

Safe Food Handling Knowledge and Practices of Street Food Vendors at Louis

Trichardt Makhado Local Municipality, South Africa

by

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**A Mini dissertation submitted in fulfillment of the requirement for the
Degree**

Master of Public Health in the Department of Public Health

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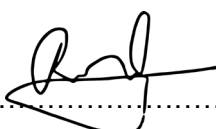
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August 2024

DECLARATION

I **Mudogwa Ronewa**, hereby declare that the mini dissertation titled- “**Safe Food Handling Knowledge and Practices of Street Food Vendors at Louis Trichardt, Makhado Local Municipality**” submitted by me, has not been submitted previously for a degree at this or any other university, that it is my work in design and execution, and that all reference materials contained therein have been duly acknowledged.



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Signature

30/08/2024

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Date

PREFACE

This mini dissertation is presented in article format and comprises three sections: Section 1 presents the study 's overview, Section 2 are manuscripts with their journal guidelines for authors and Section 3 presents the conclusion, limitations and recommendations of the dissertation.

Section 1: Overview of the study/mini dissertation

This section provides an overview that details the study's background, problem statement, purpose, objectives of this study, research design and methods and the ethical considerations.

Section 2: Manuscripts

This section has a total of two manuscript submitted to MDPI- Foods Journal –an international peer-reviewed scientific open access journal. The first manuscript is titled- “Food Safety Knowledge and Hygiene Practices Of Street-Food Handlers In South Africa: A Systematic Literature Review”.

The second manuscript is titled- “Safe Food Handling Knowledge and Practices of Street Food Vendors at Louis Trichardt Makhado Local Municipality, South Africa.

Section 3: Conclusion, Recommendation and Limitations

This last section presents conclusions from this mini dissertation, makes dynamic recommendations, outlines the study limitations reflecting in all that was presented within each section and informed by the whole research process.

DEDICATIONS

I dedicate this research to God Almighty who made it possible for me to accomplish my goals throughout my academic journey. I also dedicate this research to my loving parents and family members who supported me through all the difficulties (Matthew 19:26).

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I would like to thank the Lord Almighty who gave me strength and good health throughout my studies.

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- To the Department of Public Health staff, thank you for the opportunity you gave me, all the knowledge you imparted to me were very useful in this research.

LIST OF ABBREVIATION AND ACRONYMS

CASP	Critical Appraisal Skills Program
EU	European Union
FAO	Food and Agriculture Organization
IDP	Integrated Development Plan
JB	Joanna Briggs Institute
KAP	Knowledge, Attitude, and Practice
MMAT	Mixed Methods Appraisal Tool
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

ABSTRACT

Street-food vendors are an important component of the food supply chain; however, they have been implicated in the spreading of foodborne diseases. Street food often poses a risk to the health of consumers as they are prepared and sold in unhygienic conditions that bring about microbial and environmental contamination. This study aims to investigate safe-food handling knowledge and practices of street food vendors at Louis Trichardt, Makhado Local Municipality, Limpopo Province, South Africa. The researcher conducted the study using a quantitative approach with a cross-sectional descriptive survey design; a non-probability purposive sampling technique was utilized to sample 61 street-food vendors, and a self-administered questionnaire and a structured-observational checklist were used to collect data to determine the vendor's food safety knowledge and practices. Pre-testing was conducted with 20 randomly selected street-food vendors to determine the validity of the measuring instruments and amended them, where necessary. The collected data was analyzed using SPSS statistical software version 19.0. The results showed that majority of the respondents 85.25% were females between the age range of 36-45 years with a high school education level with grade 10-12. About 68.85% of the street food vendors knew the correct way to wash hands, however, 52.46% were observed to not wash their hands before food preparation which may compromise the safety of street food. The majority of the vendors had moderate food safety knowledge (60.66%). This study concludes that street-food vendors practiced unsatisfactory hygiene and sanitary practices, during food preparation, Major infringements were- cross contamination from different food ingredients, lack of temperature control, lack of hand washing, inadequate infrastructure. This study recommends that food handlers are imparted with knowledge through targeted health education and promotion; such initiatives should be implemented periodically to ensure desired food-handling practices are implemented and sustained.

Keywords: Food Safety, Knowledge Attitude Practice (KAP), Safe Food, Street Food, Street Food Vendors.

