BINDURA UNIVERSITY OF SCIENCE EDUCATION

DEPARTMENT OF ENVIRONMENTAL SCIENCE

AN ASSESSMENT OF THE NATURE AND CAUSES OF OCCUPATIONAL INJURIES AND ILLNESSES AT TRIPLE C PIGS.

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(B202489B)

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE BACHELOR OF SCIENCE HONOURS DEGREE IN SAFETY, HEALTH AND ENVIRONMENTAL MANAGEMENT.

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DECLARATION

Registration number: B202489B

I Elton Sena do hereby declare that this work related project is my original work and has not been submitted before. All the information derived from other sources is indicated in the project.

Signature of the student……  …… Date ……..31 May 20

To be compiled by the supervisor

This dissertation is suitable for submission to the faculty and has been checked for conformity with the faculty guidelines.

Signature of supervisor…….....Date .....

Signature of Chaireperson.....…Date……

DEDICATION

I dedicate this thesis to my family, particularly my brother J.K. Sena, who offered steadfast support and encouragement throughout my entire educational endeavor. Their assistance and comforting presence were essential, and I am deeply appreciative of their contributions. Additionally, I dedicate this work to my supervisor, departmental faculty, and classmates whose smiles, camaraderie, and intellectual support were invaluable companions on this academic journey.

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ABSTRACT

Occupational health and safety is a critical concern in the agricultural sector, yet research on workplace hazards and their impacts remains limited, especially in developing country contexts. This study intended to examine the nature and causes of occupational injuries and illnesses at triple c pigs. The objectives of this study was to (1) to determine nature of occupational injuries and illnesses to which swine practitioners are subject (2) To determine factors that contribute to occupational injuries and illnesses among to swine practitioners. A random sampling to select 145 participants from various workstations at Triple C Pigs which included, Feed meal site, Main site, Weaner, Grower, Workshop and maintenance and Yard maintainers. Of the 145 workers who were issued with the questionnaires, only 101 responded giving a response rate of 69.7%. The questionnaire gathered information on demographic details, the nature and types of injuries sustained by workers and health ailments suffered by workers. Observations were also conducted to validate the questionnaire data. Descriptive statistics were used to analyze data. All analysis was conducted using the Statistical Package for Social Science (SPSS) version 23. Data on these variables were presented in the form of charts, graphs and tables. The results indicated that physical injuries such as cuts and lacerations, electrocution, fractures and amputations were the least frequently reported type of injury at the different workplaces at Triple C Pigs, accounting for 41.4% of the total injuries while ergonomic injuries such as musculoskeletal disorders, sprains and strain injuries were reported most frequently representing up to 58.6% of the total injuries reported. Health problems perceived due to working with swine Workers suffering from allergies are the majority (25.39%) followed by those battling with respiratory issues constituting about 19.3%. Hearing problems are significant contributing about 11.17%, headaches and skin infections are least with 6.9% and 3.5% respectively. The results show that task rotation and the use of adequate personal protective equipment is essential to lessen the risk of ergonomic injuries. The study recommends that safety awareness should be given to employees so that they know the hazards associated with daily tasks.

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LIST OF ACRONYMS AND ABBREVIATIONS

COPD……CHRONIC OBSTRUCTIVE PULMONARY DISEASE

ILO……INTERNATIONAL LABOUR ORGANISATION

MSDs……. MUSCULOSKELETAL DISORDERS

NIHL……. NOISE INDUCED HEARING LOSS

OSH……...OCCUPATIONAL HEALTH AND SAFETY

PPE……PERSONAL PROTECTIVE EQUIPMENT

SPSS……...SCIENTIFIC PACKAGE FOR SOCIAL SCIENCES

VOCs……. VOLATILE ORGANIC COMPOUNDS

WHO……...WORLD HEALTH ORGANOSATION

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

According to a Global Monitoring Report published in 2022 by the World Health Organisation (WHO) in partnership with the International Labour Organisation (ILO), the global burden of work-related diseases and injuries is substantial. In 2021, it was assessed that 1.88 million deaths and 89.72 million Disability-Adjusted Life Years (DALYs) were attributable to the 41 pairs of occupational risk factors and corresponding health outcomes examined in the report. Notably, all of the covered diseases were non-communicable in nature. The Global Monitoring Report published by the WHO and ILO revealed that the burden of work-related diseases and injuries was disproportionately higher in certain regions of the world. Specifically, the report found that the WHO African Region, the South-East Asia Region, and the Western Pacific Region experienced a significantly larger work-related burden of disease compared to other parts of the globe. This finding suggests that workers in these regions face greater occupational health and safety challenges, potentially due to factors such as limited access to resources, inadequate workplace regulations, or higher prevalence of hazardous working conditions. The unequal distribution of the work-related disease burden highlights the need for targeted interventions and policies to address the unique challenges faced by workers in these regions and promote more equitable occupational health outcomes worldwide. Moreover, the burden was observed to be

higher among males and older age groups globally. These findings underscore the significant impact that occupational hazards and poor working conditions can have on the health and wellbeing of workers, particularly in certain geographical regions and demographic groups. The report highlights the critical need for comprehensive occupational health and safety interventions to protect the global workforce.

According to the Health and Safety Authority's 2021 Annual Review of Workplace Injury, Illness and Fatality Statistics, the most recently available data on work-related fatalities, injuries, and illnesses in Ireland was presented, showig that on-the-job death rate, injuries and ailments in Ireland increased in 2021 by 8% and the sectors like Agricultural, fishing and construction and transportation and storage sectors had higher prevalence's to work-related fatalities, injuries and illnesses in Ireland. These injuries, illnesses and fatalities were due to falling objects, manual labour, gases and pathogens (HSA, 2022).

The statistics above shows that occupational injuries and illnesses are spread in different working sectors, from construction with occupational injuries and illnesses like back pain due to manual labour, chronic obstructive pulmonary disease (COPD) due to dust and particulates transport and storage sectors and Agricultural, fishing and Forestry.

Livestock farming is not an exception in the areas that are highly hazardous to workers in terms of job-related injuries and illnesses. The work has high manual labour, higher interaction with machines through cleaning the area, vaccinating and dipping the livestock's, and preparation of animal feed. All these activities also result in workers being subjected to conditions that may cause occupational injuries like accident with moving parts of a machine, inhaling toxic dust from animal feed mills, inhaling cleaning chemicals and close contact with animals which may results in zoonotic disease transmission. On this research, the nature and causes of occupational injuries and illnesses from Swine farming industry has been investigated with using the Zimbabwean company Triple C as a case study from the year 2022-2023

Triple C is the largest producer of pigs in Zimbabwe, and it is a subsidiary company of the company Colcom. Working with animals on daily bases faces dangers of being exposed to many hazardous situations. Those who work with swine from farm workers, slaughterhouse workers and veterinaries face unique risks related with these animals and their environment.

