decision criteria in ANOVA is that if the F-statistic is greater than the critical value, there is a difference between mean accident levels of the study groups and if not there is no difference in average accident levels between groups. This helped to figure out if wellness programs have been effective in reducing wellness related accidents at PPC Collen Bawn.

The null hypothesis in this case is the assumption that there will be differences in accidents numbers between specified groups that are to be tested and therefore, no significant results will be revealed. The alternative hypothesis, on the other hand, is the hypothesis stating that there will be no difference between groups in terms of accident numbers as indicated by the ANOVA performed on the data that was collected.

3.6.3 Regression Analysis

The study also employed simple linear regression analysis to measure strength of association between wellness programmes and reduction of accidents. That means it was used to determine whether workplace wellness programs are effective in accident through analysing accident statistics from 2000 to 2016. Statistical Analysis Software (SAS) was employed as the software allows for regression given a categorical variable. Accidents as a percentage of employees were the explained variable and wellness programs were the explanatory variable. Wellness programs were a categorical variable and absence of wellness programs was referenced as a 0 and presence of wellness programs were referenced as a 1. With regression application in this study, a positive regression coefficient shows that wellness programmes were not effective (do not have an impact) and a negative coefficient shows that wellness programs were effective (have an Impact). The p-value shows the significance of the results.

3.7 Chapter Summary

The chapter gave an overview of the direction followed in terms of the research design used; the methods employed in data collection as well as the data analysis methods used. After usage of these aforementioned research techniques the outcome is statistical research findings and this is what the chapter to follow documented and discussion of findings in the later chapter.

CHAPTER 4

DATA PRESENTATION AND ANALYSIS OF FINDINGS

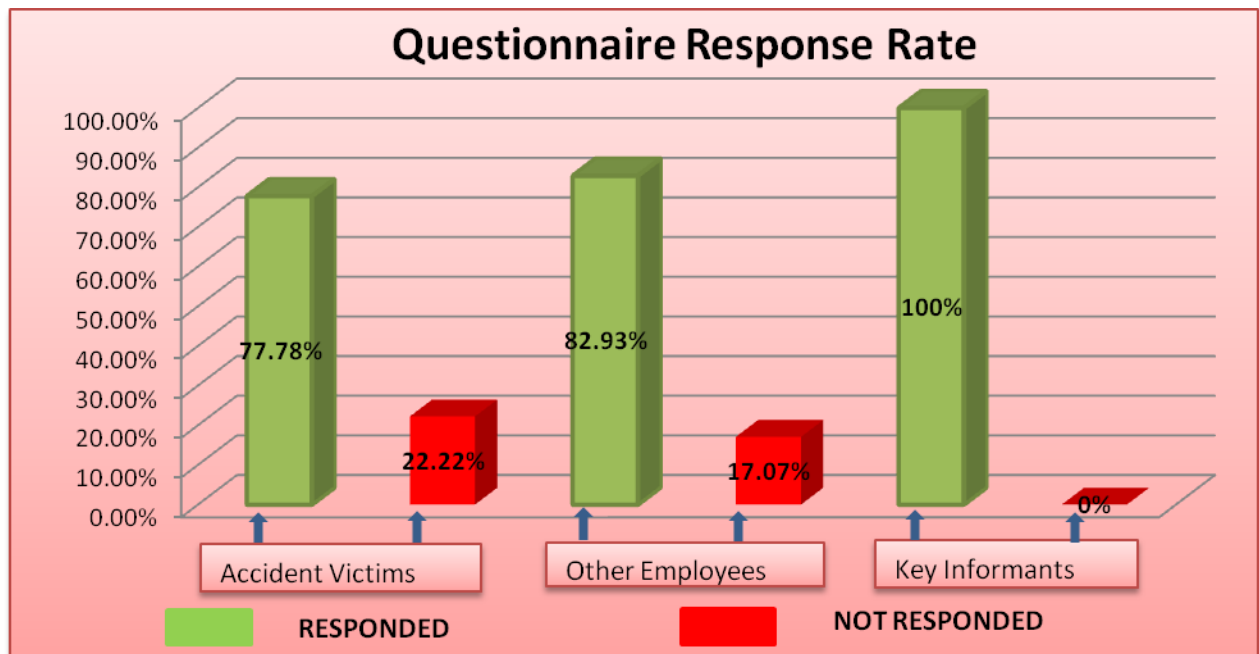
4.0 Introduction

This chapter provides a detailed presentation and analysis of the data findings on the effectiveness of workplace wellness programs in accident prevention. The chapter also outlines interpretation of the results obtained after data analysis in line with the research objectives.

4.1 Response Rate

62 questionnaires were distributed to general workers and of the 62, 9 were distributed purposively to accident victims and 53 were distributed randomly to the other general employees. A different questionnaire was distributed to key informants who were the Risk manager and the Occupational nurse. The response rate is as illustrated on Fig 4.1 below.

Fig 4.1 Questionnaire Response Rate



Source: Author's own compilation

The response rate for questionnaires to accident victims was 77.78%, for other employees it was 82.93% and for the key informants 100%. The response rate was high and thus the facts and data collected can be used for statistical and significant data analysis.