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SECTION 1: OVERVIEW OF THE STUDY

1. Introduction and background

The street-food industry is a significant economic activity offering opportunities for self-employment for unemployed individuals and low-income households (Letuka, Nkhebenyane and Thekiso, 2021). The street food micro-enterprise requires little capital investment to establish and has negligible taxation, hence, attracts many people into the industry (Marutha and Chelule, 2020). The resultant financial freedom and ability to contribute to household income motivates many individuals into street-food micro-entrepreneurship (Mahopo, Nesamvuni, Nesamvuni et al., 2022). Street food is popular amongst consumers for being low-cost, and easy to access (Ahmed, Afreen, Hassan et al., 2017); in addition, it frees people with busy lifestyles to save time cooking at home because of its ready-to-eat attributes (Abid, Banna, Hamiduzzaman et al., 2022). Generally, street food consumption occurs in countries where people earn little money and are typically more concerned with ease of access than safe-food standards (Mathye and Maliwichi, 2015).

The street-food trade is perceived, by some, a hazard to public health because of food's potential risk in contracting foodborne diseases (Loukieh, Mouannes, Jaoudeh et al., 2018). The World Health Organization (WHO) (2015) reported that foodborne disease cases amount to an estimated 600 million cases and 420 000 deaths each year worldwide, 30% of foodborne deaths occur among children under 5 years of age. Foodborne illnesses cost low-income nations at least \$100 million annually (Oduori, Kwoba, Thomas et al., 2022). Unsafe food handling practices are primarily contributed to poor infrastructures, scarcity of clean water supply, and inadequate food safety knowledge (Trafialek, Drosinos, Laskowski et al., 2018).

Food handlers' knowledge and hygiene practices determine whether there will be risk of microbiological and environmental contamination in the food (Utari, Hermansyah, Saleh, and Pembayun, 2019). When vendors prepare and sell street food in unhygienic conditions it affects the health of consumers (Nkhebenyane, and Lues, 2020); the consumption of unsafe food can lead to detrimental effects of mortality, morbidity, and economic losses (Xu and Yang, 2022). In 2020 the European Union (EU) reported a total of 3086 foodborne outbreaks and 20 017 individual human cases (European Food Safety Authority.,2021). A study done in the Southern European country of Portugal indicated that issues of street-food contamination were linked to poor personal hygiene of food handlers. This was confirmed by the presence of pathogenic microbes on food samples and the hands of food handlers, containing high levels of pathogenic micro-organisms (Campos, Gil, Mourao, Peixe, and Antunes, 2015). In a study done in Central Europe, Slovenia, (59%) of food vending stalls showed a probability of cross-contamination from consumers because there were no physical barriers between the food preparation area and customers (Prevorsek, Ovca, and Jevsnik, 2021).

According to Ncube, Kanda, Chijokwe, Mabaya, and Nyamugure, (2020) the rate in prevalence of food illnesses is higher in underdeveloped countries than in the developed ones. Trafialek et al. (2018) in their study which evaluated hygienic procedures of street- food handlers in two Asian and two EU countries, the latter demonstrated the best degree of conformity with international food-safety standards. This was largely because street vendors in Asian countries lacked a portable water supply and poor infrastructure that often created a potential risk for cross-contamination. Similar challenges were found in a study done in East Asia, in China, where it was revealed that 53.3% of food vending stalls did not have access to portable water and 53,3% of the food handlers did not wash their hands before preparing the food (Ma, Chen, Yan, Wu, and Zhang, 2019).

Studies done in South Asia, Bangladesh and Pakistan reported that street- food vendors were found to have low food safety knowledge, 96.7% did not have food safety training, another study reported that 61% of vending stalls did not cover their food at all and that more than 80% offood vending stalls were exposed to flies. This mainly occurred because food handlers lacked food-safety knowledge; this translated to low levels of food-safety consciousness during food handling (Abid et al, 2022., Ahmed et al., 2017). According to WHO (2015), the burden of foodborne disease is estimated to be highest in the African and South-East Asia regions, usually occurring among susceptible populations such as infants, children, pregnant women, aged people, and the immune-compromised.