Meat inspectors are among those who may come into touch with special safety concerns throughout ante- and post-mortem meat examination. These dangers comprise: (i) Close contact with a large number of pigs (ii) infections with pathogens that can be spread by close contact with live or slaughtered animals, such as Salmonella or Human Brucellosis; this can occur directly with the animals as well as indirectly through contaminated equipment, machineries, or polluted premises or air; and (iii) accidents/injuries caused by handling live animals or freshly stunned and bled animals that still exhibit unexpected reflex movements (Raynor et al., 2019). In an search conducted by (Taylor et al., 2020) swine Brucellosis can be transmitted to humans especially to the workers in the swine farms or slaughterhouses. Moreover, the killing procedure is highly mechanised, and a huge figure of moving, piercing, and sharp instruments are in usage, which may endanger the workers. Potential dangers include structural flaws. There may likewise be health problems owing to constant noise and poor indoor air quality, such as low temperature and excessive humidity in the abattoir buildings (Handajani et al., 2022).

When compared to other occupations involving manual labour, the degree of work-related risks in abattoirs is excessively high. Individuals employed in abattoirs frequently suffer from occupationally-related health problems, despite acquaintance with the sources of risk and the relevant preventive and preventative measures (Sooryanarain & Meng, 2020). Aside from the particular factors mentioned above, this is also attributable to high individual trauma, such as the fast working tempo on the line, regularly tight workplaces, and repetitious work (Handajani et al., 2022). Preventing illnesses and accidents necessitates a constant focus on the work process.

Although past research has looked at the occupational health of veterinarians, there is a dearth of data on the occurrence of accidents and diseases unique to swine practitioners from the farm to the abattoir. This study utilises Triple C pig firm as a case study to analyse the nature and causes of occupational injuries and illnesses at pig farms and slaughterhouses.

1.2 PROBLEM STATEMENT

Inadequate evaluation of occupational injuries and diseases among workers leads to accidents that may have been averted. These mishaps can be lethal to workers as well as the population if a disease-causing bacterium is transmitted. There has been no publication in Zimbabwe on the evaluation of occupational injuries and illnesses to swine workers, leaving a gap that needs to be

filled. This study aims to comprehensively examine the occupational injuries and diseases that might occur when working with pigs, from farm to abattoir, using Triple C pigs as a case study.

1.3 JUSTIFICATION

The findings from the Health and Safety Authority's 2021 Annual Review, regarding the nature and causes of occupational injuries and illnesses among swine practitioners, as well as occupational health and safety (H&S) records, may contribute to the realization of optimal workforce maintenance.

This research project is being undertaken as a requirement for the researcher to complete his degree program as he is anticipated to bring out a research study in the course of accomplishing his degree program. The researcher will benefit from the research since it will enable him to acquire skills and knowledge in carrying out a research for further education. It will also help the researcher to understand and have knowledge on the nature and causes of occupational injuries and illnesses.

This study is significant to the university as it will be used as a knowledge source if selected to be in the university library. This study on the nature and causes of occupational injuries and illnesses can help the university in dealing with workplace related injuries and illnesses and even on other ways of improving employee performance. This enables the university employee and the institution create a good work environment and even attract more students and researchers.

As intended by this research, the research purposes to gain a comprehensive understanding on the nature and causes of work-related injuries and illnesses. This might shed light on some unidentified and or probably underestimated challenges experienced by employees. The research also intends to offer recommendations that enable them to thrive despite the adversities they face which will benefit both the organization and the stakeholders.

1.4 AIM

To assess the nature and causes of occupational injuries and illnesses at triple c pigs.

1.5 OBJECTIVES

- To determine nature of occupational injuries and illnesses to which swine practitioners are subject
- To determine factors that contribute to occupational injuries and illnesses among to swine practitioners

1.6 RESEARCH QUESTIONS

- What are the occupational health injuries and illnesses associated with working with swine at the farm and slaughterhouse?
- What are the factors contributing to occupational health injuries and illnesses associated with working with swine at the farm and slaughterhouse?
- How to reduce these hazards faced by swine workers.

1.7 LIMITATIONS

1.7.1 Official Secrecy Act

The employees' confidentiality agreement allows them to withhold information related to their official tasks, potentially leaving the researcher with insufficient data. In this context, the researcher's promise of complete anonymity and assurance that the data will only be used for educational purposes was likely a necessary step to overcome the challenge of participants being torn between revealing and withholding information. This approach helped facilitate the study and obtain meaningful findings, despite the limitations posed by the organization's policies around classified information.

1.7.2 A limited budget

In addition to the confidentiality concerns, the researcher also has to navigate the funding challenges for this study. Conducting the research requires resources for transport, accommodation, stationery, telephone and internet expenses, as well as printing materials to obtain respondents' opinions. Since the organization itself may be limited in providing funding, the researcher will likely have to rely on personal funds to cover these necessary costs in order to carry out the study. This added financial burden places further constraints on the researcher, who must find ways to fund the various aspects of the research project out-of-pocket. Overcoming both the confidentiality and funding hurdles will require significant effort and resourcefulness from the researcher.

CHAPTER TWO: LITERATURE REVIEW

2. I INTRODUCTION

This segment attentions on reviewing the literature related to the nature and causes of occupational injuries and illnesses to the swine practitioners from the published researches. It also looks at personal, environmental and workplace factors that contribute to workplace incidents.

2.3 INCIDENTS AND INJURIES COMMON IN PIG FARMING.

Zoonotic diseases, which are illnesses spread from animals to people, account for approximately 60% of all human infectious diseases. The report's findings indicate that the work-related diseases and injuries observed are caused by a diverse range of pathogens, including bacteria, viruses, fungi, and parasites. These infectious agents can be transmitted to workers through various routes, such as inhalation, direct or indirect contact, ingestion, or vector-borne transmission. This underscores the complex and multifaceted nature of the occupational health

challenges faced by workers in the regions with disproportionately high disease burdens. The wide range of potential pathogenic causes and transmission pathways highlights the need for comprehensive, multi-pronged prevention and control measures to effectively address the occupational health risks in these areas. (Kraemer & Oppliger, 2017). Farmworkers, particularly those in the swine industry, face an elevated risk of occupational injuries and both acute and long-term health problems due to their exposure to a range of hazards, such as chemicals, equipment, animals, repetitive motions, life-threatening weather conditions, and extended toil hours (Kraemer & Oppliger, 2017). Additionally, the unique environmental conditions found in large-scale pig farms, including high levels of noxious gases, agronomic dusts, and elevated noise intensities, can contribute to the development of chronic and acute respiratory conditions in these workers, including asthma, bronchitis, COPD, coughing, hypersensitivity pneumonitis, throat irritation, sinus problems, and noise-induced hearing loss, often leading to amplified absenteeism (Dutkiewicz et al., 2017).