4.2 Research Findings

4.2.1 Workplace Wellness Programs in Place at PPC Collen Bawn Mine

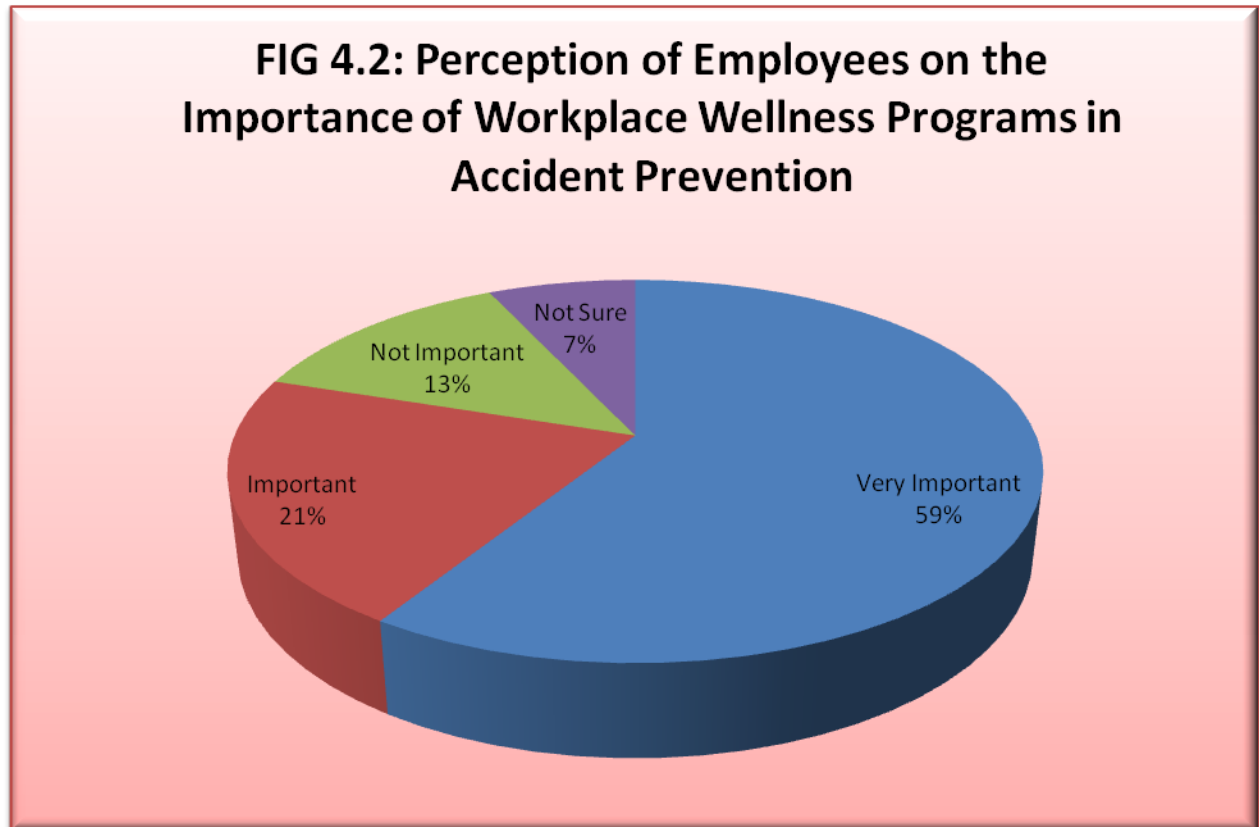
The researcher found out the workplace wellness facilities in place at PPC Collen Bawn mine. These were Alcohol, Sugar, BP, Diabetes, Stress, and Fitness management facilities. Out of these identified wellness facilities; the researcher considered alcohol, Sugar, Diabetes and BP management facilities as they can be measured and quantified.

Table 4.1 Key Workplace Wellness Facilities at PPC Collen Bawn

| Wellness Program | Testing Frequency | To Who |
|---|---|--|
| Blood Alcohol Content testing | <ul style="list-style-type: none"> On entering work premises | <ul style="list-style-type: none"> Everyone |
| BP Testing and Management | <ul style="list-style-type: none"> Upon visiting the clinic During scheduled check ups When involved in an accident On engagement | <ul style="list-style-type: none"> Everyone BP patients Accident victims New employees |
| Blood Sugar Level Testing and Management | <ul style="list-style-type: none"> Upon visiting the clinic During scheduled check ups When involved in an accident On engagement | <ul style="list-style-type: none"> Everyone Sugar patients Accident victims New employees |
| Diabetes Testing and Management | <ul style="list-style-type: none"> Upon visiting the clinic During scheduled check ups When involved in an accident On engagement | <ul style="list-style-type: none"> Everyone Diabetes patients Accident victims New employees |

4.2.2 Employee Perception on the Importance of Workplace Wellness Programs in Accident Prevention

Questionnaire responses provided the perceptions of employees on the importance of wellness programs in accident prevention and are as illustrated in Fig 4.2.