Foodborne disease incidences in the African continent are usually connected to contaminated food and water (Odeyemi, 2016). A study done by Nyoni and Bonga (2019) in Southern Africa, Zimbabwe reported that 58% of the street food vendors used tap water, supplied by the City of Harare which had been noted as containing faecal contamination. This caused a cholera outbreak in September 2018 linked to contaminated tap water. Clean water is essential for frequent hand washing, cleaning utensils, and as a food ingredient (Prevorsek et al., 2021).

Letuka, Nkhebenyane and Thekiso (2021) conducted a study in Lesotho where they observed that only 21% of food handlers washed their hands in clean water before handling, preparing, and serving food. The disregard for hygienic measures by food handlers enables pathogenic bacteria to survive causing illnesses in the consumers (Ma et al., 2019). In Namibia, only 36% of the street vendors who participated in a study had adequate knowledge of food safety (Hakwenye, 2019). Food- safety hazard mitigation is likely to be lower in environments where levels of education are low, according to Hoffmann, Moser, and Saak (2019).

In South Africa, the street- food vending trade is regulated by the Foodstuffs, Cosmetics, and Disinfectant Act 54 of 1972, which regulates general hygiene requirements for food premises and the transportation of food and related matter (South Africa, 2018). The burden of foodborne disease is often underreported and underestimated in South Africa (Shonhiwa, Ntshoe, Essel, Thomas, and McCarthy, 2019). The outbreak of listeriosis, in the country, from 2017 to 2018 highlighted a societal need to strengthen food-safety management systems throughout the food chain (Ramalwa, Page, Smith, Sekwadi et al., 2020).

In a study conducted by Moloi, Lenetha, and Malebo (2021) in Mangaung Metropolitan Municipality, Free State Province, it was found that street food samples contained pathogenic microorganisms and were non-compliant with microbial standards for foodstuffs in South Africa; it was also found that 98% of the vendors prepared foods on unclean surfaces. Food preparation areas can be carriers of pathogenic microbes that can be transferred to the food consumed by customers causing foodborne disease (Hakwenye, 2019).

A study done in Zululand District, Kwa-Zulu Natal by Nkosi, and Tabit (2021) it concluded that street food vendors constitute a food safety risk to consumers, primarily by the possession of inadequate food-safety knowledge, non-compliant street food vending infrastructure, and inadequate monitoring and controls by competent authorities. Research conducted in the City of Johannesburg Metropolitan Municipality, Gauteng by Oladipo-Adekeye, and Tabit, (2021) revealed that street food vendors possessed inadequate knowledge concerning internal cooking temperatures of foodstuffs as well as inappropriate food storage temperature for ready-to-eat foods. In Polokwane City Municipality, Limpopo Province, a study by Marutha and Chelule (2020) concluded that safe-food handling practices were mostly inadequate in the Municipality.

In the Vhembe District Municipality, foodborne diseases are considered biological risks to the community (Makhado Local Municipality IDP (2019/2020 -2021/22). Massyn et al. (2015) reported that diarrhea, a symptom of foodborne disease, is a high cause of death for children under the age of 5 in the Vhembe District Municipality with a 21% mortality rate. Research at Thulamela Municipality revealed that only 50% of street- food vendors knew that expired and spoiled foods can cause foodborne illnesses (Nesamvuni, Mahopo, Monyai et al., 2015). Mukwevho in a study conducted in 2018 highlighted that although some vendors articulated a high food safety knowledge, those at Thulamela Municipality did not apply this to safe-food handling practices. Majority of street-food vendors displayed poor hygienic practices and prepared food in unhygienic sites. A study done by Kazaji (2015) to assess factors contributing to the prevalence of cholera, from 2008 to 2009, in the Vhembe District, revealed that the lack of adequate hygiene practices, lack of safe food preparation and handling, inadequate sanitation systems were the major risk factors associated with cholera outbreaks.

1.1 Conceptual framework

The conceptual framework underpinning this study is the grounded theory approach, which according to Chun, Birks, and Francis (2019) represents a method of inquiry and a resultant product of that inquiry. The researcher chose this framework as it explains the causal and effect relationship between variables, hence, in this study, the theory was deemed appropriate in showing the causes of food contamination and their effect of producing foodborne diseases in consumers. Using this theory, the main causes are street- food vendors with inadequate food-safety knowledge, resulting in them implementing poor food-handling practices. The lack of monitoring by law enforcement also creates an environment where street-food vendors are negligent of national regulations, thus, compromising public's health by factors like- using unsafe raw materials, for instance dirty water in the preparation of food.