2.4 FACTORS ASSOCIATED WITH ACCIDENTS IN PIG FARMING.

The animal facility environment can promote quick microbial growth and expansion, particularly when proper sanitation and cleanliness standards are not upheld. The most hazardous biological agents found in organic dust from sources like hay, grain, animal skin, and hair are microbes and fungi of animal and plant origin, as well as allergenic and immunotoxic compounds produced by these microorganisms. The report highlights an additional significant biological risk factor for workers in the swine industry - the presence of mold growth within swine housing units. Pig farmers, in particular, are a group with high occupational exposure to inhalable mold spores in these environments. The health effects of exposure to fungi from genera such as Aspergillus, Penicillium, Fusarium, Stachybotrys, and Trichoderma are well-documented. These harmful fungi can cause a range of respiratory and other health issues for workers in swine facilities. This underscores the need for comprehensive strategies to monitor and mitigate mold growth in swine housing, in addition to the other occupational health and safety measures required to protect pig farmers and other workers in this industry. Proper ventilation, humidity control, and regular cleaning and disinfection of swine facilities are crucial to reduce workers' exposure to these fungal hazards. (Douglas et al., 2018).

The literature highlights the significant occupational health risks faced by swine farm workers due to the potential transmission of zoonotic infections from pigs. Pigs can harbor pathogens like Salmonella, E. coli, and influenza viruses, which can then be passed on to farm workers (Douglas et al., 2018). Exposure to these infectious agents can lead to a range of health problems, such as asthma, allergic rhinitis, extrinsic allergic alveolitis (EAA), chronic bronchitis, mucous membrane irritation, and other communicable diseases. Additionally, studies have found a high prevalence of methicillin-resistant Staphylococcus aureus (MRSA) among swine farm workers, with increased colonization rates associated with intensive breeding and close animal contact, suggesting the potential for animal-to-human transmission of livestock-associated MRSA (Pirolo et al., 2019). Furthermore, research has revealed the presence of CTX-resistant and extended-spectrum β-lactamase (ESBL) producing Escherichia coli in swine workers and pigs, particularly in regions with rapid growth in industrial swine production and heavy agricultural antibiotic use (Dignard & Leibler, 2019). These findings underscore the critical importance of implementing robust occupational health and safety measures to protect swine farm workers from the risks posed by zoonotic infections and the transmission of antibiotic-resistant pathogens.

The bio aerosol containing organic compounds from microbes, such as endotoxins, peptidoglycans, glucans, and mycotoxins, can trigger an allergy-like reaction in the pulmonary immune system when inhaled, leading to a condition identified as toxic syndrome of organic dust (ODTS) (Niaz et al., 2021). The release of these toxic substances related with massive pig farming poses a significant health risk to animal rearing and breeding workers, affecting a large number of individuals, as evidenced by the fact that approximately 300,000 farms are involved in pig production in Poland, with secluded farms accounting for 99.8% of the total (Ramos et al., 2018).

2.4.1 CHRONIC AND ACUTE RESPIRATORY DISEASES.

The indoor air in animal buildings can be contaminated with a variety of chemical compounds, including alcohols, aldehydes, amines, organic chlorine compounds, and those produced during the metabolic processes of sulfur-containing amino acids in the animal gastrointestinal tract, such as sulfides and thiols (Sigsgaard et al., 2020; Sun et al., 2017).Swine confinement encourages waste byproducts and feed concentration, resulting in high amounts of organic dust, together

with dusts, gases, bacteria, microbial metabolites, and other possible airborne health concerns (Viegas et al., 2017). The bioburden, which consists of fungus and bacteria, should be considered a serious airborne contaminant in swine production facilities alongside organic dust (Buoio et al., 2023). When feeding happens, large amounts of organic dust particles from the meal are aerosolized and deposited on the floor. Microorganisms and their byproducts are also commonly distributed as they become airborne during the feeding process (Han et al., 2023; Viegas et al., 2017). In swine production, volatile organics (VOCs) can be produced by the fermentation and decomposition of numerous microbial growth substrates, including as feeding supplies, mouldy hay, faeces, manure, and bedding material, as well as ventilation, filtration, and misting applications. Air contaminated with volatile compounds created during the breakdown of organic animal matter can be harmful, unpleasant, and even carcinogenic. These chemicals irritate the mucous membranes of the eyes, nose, throat, and skin. According to (Chmielowiec-korzeniowska et al., 2018), these pollutants activate sensory nerves, causing neurochemical alterations that impair health. Long-term VOC exposure compromises immunological function in humans and leads to a variety of illnesses (Chmielowiec-korzeniowska et al., 2018). Symptoms typically reported by farm workers and communities living near swine farms include eye, nose, and lip irritation, headache, diarrhoea, hoarseness, lip ulceration, cough, chest tightness, palpitation, shortness of breath, stress, drowsiness, and mood disorders. The severity of symptoms is proportional to the level of air pollution (Yu et al., 2021). Swine workforces have an enlarged occurrence of numerous respiratory symptoms and diseases, such as chronic bronchitis, chronic obstructive pulmonary disease, and organic dust toxic syndrome, due to irritation caused by volatile organic substances, especially when VOC concentrations in the air exceed 2.5 mg/m3 (Chmielowiec-korzeniowska et al., 2018). The variety of contamination sources exacerbates the job-related problem and makes control measures ineffective.

2.4.2 EXPOSURE TO HAZARDOUS SUBSTANCES:

The report also brings attention to the occupational health hazards associated with pesticide and chemical exposure among animal workers, specifically those in the swine industry. The research suggests that the use of pesticides in livestock production may increase the risk of Parkinson's disease (PD) for farmers. While the connection between pesticide exposure and PD has been previously studied in crop farmers, identifying animal farmers as a population at risk due to similar exposures is a significant contribution (Dignard & Leibler, 2019). Furthermore, the report

cites a study that found elevated levels of macrophage-derived chemokine (CCL22) in swine farmers, which is believed to contribute to lung carcinogenesis. This provides an immunological explanation for the inverse relationship between swine farming and lung cancer, which is thought to be caused by endotoxin exposure. These findings underscore the importance of implementing robust occupational health and safety measures to protect animal workers, particularly swine farmers, from the harmful effects of pesticides, disinfectants, and other chemicals used in livestock production.