Source: Author's own compilation from questionnaire responses

59% of the respondents identified wellness programs as very important, 21% as important, 13% as not important and 7% were not sure. The results show that employees perceive wellness programs as an important aspect in accident prevention. Thus, the study failed to reject the null hypotheses that employees perceive wellness programs as effective in accident prevention. Thus it can be concluded that employees perceive workplace wellness programs as important in accident prevention at workplaces.

4.2.3 Accident Trends Considering the Total Workforce

4.2.3.1 Yearly Accident Numbers from 2000 to 2017

The number of accidents and the number of accidents as a percentage of employees were graphed to show the yearly changes in accident levels as illustrated on the graph below:

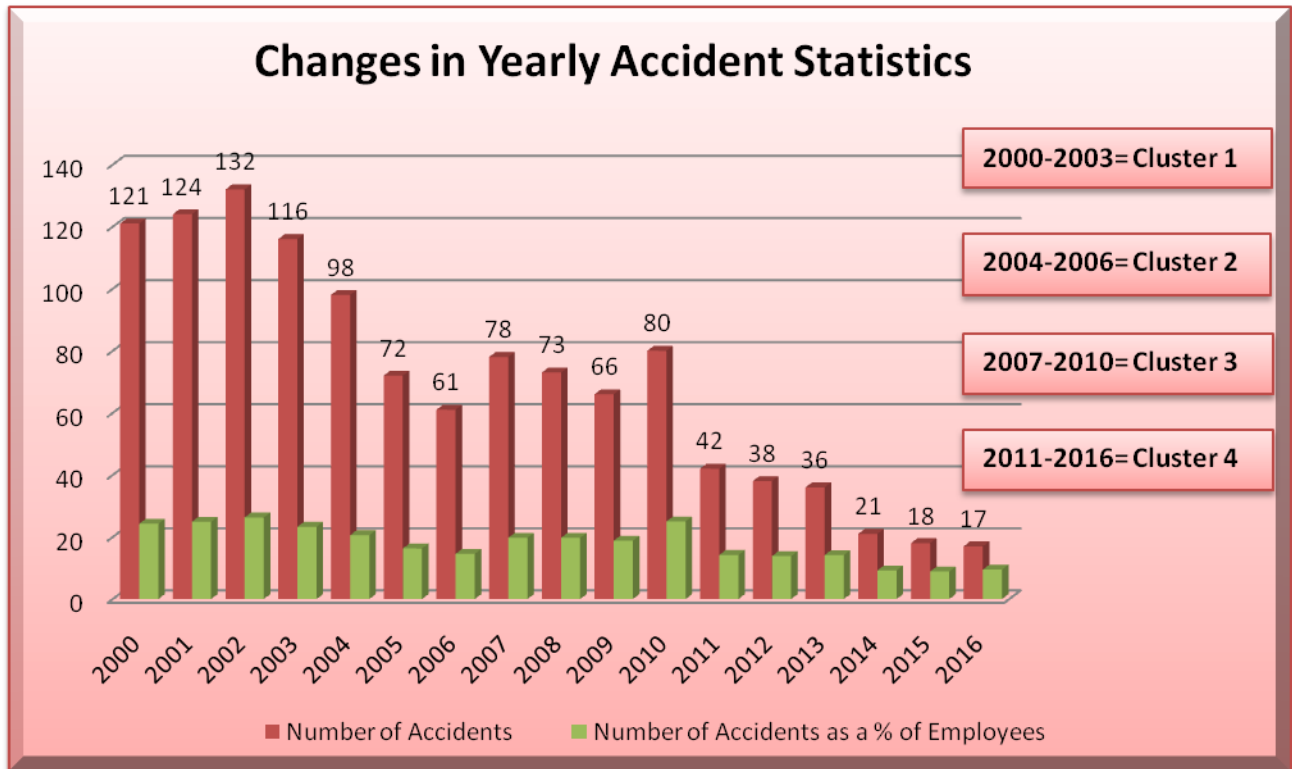


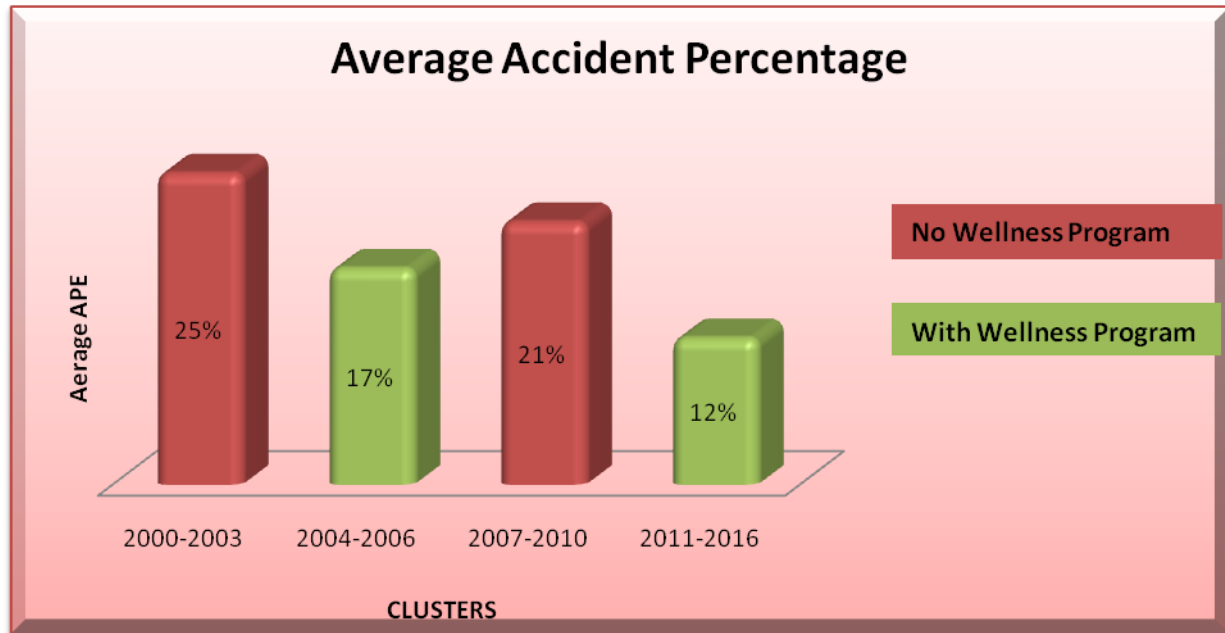
Fig 4.2 Number of Accidents and the number of Accidents as a Percentage of Employees

Cluster 1 and 3 are the period with no wellness programs and cluster 2 and 4 are the years with wellness programs fully in place. Figure 4.2 shows that generally the number of accidents was on a decrease over the years however this was partly explained by the decrease in the numbers of employees at PPC Collen Bawn. The chart also shows that the periods which had no workplace wellness programs generally had more accidents in terms of total numbers and percentages recorded compared to periods which had wellness programs fully in place.

4.2.3.2 Accident Statistics per Cluster