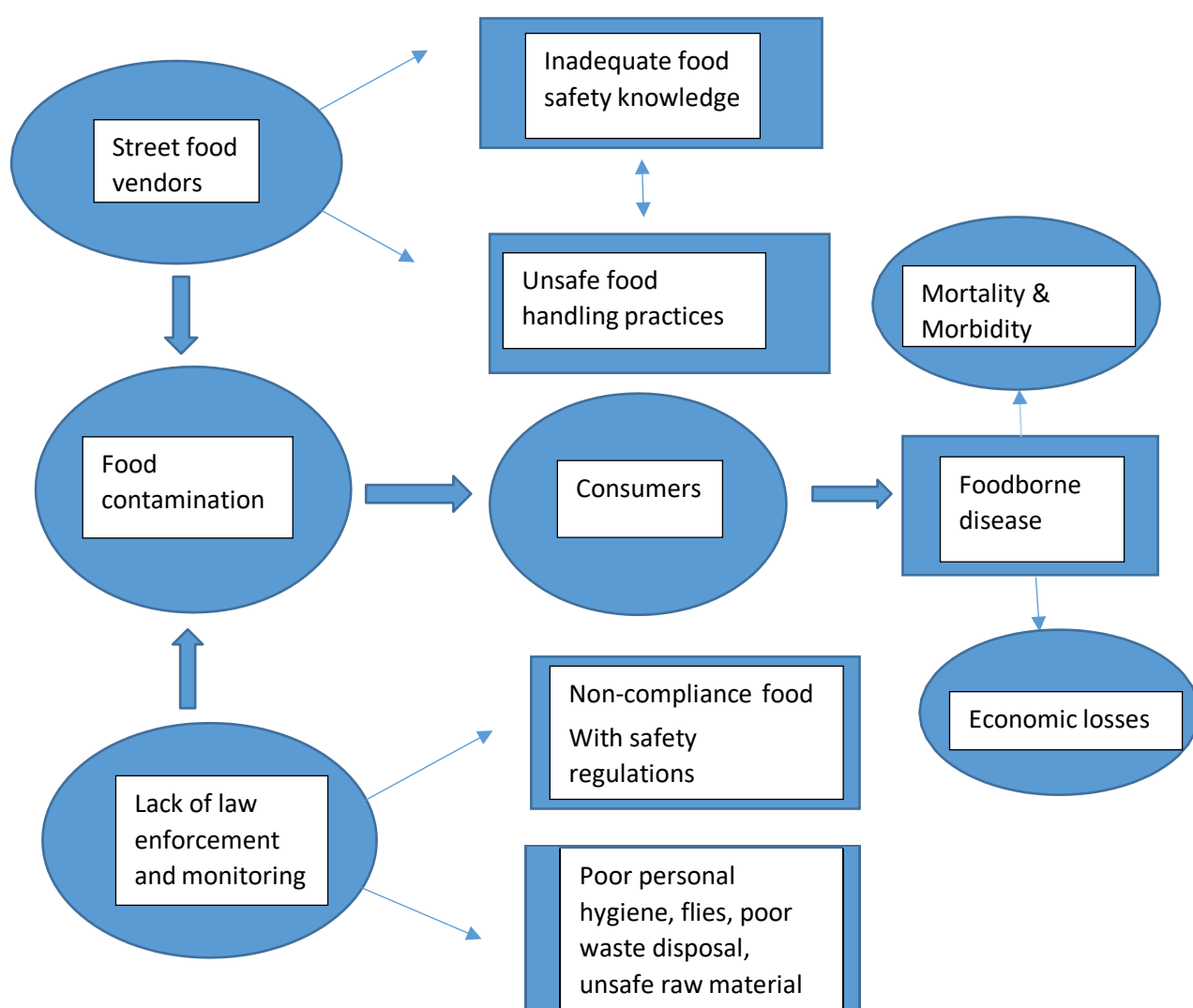


Figure 1: Conceptual framework (Oladipo-Adekeye, and Tabit, 2021).