2.4.3 HEAT STRESS:

Workers on pig farms are frequently required to labour in hot and humid circumstances, particularly in pig housing facilities. Heat-related ailments for example heat exhaustion or heat stroke can arise from prolonged exposure to high temperatures and poor hydration.

2.4.5 SLIPS, TRIPS, AND FALLS:

Pig farms frequently have slick surfaces as a result of animal excrement, water, or feed spillage. Slips, trips, and falls among workers can result in fractures, sprains, brain injuries, and other damage. Uneven ground, poor lighting, or cluttered locations all contribute to the danger of such incidents. In Missouri, a short study looked at self-reported injury and healthiness standing among Latino immigrant workforces (Caroline & Vale, 2019). Their findings revealed a significant proportion of employees evaluating their well-being as fair or bad, as well as a high proportion of occupational injuries.

2.4.6 MACHINERY AND EQUIPMENT ACCIDENTS:

Farm machinery and equipment, such as tractors, loaders, and livestock handling equipment, can be dangerous if not properly operated and maintained. Workers can sustain fractures, amputations, or crush injuries as a result of moving parts, entanglement, or being struck by equipment.

2.4.7 NOISE AND VIBRATION HAZARDS:

According to numerous studies, hearing loss affects 50% of the rural population. According to the information provided, the mean noise levels from certain equipment and activities in swine

farming operations, such as tractors, hoover pumps, and feed unloading areas, exceed the Occupational Safety and Health Administration (OSHA) procedures for hearing protection standards. This indicates that the noise levels in these areas of the swine facility are high enough to potentially cause hearing damage or loss for workers who are exposed to them. OSHA has established noise exposure limits and guidelines to protect workforces from the injurious effects of extreme noise in the workplace. The fact that the mean noise levels in these swine farming environments exceed the OSHA standards suggests that workers in these areas may need to wear appropriate hearing protection devices, such as earplugs or earmuffs, to safeguard their hearing health and prevent long-term, irreversible hearing damage. Pig farm noises, such as machinery, ventilation systems, or squealing pigs, might cause hearing loss or other auditory disorders. Heavy equipment or vehicle vibrations might potentially contribute to musculoskeletal diseases over time.

2.4.8 MUSCULOSKELETAL DISORDERS (MSDS):

Farming and other agricultural producing operations are considered physically demanding. Farm workers who handle large feed bags, clean pens, or manually restrain pigs are at risk of getting MSDs such as back pain, strains, and repetitive strain injuries. These diseases are exacerbated by awkward postures, repetitive activities, and overexertion.

2.4.9 LACK OF TRAINING AND AWARENESS:

Inadequate training or awareness about safety protocols, animal behaviour, and proper handling skills can all lead to workplace injuries and illnesses. Workers, especially new staff, must get comprehensive training on farm-specific dangers, preventive measures, and emergency protocols (Shang et al., 2020). The report also highlights the occupational health risks associated with pesticide and chemical exposures among animal workers, including those in the swine industry. Specifically, the research indicates that the pesticides used in livestock production may increase the risk of Parkinson's disease (PD) for farmers, while swine farmers have elevated levels of a chemokine linked to lung carcinogenesis. These findings underscore the need for robust occupational health and safety measures to protect animal employees, particularly swine farmers, from the harmful effects of pesticides, disinfectants, and other chemicals used in livestock production. The majority of the studies analysed showed the training programmes to be

ineffective, with little or little change in injury outcomes when the typical training programmes were used or not.

2.4.10 LACK OF PERSONAL PROTECTIVE EQUIPMENT (PPE):

The lack or incorrect use of PPE on pig farms can dramatically raise the risk of accidents and diseases. To reduce exposure to dangers, workers should be equipped with suitable protective equipment, such as gloves, safety glasses, respiratory protection and protective clothes

CHAPTER THREE: METHODOLOGY

3.1 INTRODUCTION

Chapter three outlines the study methodology employed in the current research. The purpose is to detail the research design, instruments, and data collection procedures that were utilized. This section also provides justification for the use of the various methods. Additionally, this chapter addresses the ethical considerations of the research. This includes how informed consent was obtained from the participants, the measures taken to maintain confidentiality, and the protocols for data usage and storage. In summary, this research followed a robust and well-planned methodology that was rigorously executed to ensure the results were accurate and reliable.

3.2 STUDY AREA

The research was conducted at Grasmere farm which is located in the Mashonaland West province of Zimbabwe (17°55'30"South 30°54'50"East), about 60 km south of the capital, Harare. It is situated in Norton, a small town that is well known for its agricultural production, especially of pigs and poultry. It falls within the Zvimba District, which is one of the 7 districts that make up the Mashonaland West Province. The climate in Norton and the broader Zvimba District is classified as subtropical highland. The climate in this region is characterized by warm, humid summers and cool, dry winters. The average annual temperature typically falls between 18-25 degrees Celsius. Precipitation levels are moderate throughout the year, with the rainy season occurring from November to March, and an average annual rainfall of around 800-900mm.The Zvimba District, including the Norton area, has an economy that is largely agrarian-based. The primary economic activities include commercial and subsistence farming. The district

is known for the production of crops such as tobacco, maize, sorghum, and various horticultural products. Livestock farming, particularly of cattle, goats, poultry and swine, is also an important economic activity.