The average accident percentage was calculated for each cluster and these are illustrated on the graph below.

FIG 4.3: Average Accidents Per cluster



Source: Author's own compilation from accident statistics

Cluster 1 (2003-2003) had an average accident percentage of 25%, cluster 2 (2004-2006) had 17%, which represents 8% reduction in accidents. Cluster 3 (2007-2010) had 21%, which represents a 4% increase and cluster 4 (2011-2016) had 12% which represents 9% decline in accidents. The chart above shows that clusters 1 and 3 (which are the periods with no workplace wellness program in place) had a higher average in terms of accidents when compared to clusters 2 and 4 (which are years with a workplace wellness program fully in place. Cluster 1 had the highest average. This possibly was due to the fact that there was not in place related to wellness at the mine. When the mine first implemented a workplace wellness program in 2004 to 2006, the average accident percentage fell by 8%.

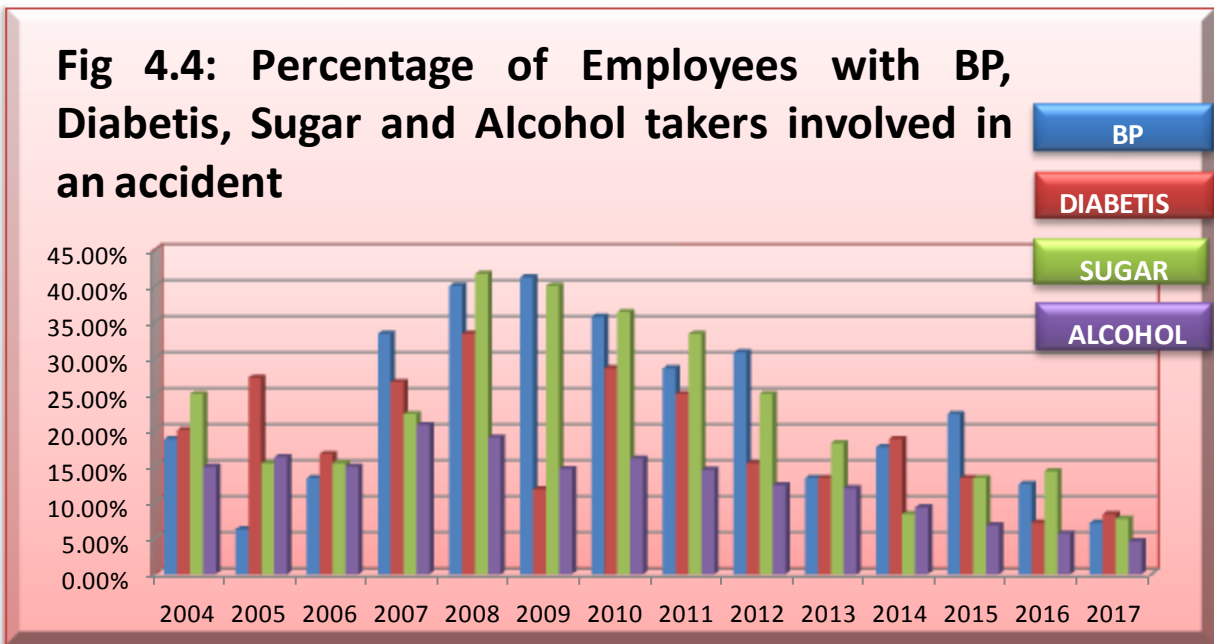
In the period 2007 to 2010, the average rose up by 4% from the average of the preceding period and this was possibly due to suspension of almost all the workplace wellness facilities. However the average of cluster 3 was lower than that of cluster 1. This is explained by the fact that though

most wellness facilities were suspended employees and management now had an appreciation of wellness issues. Cluster 4 had the lowest average (12%) amongst all the groups. This is possibly because of reimplementation of the wellness program with added wellness facilities.