1.2 Problem statement

The researcher, from observations noticed, that street-food vendors at Louis Trichardt were non-compliant with the food safety regulations governing general hygiene requirements for food preparation and keeping of premises (South Africa, 2018). Infringements include- wearing jewelry while preparing meals, keeping long nails, not wearing aprons, as well as waste, and flies in the vicinity of vending sites. These risk factors provide an environment for food to be contaminated by pathogenic micro-organisms which are transferred to the consumer. This has raised concerns to the researcher whether poor food-handling practices and unhygienic environmental conditions are common phenomena with all street food vendors at Louis Trichardt or if these conditions pertain only to street food vendors who were observed. Studies predominantly associate food-borne diseases and food poisoning with poor food-handling practices (Ncube, Kanda, Chijokwe et al., 2020; Nkhebenyane, and Lues, 2020). The SA Fm radio social media, for example, reported cases of food poisoning in Bungeni village, Louis Trichardt where 100 primary school pupils were rushed to the hospital after complaining of abdominal pain; this resulted in the death of one learner (SA Fm News, 2018). In addition, cases of food poisoning have been reported by the Limpopo Mirror Newspaper in Gumbani village where 29 pupils were hospitalized and one died (Nduvheni, 2019). According to National Regulation R638, a person in charge of food preparation services must ensure that he or she is adequately trained, in the principles and practices of food safety, by an inspector or suitable person.

1.3 Rationale of study

Studies conducted on street vendors' compliance with national regulations governing general hygiene requirements have focused only on Thulamela Municipality (Mukwevho, 2018., Murwirwa, Nemathaga, and Amosu, 2015). Based on the literature available, no known studies have been done to determine the knowledge and practices of street-food vendors at Louis Trichardt, Makhado Local Municipality. This research may provide clarity on safe-food knowledge, required hygienic environmental surrounding, personal hygiene, and safe-food storage practices of street-food vendors in Louis Trichardt.

1.4 Significance of study

The study findings will contribute to the existing knowledge on food safety and required hygienic practices for street-food vendors in the Limpopo Province and in South Africa. Findings will assist the relevant authorities to identify and review existing gaps and help them develop effective policies. It may also benefit health inspectors, health promoters, and community health workers to enforce targeted training for street-food vendors to mitigate non-conformance to the national regulations governing general hygiene requirements for food premises R638. In addition, these may also boost consumers' confidence in purchasing street foods which in turn will promote the street-food vending business, thereby positively impacting unemployment rates.

1.5 Study purpose and objectives

1.5.1 Purpose of the study

The purpose of this study was to investigate safe-food handling knowledge and practices of street-food vendors at Louis Trichardt, Makhado Local Municipality, Limpopo Province, South Africa.

1.5.2 Objectives

- To determine the knowledge of street-food vendors regarding food safety at Louis Trichardt, Makhado Local Municipality, Limpopo Province.
- To ascertain and evaluate the practices of street-food vendors regarding food safety at Louis, Trichardt, Makhado Local Municipality, Limpopo Province.

1.6 Definition of concepts

Food handling: “Refers to the direct handling of packaged or unpackaged food, equipment, and utensils used for food, or surfaces that come into contact with food and that is expected, therefore, to comply with food hygiene requirements” (Codex Alimentarius, 2009). In the context of this study, the concept of, food handling focuses on the handling of cooked and uncooked (raw) food, equipment, and utensils for food or surfaces that come into contact with food and are required to comply with the National Regulations of South Africa, R638.

Practice: “Refers to doing something regularly or constantly as an ordinary part of life” (Britannica Dictionary, 2022). In the context of this study, practice defines the performing of food-hygiene activities to improve or maintain food safety standards.

Safe Food: “Any food that will not cause harm to the consumer when it is prepared and/or eaten according to its intended use” (Codex Alimentarius, 2009). In the context of this study, safe food, refers to the assurance that the food prepared by street-food vendors at Louis, Trichardt, Makhado Local Municipality will not cause harm to the consumers.

Street food: “This is defined as any ready-to-eat foods prepared and/or sold by vendors and hawkers in streets and other similar public places” (Food and Agriculture Organization (FAO), 2022) In the context of the study, street food, refers to ready-to-eat food sold around Louis, Trichardt Makhado Local Municipality

Street-food Vendors: “These are entrepreneurs selling ready-to-eat foods and beverages” (FAO, 2022). In the context of this study, street food vendors are individuals who are 18 years and above, who on a normal work day cook and sell ready-to-eat food at any vending site at Louis Trichardt, Makhado Local Municipality.