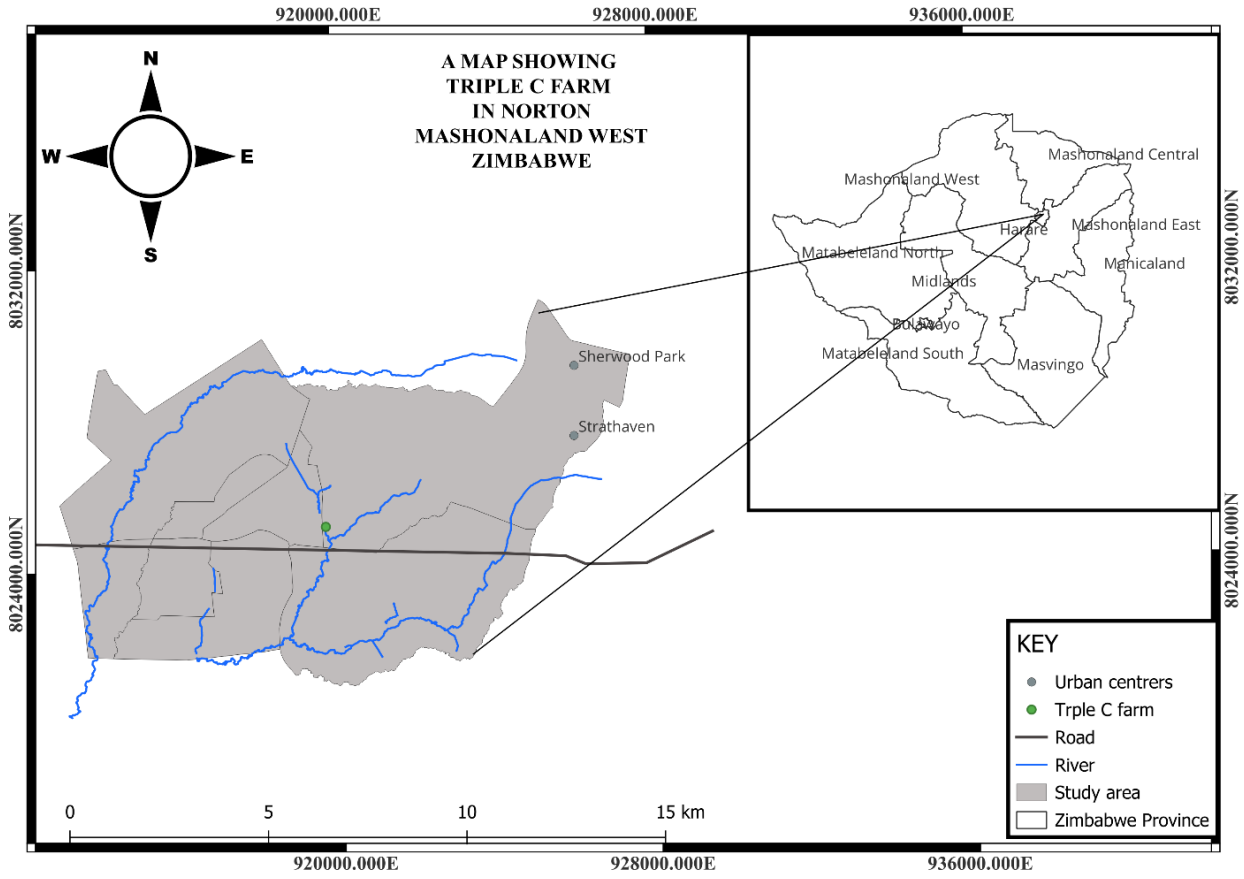


Figure 3.: Study area map1

3.3 STUDY DESIGN

The research utilised a cross-sectional study design to investigate the nature and causes of injuries and illnesses at Triple C pigs. This approach provided a comprehensive snapshot of the trends and reasons behind these issues at the farm. By employing this study design, the researcher and team were able to efficiently gather information on injuries and illness among all employees over a short period of time without significantly impacting production at the organisation.

3.3.1 SAMPLING AND SAMPLE SIZE

Participants for research study were selected randomly from various departments, including abattoir workers, general work staff, veterinarians, house attendants, workshop and maintenance, feed meal operators, drivers, and administration staff.

3.3.2 SAMPLING TECHNIQUE:

The sampling technique used in this research study is a combination of random sampling and stratified sampling. Random sampling was employed to safeguard that each individual in the populace had an equivalent chance of being selected. Additionally, the inclusion of participants from various departments indicates the use of a stratified sampling approach, where the population was divided into subgroups (departments) and samples were randomly selected from each subgroup.

3.3.3 RATIONALE FOR CHOOSING THE SAMPLING TECHNIQUE:

The decision to use random sampling was driven by the need to minimize bias and guarantee that the sample was representative of the entire population. By giving each individual an equal opportunity to be selected, random sampling helps in obtaining a sample that is likely to be reflective of the overall population. The inclusion of participants from different departments through stratified sampling was motivated by the desire to capture diverse perspectives and experiences within the organization. This approach allows for insights from various roles and responsibilities to be represented in the sample, providing a more comprehensive understanding of the workforce.

3.3.4 SAMPLE SIZE AND POPULATION INFORMATION:

The sample size for this study was determined to be 101, while the total population at the company is 970. This sample size represents approximately 10.4% of the total population, which is generally considered sufficient for many research studies.

3.3.5 JUSTIFICATION FOR SAMPLE SIZE:

The sample size of 101 was established grounded on considerations such as the desired level of confidence, the margin of error, and the variability within the population. It provides a equilibrium between obtaining meaningful insights and handling the practical constraints of data collection and analysis.

By employing a combination of random and stratified sampling, and considering the sample size in relation to the total population, the research study aims to gather a representative sample that encompasses a diverse range of perspectives within the company. This approach is intended to enhance the validity and generalizability of the study's findings.

3.4.1 QUESTIONNAIRE

Structured questionnaires formed the basis for the data collection process as a means of soliciting the nature and causes of injuries and illnesses among workers at Triple C Pigs. These identical questionnaires had five sections namely, 1 Demographic Covariates, 2 Self-rated health,3 Occupational Injury, 4 work-related health problems reported by individuals working with pig and 5 Job context. A total of 100 questionnaires were administered to Triple C Pigs workers.

3.4.2 DEMOGRAPHIC COVARIATES

The study included several demographic covariates such as age, length of employment, education, English language ability, and relationship status. Age was recorded as a continuous variable but was also categorized into three groups: 18–24, 25–40, and over 41. Length of

employment at the current employer was divided into three categories: less than one year, one to three years, and more than three years. Education level was determined based on the highest grade or year of school completed, with six categories ranging from never attending school to graduating from college or above. For the analysis, education was divided into two categories: completed more than a high school education, or completed less than a high school education. Relationship status was categorized as never married, married, or part of an unmarried couple.

3.4.3 SELF-RATED HEALTH

The study used a single self-rated health question to gauge wide-ranging health status, with answer options ranging from excellent to poor. The responses were coded from 4 to 0, and for the analysis, self-rated health was divided into two categories: fair and bad, and good, very good, and excellent.

3.4.4 OCCUPATIONAL INJURY

The evaluation of occupational injury was based on the question "Have you ever been injured on the job?" related to the worker's present job. The possible responses were yes and no. Participants who reported sustaining an injury at work were asked additional enquiries about the injury, such as its type, location, origin, and duration of missed time. Lastly, participants were asked if they knew other employees who had suffered workplace injuries, with possible responses being yes or no.