4.2.4 Accident Trends Considering Employees with Wellness Issues

4.2.4.1 Yearly Percentage of Employees with BP, Diabetes, Sugar and Alcohol Takers Involved in an Accident

Chart analysis was done to show the variation in the number of employees with wellness issues that were involved in accidents. For the period 2000 to 2003 statistics related to employee health were not there since employees were not checked on their health status. The trends from 2004 to March 2017 are as shown below.



Source: Author's own compilation from health and accident statistics

KEY: Fig 4.4

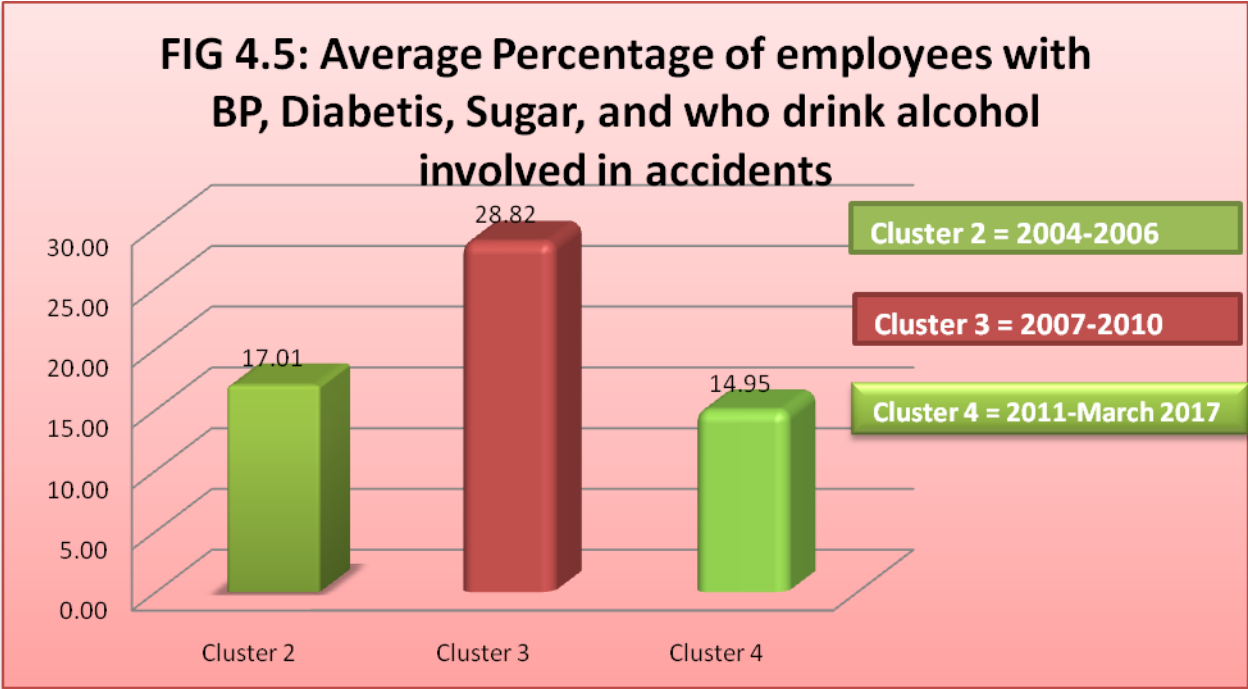
2004-2006 ➡ First Implementation of a Wellness Program

2007-2010 ➡ Wellness Program Suspended

2011- March 2017 ➡ Wellness Program Re-implemented

Figure 4.4 shows that generally accidents amongst people with wellness issues were high in the period 2007 to 2010 since there were no more wellness facilities to effectively and frequently check wellness issues amongst workers as they go to work and to make decisions accordingly. In the periods 2004-2006 and 2011- March 2017 the percentage of employees with wellness issues who got involved in accidents was relatively lower than in the 2007-2010 period. This is probably so because with wellness programs in place employees with wellness issues were checked on the severity of their health issues.

The study also unearthed the percentage of people with wellness issues that were involved in accidents in the period under study and these are illustrated on figure 4.5.



Source: Author’s own compilation from health and accident statistics

The average number of employees with the specified wellness issues who got involved in accidents averaged 17.01% in the period 2004-2006, 28.82%, in cluster 3 and 14.95 in the period 2011- march 2017. This again illustrates the fact that presence of wellness facilities resulted in fewer employees with wellness issues being involved in accidents.