2. Methodology

Methodology is defined as the systematic, theoretical analysis of the methods applied to a field of study (Patel and Patel, 2019). The following concepts related to methodology, of a study will now be discussed- the approach, study design, setting, population, sampling, measurement instrument, pre-testing, validity and reliability, data collection, data management and analysis, ethical consideration as well as plan for dissemination and implementation of results.

2.1 Research approach

In this study a quantitative approach was used. According to Patel and Patel (2019), quantitative research is concerned with the measurement of a phenomenon in terms of quantity and is subjected to statistical analysis. The researcher chose a quantitative approach as the study was investigating safe-food handling knowledge and practices of street-food vendors at Louis Trichardt, Makhado Local Municipality. A quantitative approach allowed for variables of knowledge and practice of the street food vendors to be measured into the numerical data.

2.2 Research study design

A cross-sectional descriptive survey design was exploited in this study. A cross-sectional study is done at a specific time and all the information on a specific topic is collected at the same time from the same participants (Brink, Van der Walt, and Van Rensburg, 2018). The researcher chose this design because data was collected from many individuals at a single point without manipulating variables. This study design allowed the researcher to describe the current state of the variables and the characteristics of the study population.

2.3 Study setting

This study was conducted at the town of Louis Trichardt situated in the proximity of the Soutpansberg Mountain range in Makhado Local Municipality, Limpopo Province. The town originated as a Voortrekker settlement, and the town's economy is boosted by farming activities from nearby areas (Thotse, 2010). According to the Makhado Local Municipality Integrated Development Plan (IDP) (2019/2020 - 2021/22), approximately 416 728 people currently reside within the Municipality. Makhado Local municipality forms part of the four local municipalities of the Vhembe District Municipality, located in the northern parts of the Limpopo Province.

The Municipality borders Musina in the north, Thulamela and Collins Chabane in the east, Molemole of Capricorn District Municipality in the west, and Giyani of the Mopani District in the south. According to the Makhado Local Economic Development strategy (2013), the unemployment rate for youths between 15-34 years is 36.7%. The Makhado Local Municipality IDP (2019/2020 - 2021/22) reported that this is because the Municipality is unable to provide sufficient employment opportunities to meet the needs of the population; 19% of the population have no schooling, approximately 11% of the people had attained some form of primary education; 22% of people have a Grade 12 education, and 9% of the people have attained higher education. The Municipality is serviced by health care facilities such as clinics and visiting points. The following health-care facilities are located within the Municipality- 3 Hospitals (Siloam, Elim, and Louis Trichardt Memorial Hospital), 1 private hospital, 44 Clinics, 7 Mobile Clinics, 4 Health Centre, 3 Places of Safety, and 1 Malaria Camp (Makhado Local Municipality IDP 2019/2020 -2021/22). Primary and secondary health care facilities are problematic in certain areas due to limited resources, which renders it difficult to ensure that all the communities are provided with the minimum acceptable levels of health services, for example, most of the clinics do not provide a 24-hour service due to lack of staff and resources (Makhado Local Municipality IDP 2019/2020 - 2021/22). The researcher chose this study area because, from observations, there was a need to investigate the safe food handling practices of street food vendors in this area and the Municipality's lack of resources in offering full health services.



Figure 2: Map showing the location of Makhado Local Municipality.

2.4 Study population

A study population is the entire group of persons or objects that are of interest to a researcher, that is those who meet the criteria for selection as a sample (Brink et al., 2018). The study population of this study is street-food vendors in the town of Louis Trichardt, Makhado Local Municipality Limpopo Province. According to Mahopo, Nesamvuni, Nesamvuni et al. (2022) street-food vendors in Limpopo Province are prevalent in public places, such as taxi ranks and busy roadsides.

2.4.1 Target population

The target population of this study involved street food vendors cooking and selling ready-to-eat food in Louis Trichardt who are aged 18 and above.