3.4.5 OCCUPATIONAL HEALTH PROBLEMS PERCEIVED TO BE DUE TO WORKING WITH PIGS.

Participants were probed if they thought working with pigs had caused any health issues. There were two possible responses: yes (1) and no (0). Following their "yes" response, participants were questioned about the specific occupational health issues they had encountered, including allergies, breathing issues, scorching eyes, headaches, hearing issues, sinus issues, contagions, muscle soreness, nausea, skin conditions, throat irritation, and others. In addition, participants were inquired if they currently smoked, including both daily and occasional smokers (1), or if they were not a smoker (0).

3.4.6 JOB CONTEXT.

The study collected several continuous variables related to the job context of the participants in order to evaluate their working conditions. These included the number of hours worked per week, the total number of animals in the "Triple C Pigs" facility, and the number of animals each worker personally cared for at that location. By gathering this objective data on the job factors, the researchers aimed to gain a comprehensive understanding of the participants' work environment.

Additionally, to assess the workers' subjective perceptions of occupational risk, the participants were asked a single question: "How dangerous do you feel your job is?" The response options ranged from "Not at all risky (0)" to "A little dangerous (1)", "Dangerous (2)", or "Very dangerous (3)". This categorical variable allowed the study to evaluate the workers' personal views on the extent of risk associated with their jobs. Together, the continuous job context measures and the subjective risk perceptions provided the researchers with a multi-faceted assessment of the working conditions experienced by the participants.

3.5 PERMISSION AND ETHICAL CONSIDERATIONS

The study's purpose was clearly communicated to all participants, and the researchers obtained ethical approval from the Human Resources department prior to the commencement of the study. The participants volunteered to take part in the study and were told that they could quit at any

time. Respect for dignity of participants was prioritized during the study. All information was treated confidentially and was only used for research purposes.

3.6 DATA ANALYSIS AND INTERPRETATION.

The data analysis for this study was conducted using SPSS version 23.0. The researchers utilized descriptive statistical analysis, calculating measures such as means, standard deviations, and frequencies, to provide an overview of the salient features of the collected data. A standard statistical significance level of $p < 0.05$ was used to determine whether any observed relationships were statistically significant. To examine the magnitude and significance of the relationships between the study variables and any factors believed to be linked to work-related injuries, the researchers utilized Pearson's correlation analyses. This rigorous statistical approach allowed the researchers to thoroughly examine the relationships between the various factors measured in the study, providing a solid foundation for their findings and conclusions.

CHAPTER FOUR: RESULTS

4.1: DEMOGRAPHIC DETAILS OF STUDY PARTICIPANTS

The distribution of gender among a sample of 101 Triple C Pigs workers was almost equal, as demonstrated by the fact that 43% were females 57% were males. This shows that both sexes were represented in significant numbers at the workplace. The ages of the respondents varied widely from 18 to over 40 years. The largest proportion 51% of respondents fell within the age range of 25 to 40 years while the smallest proportion 12% were between 18 to 24 years of age. This shows that the workforce was skewed towards a slightly older demographic. The level of education attained by the respondents was diverse with graduates from college or above representing 31.7% those who completed college or technical training comprised of 5.9 followed by respondents who attained form 5 to 6 level education which accounted for 8.9 of the respondents. Respondents completed form 1 to 4, grade 1 to 7or never went to school represented 29.7%, 18.8% and 3 % respectively.

Variable		Frequency(N)	Percentage (%)
Gender	-Male	57	57
	-Female	43	43
Marital Status	-Married	75	75
	-Single	25	25
Age	-18 to 24	12	12
	-25 to 40	51	50.5
	- Over 40	33	32.7
Level Of Education	-never went to school	3	3
	-grade 1 to7	19	18.8
	-form 1 to4	30	29.7
	-form 5 to 6	9	8.9
	-completed college or technical training	6	5,9
	- graduated from college or above	33	31.7

Table 4.: Demographic details of respondents1

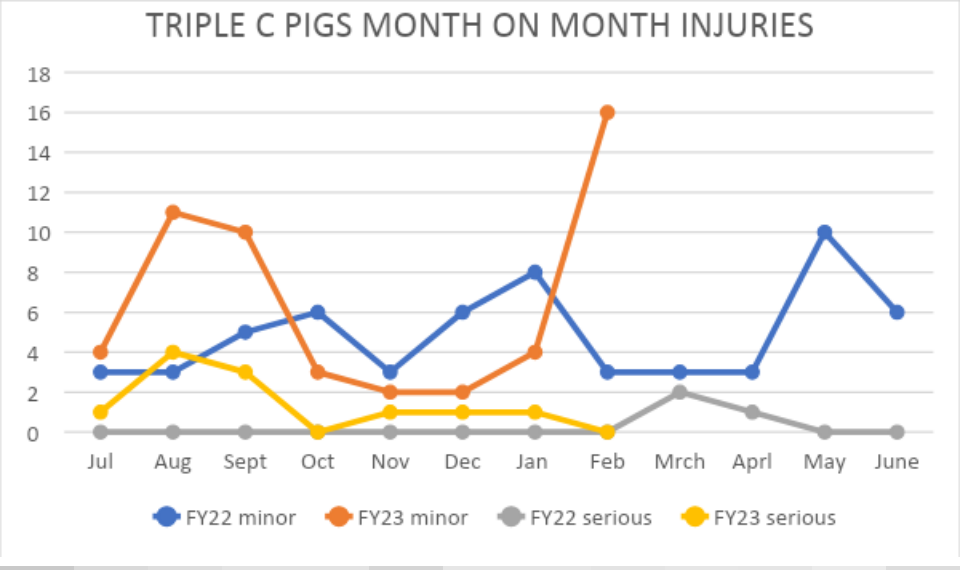
4.2 NATURE OF INJURIES OCCURING AT TRIPLE C PIGS.

As depicted in table 4.1 below, physical injuries such as cuts and lacerations (34.7%), electrocution (4.9%), fractures and amputations (1.9%) were the most frequently reported type of injury at the different workplaces at Triple C Pigs. In the same vain, ergonomic injuries such as musculoskeletal disorders, sprain and strains were reported more frequently as well at various workstations representing 28.7% each of the total injuries reported.