4.3.5 Analysis of Variance Results

ANOVA analysis was done to test significant difference in the average number of accidents expressed as a percentage of employees between pairs of clusters with and without workplace wellness programs. Statistically different means or averages imply effectiveness of wellness facilities in accident prevention. ANOVA tests were done at 5% level. An F-statistic lower than the critical value shows that there is no difference between the means or averages and if it is greater than the critical values then there is a difference between the average number of accidents expressed as a percentage of employees.

ANOVA tests between clusters 1 and 2, 1 and 4, 2 and 3, and 3 and 4 were done to assess whether there are significant differences in accident levels between clusters with and without wellness programs in place.

Table 4.1 ANOVA Results

| Clusters Tested | F-Statistic | Critical Value | P-Value |
|------------------------|--------------------|-----------------------|----------------|
| 1 and 2 | 20.26 | 6.61 | 0.010 |
| 1 and 4 | 70.62 | 5.98 | 0.000 |
| 2 and 3 | 2.34 | 7.70 | 0.200 |
| 3 and 4 | 17.01 | 6.61 | 0.001 |

The ANOVA results showed that there are significant differences in the mean accident levels between the groups as shown by the F-statistics greater than the critical values. Of all the four tests, only the ANOVA test between cluster 2 and 3 produced statistically insignificant differences. Tests between clusters 1 and 2, 1 and 4 and 3 and 4 showed significant differences with P-values of 0.01, 0.00 and 0.00. This thus shows that there are statistically significant differences between accident levels between clusters with wellness programs and those without wellness programs in place.

ANOVA test results show that there are significant differences in accident levels between clusters with and without workplace wellness programs in place implying that wellness programs are effective in accident prevention

4.3.6 Regression Analysis Results

Regression analysis was done to further test the nature and strength of association between implementation of wellness programs and accident prevention. This was done to compliment ANOVA tests. The regression analysis was done using statistical analysis software (SAS). The analysis was done taking into account that wellness programs can only take two numerical values that is a 0 if not present and a 1 if present. The regression results show that presence of wellness facilities has a negative relationship with the number of accidents as shown in appendix B. Thus when workplace wellness facilities are in place accidents are highly likely to fall down thus supporting the hypothesis that wellness facilities are effective in accident prevention. The regression co-efficient was statistically significant with a P-value of 0.00 (Appendix B). As such the study fails to reject the null hypothesis that wellness programs are effective in accident prevention.

4.4 Chapter Summary

The results from the analysis of the data show that the most vibrant wellness facilities at PPC Collen Bawn mine are Alcohol testing, BP checking, Sugar testing and testing of Diabetes. The analysis also showed that most employees highly perceive workplace wellness programs as being important in accident prevention. Further data analysis proved that the presence of wellness programs at PPC Collen Bawn has been very effective in accident prevention as shown by the statistically significant differences in accident levels between groups with a wellness program in place and without a wellness program in place.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

The study sought to empirically test whether workplace wellness programs have been effective in accident prevention and reduction. This chapter thus provides a summary of the key research findings, and outlines the conclusions that can be drawn from the research findings. It also provides the recommendations made by the researcher in respect to wellness issues and facilities as well as the suggestions for further research.

5.1 Summary of Key Findings

The first objective was to identify the wellness programmes in place at PPC Collen Bawn hence the study revealed that the following were the wellness programmes available at PPC Collen Bawn: BP , Blood sugar level, and Diabetes management, Alcohol testing and Fitness facilities(these include sporting activities and gym)

The other objective was to determine employee perception on effectiveness of wellness programmes in accident prevention and this study reveals that majority (80%) of employees perceive wellness programmes as important in preventing accidents. The study also revealed that there were significant differences in the levels of accidents, with periods without wellness programmes recording higher accidents as compared to those with accident levels.

The current wellness programmes in place at PPC Collen Bawn are effective in accident prevention. Since there was no previously published study in the field of wellness programmes and accident prevention, this study brings a new horizon in the academic arena of accident prevention. Although not very related, studies by Catharine et al, (2009) and Weldon et al, (2014) in Australian mines and Kenya respectively proved that workplace wellness programmes were instrumental in boosting workers morale, reduce absenteeism and enhance productivity. . Studies by Silberman, (2007) and Williams, (2014) in Georgia and Michigan respectively concluded that wellness programmes were effective in reducing health care insurance costs

5.3 Recommendations

- With the identified wellness programmes in place the PPC Collen Bawn need to improve in the administering BP and Blood sugar level testing. BP should be tested daily on checking in to working areas and blood sugar level should be tested monthly.
- The company under study need to make use of awareness campaigns and training programs to change the perception of those employees(20%) who do not view the wellness programmes as important in accident prevention as well as those who are not sure about the importance of wellness programmes in accident prevention.
- PPC Collen Bawn should increase the range of fitness facilities they offer to the employees
- The company under study should consider adding stress management facilities to the wellness programmes package
- The company should implement the wellness programmes continuously as suspending results in increase in accidents.
- Other mining companies in Zimbabwe should consider implement wellness programmes to reduce accidents
- The law makers should consider regulating wellness programmes in Zimbabwe

5.4 Suggestions for further Research

- This research empirically tested if workplace wellness programs are effective in accident prevention and or reduction focusing on the mining industry in Zimbabwe. This calls for further research on wellness programs focusing on other industries like construction, transport, manufacturing and others. This will also validate effectiveness of wellness programmes in those industries. This is because current studies were concentrated effects of wellness programmes on productivity, absenteeism and reduction in health care insurance.