2.4.2 Sampling

This study used, a non-probability purposive sampling technique, to select the study population, who included all street-food vendors selling ready-to-eat meals at Louis Trichardt. Purposive sampling allowed the researcher to select the study population based on the knowledge of the phenomenon being studied (Brink et al., 2018). This sampling technique allowed the researcher to distinguish street-food vendors from other vendors selling other goods. Street-food vendors were deemed to be able to provide the best information for the study objectives, because they shared a common characteristic of selling ready-to-eat food, outdoors. The total population of street-food vendors was used because there is a small population of them since this is a sub-group of a larger population of street vendors in the town. Initially, the researcher attempted to get the overall number of street-food vendors located at Makhado Local Municipality from the Vhembe District Municipality, however, they stated that they do not have a database where records of street food vendors are kept. This is supported by a study done by Mahopo, Nesamvuni, Nesamvuni et al. (2022) that reported that municipalities had no records indicating the locations of street food vendors, hence, researcher went to the study area and found a total population of 110 street-food vendors selling ready-to-eat foods in the town of Louis Trichardt and a total population of 61 consented to participate in the study.

2.4.3 Inclusion and exclusion criteria

Inclusion criteria

- Street-food vendors cooking and selling ready-to-eat food at Louis Trichardt and are age 18 and above.

Exclusion criteria

- Street-food vendors who are not willing to sign the consent forms.

2.5 Measurement instrument

The measuring instruments used during this study included a self-administered questionnaire and a structured observational checklist. The measuring instrument were adapted and modified from previous studies to suit this research topic (Nkosi and Tabit, 2021; Oladipo-Adekeye, and Tabit, 2021; Mukwevho, 2018). The questionnaire is divided into two sections- Section A requested the demographic characteristics of the population and Section B analyzed the knowledge on safe food handling procedures that the street-food handlers possess. The food-safety knowledge section assessed food handlers' knowledge on personal hygiene, microbial hazards and their food handling practices during food preparation. The observational checklist is divided into three sections that focused on: environmental practices around the stall, personal hygiene practices, and food storage practices.

2.6 Pre-testing

The researcher conducted a pre-test of the measuring instruments with a group of 20 randomly-selected street food vendors from the neighboring villages in Elim. This was done to check if the sampled respondents would understand the questions in the data collection tool and to check recruitment strategies. The findings from the pretests were used to amend the questionnaire, observational checklist, and research procedures. The data collected during pre-testing was not included in the final study.

2.7 Validity and Reliability

Validity and reliability of the measuring instrument are two indispensable features. A research study conducted using a measuring instrument that does not possess one or both of these features will not yield beneficial accurate results (Surucu and Maslaskci, 2020). A researcher needs to consider both validity and reliability when selecting a research instrument.

Validity is defined as the extent to which a concept is accurately measured in a quantitative study (Heale and Twycross, 2015). The validity of this study was ensured through content and face validity.

Content validity is an assessment of how well an instrument represents all components of the variables to be measured, hence, ascertaining this feature, always precedes the data collection process (Brink et al., 2018). The researcher ensured that all the questions in the questionnaire are framed to include the research objectives. The questionnaire and checklist were presented to the study supervisors to identify gaps and professionals in the food safety fields.

Face validity is performed by experts in the field of the research on the structure of the measuring instrument to try to and determine its appropriateness in providing the required information (Surucu and Masliski, 2020). The face validity of this study was ensured through the scrutiny of the questionnaires by the supervisors, co-supervisors, the Research Ethics Committee, and the Public Health Department. Feedback from these stakeholders was used to clarify contents and to amend the measuring instruments where necessary.

Reliability is defined as the extent to which a research instrument consistently has the same results if it is used in the same situation on repeated occasions (Heale and Twycross, 2015). The reliability was determined by calculating the correlation coefficient of the measuring instrument by re-testing it with the same pilot study participants on two different occasions. The internal consistency of the measuring instrument was determined by using Cronbach's alpha. The measuring instrument had a Cronbach's alpha value of 0,7. a good indicator of the internal consistency of the scale.