Type of injury	**Frequency**	**Percentage (%)**
Musculoskeletal Disorders (MSDs)	29	28.7

Cuts and Lacerations	35	34.6
Sprains and Strains	30	28.7
Electrocution	5	4.9
Fractures and amputations	2	1.9

Table 4.: Types of injuries sustained by workers2



4.3: FACTORS THAT CONTRIBUTE TO THE NATURE OF INJURIES AND ILLNESSES AT TRIPLE C PIGS.

Heavy manual tasks can contribute to injuries among Triple C Pigs workers, including strains, sprains, and musculoskeletal injuries. Prolonged or repetitive heavy loading and offloading of feed can lead to physical strain and injury, impacting the overall health and well-being of workers. On top of that, hostile or aggressive behavior in pigs posed a significant risk to farm workers, leading to injuries such as bites, kicks, or trampling. The lack of proper PPE for tasks such as operating pressure washers and treatment controllers exposed workers to various hazards, including chemical exposure, high-pressure water risks, and other occupational health and safety concerns. Prolonged work shifts result in worker fatigue and diminished vigilance, thereby elevating the potential for work-related accidents and injuries to some workers. Fatigue can impair cognitive function and physical coordination, potentially leading to workplace incidents.

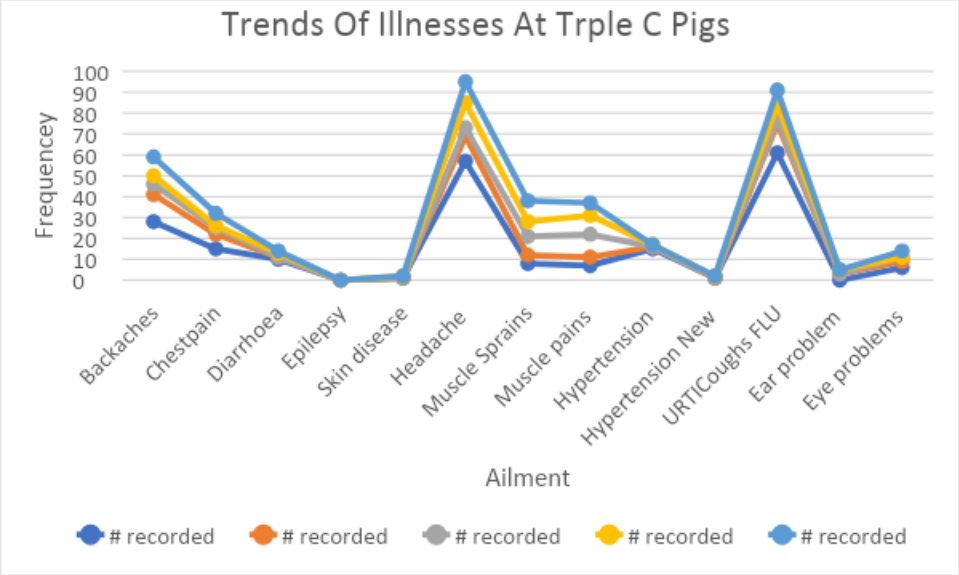


Figure 4.: Trends of illness from January 2023 to May 20233

4.4 HEALTH PROBLEMS PERCEIVED DUE TO WORKING WITH SWINE.

The figure below presents different ailments perceived by workers due to working with swine. Workers suffering from allergies are the majority (25.39%) followed by those battling with

respiratory issues constituting about 19.3%. Hearing problems are significant contributing about 11.17%, headaches and skin infections are least with 6.9% and 3.5% respectively.

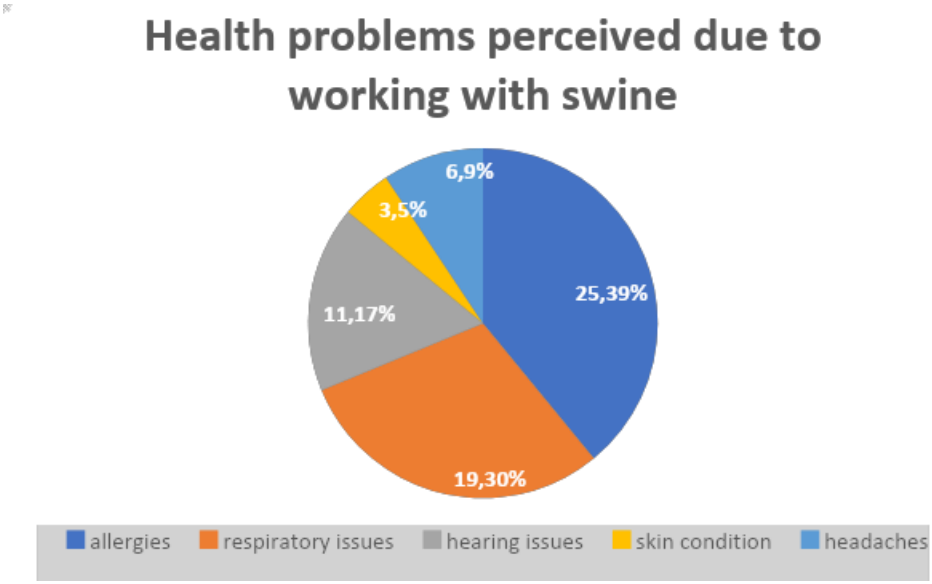


Figure 4.: Health problems perceived due to working with swine4

CHAPTER FIVE: DISCUSSION

5.1 INTRODUCTION

The following section is going to discuss results obtained from analysis done. The purpose of this discussion is to provide an explanation of the results as per the objectives.

5.2 NATURE OF INJURIES OCCURING AT TRIPLE C PIGS.

The study's results revealed that the largest portion of all injuries consisted of physical injuries**.** The definition of physical injury refers to harm or damage caused to a person's body. From the research, findings reveal that, it can be noticed that most workers were suffering from needle stick injuries, extreme weather related problems, being stepped by pigs during loading, finger amputations caused by rotating augurs, cuts and laceration, bruise, animal bites, slips trips and fall, sprains and strains, machinery and equipment accidents, noise and vibration hazards. The study reveals that employees working at the pigsty face a significant risk of cuts and lacerations. This is attributed to their frequent handling of sharp objects, such as rotating augers during stock feed reception. Similarly, the workshop and maintenance teams encounter similar risks due to their daily interaction with sharp tools. Furthermore, veterinarians working with animals are also

prone to needle stick injuries. Quite a number of cuts and lacerations are reported from the slaughter house workforce.