5.5 Conclusion

The research sought to assess the effectiveness of a wellness program in accident prevention. To support the assessment, the research provided in chapter one a background to the study, a statement outlining the problem, the research objectives and the hypothesis to be tested. Chapter two outlined the literature surrounding the issues of occupational accidents and workplace wellness issues. Chapter three provided the methods the study employed in testing the research hypothesis and the results from the data analysis were documented in chapter 4. The final chapter outlined the summary of the findings, the recommendations and the suggestions for further research. The study revealed that wellness programs are effective in accident prevention at PPC Collen Bawn.

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APPENDICES

Appendix A

Anova: Single Factor
(Cluster 1 and 2)

SUMMARY

| <i>Groups</i> | <i>Count</i> | <i>Sum</i> | <i>Average</i> | <i>Variance</i> |
|---------------|--------------|------------|----------------|-----------------|
| Cluster 1 | 4 | 0.987361 | 0.24684 | 0.000159 |
| Cluster 2 | 3 | 0.514363 | 0.171454 | 0.000964 |

ANOVA

| <i>Source of Variation</i> | <i>SS</i> | <i>Df</i> | <i>MS</i> | <i>F</i> | <i>P-value</i> | <i>F crit</i> |
|----------------------------|-----------|-----------|-----------|----------|----------------|---------------|
| Between Groups | 0.009742 | 1 | 0.009742 | 20.26024 | 0.006393 | 6.607891 |
| Within Groups | 0.002404 | 5 | 0.000481 | | | |
| Total | 0.012147 | 6 | | | | |

**Anova: Single Factor
(Cluster 1 and 4)**

SUMMARY

| <i>Groups</i> | <i>Count</i> | <i>Sum</i> | <i>Average</i> | <i>Variance</i> |
|---------------|--------------|------------|----------------|-----------------|
| Cluster 1 | 4 | 0.987361 | 0.24684 | 0.000159 |
| Cluster 4 | 4 | 0.460689 | 0.115172 | 0.000823 |

ANOVA

| <i>Source of Variation</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | <i>P-value</i> | <i>F crit</i> |
|----------------------------|-----------|-----------|-----------|----------|----------------|---------------|
| Between Groups | 0.034673 | 1 | 0.034673 | 70.62014 | 0.000155 | 5.987378 |
| Within Groups | 0.002946 | 6 | 0.000491 | | | |
| Total | 0.037619 | 7 | | | | |

**Anova: Single Factor
(Cluster 2 and 3)**

SUMMARY

| <i>Groups</i> | <i>Count</i> | <i>Sum</i> | <i>Average</i> | <i>Variance</i> |
|---------------|--------------|------------|----------------|-----------------|
| Cluster 2 | 3 | 0.514363 | 0.171454 | 0.000964 |
| Cluster 3 | 3 | 0.635331 | 0.211777 | 0.001117 |

ANOVA

| <i>Source of Variation</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | <i>P-value</i> | <i>F crit</i> |
|----------------------------|-----------|-----------|-----------|----------|----------------|---------------|
| Between Groups | 0.002439 | 1 | 0.002439 | 2.343879 | 0.200528 | 7.708647 |
| Within Groups | 0.004162 | 4 | 0.001041 | | | |
| Total | 0.006601 | 5 | | | | |

**Anova: Single Factor
(Cluster 3 and 4)**

SUMMARY

| <i>Groups</i> | <i>Count</i> | <i>Sum</i> | <i>Average</i> | <i>Variance</i> |
|---------------|--------------|------------|----------------|-----------------|
| Cluster 3 | 3 | 0.635331 | 0.211777 | 0.001117 |
| Cluster 4 | 4 | 0.460689 | 0.115172 | 0.000823 |

ANOVA

| <i>Source of Variation</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | <i>P-value</i> | <i>F crit</i> |
|----------------------------|-----------|-----------|-----------|----------|----------------|---------------|
| Between Groups | 0.015999 | 1 | 0.015999 | 17.00631 | 0.009139 | 6.607891 |
| Within Groups | 0.004704 | 5 | 0.000941 | | | |
| Total | 0.020702 | 6 | | | | |

Appendix B

Regression Output

Regression Statistics

| | |
|-------------------|-------|
| Multiple R | 0.823 |
| R Square | 0.677 |
| Adjusted R Square | 0.655 |
| Standard Error | 0.034 |
| Observations | 17 |

ANOVA

| | <i>df</i> | <i>SS</i> | <i>MS</i> | <i>F</i> | <i>Significance F</i> |
|------------|-----------|-------------|-----------|------------|-----------------------|
| Regression | 1 | 0.036522999 | 0.036523 | 31.3848956 | 0.000 |
| Residual | 15 | 0.017455689 | 0.001164 | | |
| Total | 16 | 0.053978689 | | | |

| | <i>Coefficients</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>P-value</i> | <i>Lower 95%</i> | <i>Upper 95%</i> |
|--------------|---------------------|-----------------------|---------------|----------------|------------------|------------------|
| Intercept | 0.23 | 0.012060849 | 18.86435 | 0.000000000007 | 0.201813 | 0.253227 |
| X Variable 1 | -0.09 | 0.016576051 | -5.60222 | 0.000050444944 | -0.12819374 | -0.05753 |

Appendix C

Questionnaires on Wellness Study-Key Informants Effectiveness of wellness programmes on accident prevention

Please tick where possible

Department

.....

Age.....

Years of

service.....

How many employees you have treated for the following conditions in the following years

| Year | Condition & employees affected | | |
|------|--------------------------------|----------|-------|
| | BP | Diabetis | Sugar |
| 2000 | | | |
| 2001 | | | |
| 2002 | | | |
| 2003 | | | |
| 2004 | | | |
| 2005 | | | |
| 2006 | | | |
| 2007 | | | |
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| 2011 | | | |
| 2012 | | | |
| 2013 | | | |
| 2014 | | | |
| 2015 | | | |
| 2016 | | | |
| 2017 | | | |

How many employees involved in accidents with the following conditions

| Year | Condition & employees affected | | |
|------|--------------------------------|----------|-------|
| | BP | Diabetes | Sugar |
| 2000 | | | |
| 2001 | | | |
| 2002 | | | |
| 2003 | | | |
| 2004 | | | |
| 2005 | | | |
| 2006 | | | |
| 2007 | | | |
| 2008 | | | |
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| 2010 | | | |
| 2011 | | | |
| 2012 | | | |
| 2013 | | | |
| 2014 | | | |
| 2015 | | | |
| 2016 | | | |
| 2017 | | | |

How often do you test the employees for these conditions?

.....

Do you know about wellness Programmes at your workplace? What are they?

.....

In your opinion do they help prevent accidents at PPC Collen Bawn?

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

Are the programme facilities in place enough?

Yes

No

If not enough what else do you think need to be added in order to prevent/reduce accidents?

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

Thank You, Siyabonga, Tatenda

Appendix D

Questionnaires on Wellness Study-General employees Effectiveness of wellness programmes on accident prevention

Please tick where possible

Department Age..... **Years of service**.....

Have you ever involved in a work related accident? Yes No

If Yes How Many times? Once 2 Times 3 Times 4 Times 5times +

Please Indicate the years you were involved

Was it a human Injury accident or equipment damage? Human Equipment

How many times? Human Times Equipment Times

Please indicate years involved Human Injuries Equipment damage

Have you ever suffered or affected by the following wellness issues

Bp Yes No

If yes for how long.....

Diabetes Yes No

If yes for how long.....

Sugar Yes No

If yes for how long.....

Do you Drink

Alcohol

Yes

No

If yes for how long.....

Do you know about wellness Programmes at your workplace? What are they?

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

In your opinion do they help prevent accidents at PPC Collen Bawn?

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

Are the programme facilities in place enough?

Yes

No

If not enough what else do you think need to be added in order to prevent/reduce accidents?

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

Thank You, Siyabonga, Tatenda

Appendix E

| Questionnaires on Wellness Study | | | |
|---|------------------------------|-----|----|
| Effectiveness of wellness programmes on accident prevention | | | |
| Employee NO | Do you take alcoholic drinks | | |
| | | Yes | No |
| 1 | | Yes | No |
| 2 | | Yes | No |
| 3 | | Yes | No |
| 4 | | Yes | No |
| 5 | | Yes | No |
| 6 | | Yes | No |
| 7 | | Yes | No |
| 8 | | Yes | No |
| 9 | | Yes | No |
| 10 | | Yes | No |
| 11 | | Yes | No |
| 12 | | Yes | No |
| 13 | | Yes | No |
| 14 | | Yes | No |
| 15 | | Yes | No |
| 16 | | Yes | No |
| 17 | | Yes | No |
| 18 | | Yes | No |
| 19 | | Yes | No |
| 20 | | Yes | No |
| 21 | | Yes | No |
| 22 | | Yes | No |
| 23 | | Yes | No |
| 24 | | Yes | No |
| 25 | | Yes | No |
| 26 | | Yes | No |
| 27 | | Yes | No |
| 28 | | Yes | No |
| 29 | | Yes | No |
| 30 | | Yes | No |
| 31 | | Yes | No |
| 32 | | Yes | No |
| 33 | | Yes | No |
| 34 | | Yes | No |
| 35 | | Yes | No |
| 36 | | Yes | No |
| 37 | | Yes | No |
| 38 | | Yes | No |
| 39 | | Yes | No |
| 40 | | Yes | No |
| 41 | | Yes | No |
| 42 | | Yes | No |
| 43 | | Yes | No |
| 44 | | Yes | No |

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A visitor being checked for alcohol content at the main entrance gate (PPC Collen Bawn)