Additionally, research has highlighted the and Matunhira 2022). Employees working with swine face the risk , Rau et al. 2021)of cuts and lacerations due to the nature of their tasks, which often involves handling sharp tools and working in environments where such injuries are likely to occur. The Occupational Safety and Health Administration (OSHA) prevalence of cut injuries (lacerations) among pork processing workers, emphasizing the significance of this issue in the industry(Jeriestresses the importance of managers choosing and needing workers to use suitable hand protection to prevent cuts, lacerations, and other injuries(Stellman.

Workers in the feed mill department reported, Andersson et al. 2021). Research has shown that a significant proportion of workers have reported symptoms and disruptions in work due to musculoskeletal discomfort, highlighting the necessity for ergonomic interventions to address these issues. experiencing significant lower back pain and hearing issues. This is primarily due to the physically tough nature of their work, which involves repeatedly lifting heavy feed bags throughout an 8-hour shift. Additionally, they are impacted by the noise and vibrations generated by the plant, especially those working directly within the facility. Ergonomics is crucial in safeguarding the health and well-being of employees engaged in swine-related tasks. The demanding nature of work in swine barns and slaughterhouses can lead to various musculoskeletal issues and discomfort among workers(Wilhelmsson

Employers in the swine industry are advised to implement ergonomic programs aimed at minimizing stressors and reducing the risk of work-related musculoskeletal disorders (WMSDs)(van de Wijdeven, Visser et al. 2023). This involves identifying and mitigating unsafe conditions, providing comprehensive training for both employees and employers, and ensuring favorable work conditions for ergonomic handling.

5.3 ILLNESSES PERCEIVED DUE TO WORKING WITH SWINE.

From that research, that has been done, it has been noted that swine practitioners were suffering from different ailments. Ailments refer to bodily disorders or chronic diseases, often of a minor or persistent nature(Sinha, Uddin et al. 2023). They can encompass a range of physical disorders or illnesses, including minor or chronic conditions such as cough, fever, sore throat, upper

respiratory tract infection, earache, and other health problems that may resolve on their own and can be reasonably self-diagnosed and self-managed. From the study, the ailment found among workers included, allergies, headaches, hearing issues, skin disorder and respiratory issues as dominant ones.

5.4 EDUCATIONAL LEVELS OF STUDY PARTICIPANTS AS A CONTRIBUTING FACTOR TO THE INJURY OCCURRENCE.

According to the study, one may note that the highest proportion is constituted by those which graduated from college or above (33%). The researcher noted that some work stations requires expertise for example, treatment controllers, engineers, administration team and feed meal operators. The second highest was such that those who completed form 1 to 4 had a 30%. These workers are given tasks that do not require a lot of expertise for example truck drivers, weighbridge operators and chefs. The third group had respondents which completed grade 1 to 7 (19%). It is not surprising that the much of the injuries were sustained by this group. These workers worked mostly as pig house attendants, workshop assistance and yard maintainers.it has been noted that their awareness was relatively low because of their level of education resulting in more injuries. The least group marked by never went to school constituted only 5% and it is obvious that injuries were also rampant amongst this group because of the reason above.

CHAPTER SIX: CONCLUSIONS RECOMMENDATIONS

6.1 INTRODUTION

This part provides a summary of the research's conclusions centered on the outlined precise objectives. Moreover, it bids commendations for consideration by several stakeholders to address the identified issues.

6.2 CONCLUSION

The findings of this study lead to the following conclusion

- Ergonomic injuries outnumbered other type of injuries. Musculoskeletal disorders, sprains and strain, cuts and lacerations were the dominant types of injuries sustained by the workers.
- Allergies and respiratory diseases are more dominant among swine practitioners

- Lack of safety awareness is high amongst unlearned workforce

6.3 RECOMMENDATIONS.

Therefore, it is recommended that:

- It is important to priorities raising awareness among individuals who have completed grades 1 to 7 and those who have not received formal education, ensuring they are informed about the hazards associated with their workplace.
- All workers should be provided with efficient and adequate PPE appropriate to their task.

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Appendix I: Questionnaire for Triple C Pigs workers

Dear Respondent,

My name is Elton Sena, and I am a BSc.SHEM student at Bindura University of Science Education, majoring in Environmental Science. I am conducting a study to assess the nature and causes of occupational injuries and illnesses at Triple C Pigs. I would greatly appreciate your assistance in completing the following questionnaire.

Please be assured that the information collected will be treated with the strictest confidentiality and will be used solely for research purposes.

Thank you in advance for your time and cooperation.

Sincerely,

Elton Sena

Fill in the spaces provided to indicate your response

1. **Self-Rated Health**.

Question	**Response Rating**				
	Excellent (5)	very good (4)	Good (3)	Fair (2)	Poor (1)
Would you say that in general your health is...?					

2. Occupational Health Problems Perceived to Be due to Working with Swine.

Question	**Response Rating**

• Would you perceive working with pigs had caused any health issues	Yes (1)	No (0)
If yes, which occupational health issues did you encounter?		
• Allergies. • respiratory issues • burning eyes		
• headaches		
• hearing issues		
• sinus issues		
• Infections (specify)		
• muscle soreness		
• nausea • skin conditions • throat irritation		
• Other occupational health issues (specify)		
• Do you currently smoke	including both daily and occasional smokers (1)	Not a smoker (0).

1. Occupational Injuries.

Question	**Response Rating**	
	Yes (1)	No (0)
• Have you ever been injured on the job		
If you had sustained an injury at work		

• Which type of injury?	
• Location where injury happened?	
• Position of where injury was sustained.	
• Origin	
• duration of missed time	

1. **Job Context.**

Questions			
• Number of animals in the Triple C Pigs.			
• Number of animals a worker personally cared for in the Triple C Pigs.			
• Number of hours worked per week.			
• Number of days per week with overtime.			
• Number of overtime hours per day. • How dangerous do you feel your job is?	Not at all risky (0)	a little dangerous (1) dangerous (2)	very dangerous (3)

2. **Demographic Covariates.**

Covariate						
Age	**18–24**		**25–40**		**Over 41**	
length of employment	**less than one year**		**one to three years**		**more than three years**	
What is the highest grade or year of school you completed?	never went to school (1)	went to elementary school (grades 1–7) (2)	completed some high school (Form 1-4) (3)	graduated from high school (4)	completed some college or technical training (5)	graduated from college or above (6)
relationship status		Never married		Married		part of an unmarried couple

COMMENTS……
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Appendix II: Pictures of the student as he was collecting data.

Picture of the student (in white dustcoat) distributing questionnaires to stock feed loaders

Picture of the student explaining the questionnaire to feed mill operators.