2.8 Plan for data collection

The researcher applied for ethical clearance from the University of Venda Ethics Committee, after obtaining clearance, then in writing asked for permission to conduct the study from the Manager at Vhembe District Municipality. After obtaining permission the researcher was able to set a date to visit the target population to seek their permission to participate in the study; those who agreed were given letters. The researcher then notified the respondents of the month for data collection but did not tell them the date to avoid the Hawthorne effect and to ensure normal day-to-day activities are not altered to fit the researchers' expectations. On the day of data collection, the researcher ensured that respondents were informed about relevant information concerning the study, including their right to withdraw from the study, as well as its purpose and benefits. The respondents were asked to sign an informed consent form designed by the University of Venda's Ethics Committee. The researcher then asked to observe the respondents for 15 minutes to evaluate their food safety practices using a structured observational checklist. The respondents were then given a self-administered questionnaire to fill out to collect data on their knowledge of levels on safe food-preparation practices. For those who cannot read or write, and those who preferred the questions to be read to them, the researcher read the questions and completed the questionnaires for them.

2.9 Plan for data management and analysis

The collected Data was captured on a Microsoft word excel spreadsheet and then transferred to an SPSS.19.0 software program; tables were used to interpret the results. The researcher is the custodian of the collected data, to ensure compliance with the confidentiality and privacy agreement of the study, hence, is the mediator of access to data with authorized personnel, for example, the supervisor, co-supervisor, and statistician to ensure compliance with ethical principles. The data has been stored in a storage system in the form of hard copies and hard drives, this will be kept until the end of the project's life cycle and will be destroyed at the end of the retention period of 5 years.

2.10 Ethical considerations

Public health ethics is described as a branch of bioethics that helps guide principles and values amongst public health system actors. These principles are used to promote health and prevent injury and diseases in a population (Joubert, Ehrlich, Katzenellenbogen, and Karim, 2007). The researcher sought permission to conduct this study from the University of Venda Ethics Committee and ensured that the principles of ethics, such as, informed consent and disclosure; privacy and confidentiality; and freedom from harm and exploitation were followed.

2.10.1 Permission to conduct the study

The researcher presented a proposal to the Department of Public Health and the Faculty of Health Science Higher Degree Committee for evaluation and quality assessment. The proposal was sent to the Faculty of Health Science Executive Committee for evaluation and quality assessment. The proposal was then submitted to the University of Venda Research Ethics Committee for ethical clearance, thereafter, approval of the proposal was sought from the University's Higher Degree Committee. The approval letter was used to obtain permission to conduct the study from the Vhembe District Municipal Manager and the respondents.

2.10.2 Informed consent and disclosure

The researcher sought informed consent from the respondents to participate in the study. A standard University of Venda informed consent form was given, signed and returned by respondents who agreed to participate in the study. The researcher explained the voluntary nature of the study and disclosed all the relevant knowledge about the study in a language that the respondents understand. All relevant information about the proposed study including participants right to withdraw from the study at any point in the procedure and their right to withhold information, if necessary. The researcher ensured that only respondents who are of the legal age 18 years and above and are mentally competent were requested to participate in the study.

2.10.3 Freedom from harm and exploitation

Respondents have a right to be protected from discomfort and harm, whether physical, psychological, emotional, economic, social, or legal (Brink et al, 2016). This research did no harm, bring any discomfort or risk to the respondents, hence, were not given any medication or treatment. They were protected from humiliation and embarrassment by ensuring their privacy and confidentiality as well as the information they provided. The respondents association with this study will not affect their level of service, employment, or political affiliation. The researcher also ensured that the respondents were not inappropriately or unjustly treated and excluded from this research study based on their race, age, sex, sexual orientation, disability, education, religious beliefs, pregnancy, marital status, ethnicity, belief, and language.

2.10.4 Privacy and confidentiality

The researcher treated the information received from the respondents with confidentiality. This was done by keeping the identities of the respondents anonymous even in the final research report.

2.11 Plan for dissemination and implementation of results

The final report of this study will be sent to the University of Venda Library for reference by future researchers. It will add to the data available on street-food vendors in the Limpopo Province and South Africa; a soft copy will also be sent to the Manager of Makhado Local Municipality. The researcher has submitted a report of the study to an accredited journal for publishing and peer review to reach a larger audience. The final report will also be presented at workshops, seminars, and conferences.

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SECTION 2: MANUSCRIPT

2.1: AUTHOR GUIDELINES

The manuscript for this mini dissertation followed the author guidelines of Foods and was submitted to the Foods Journal Review Board.

AIMS AND SCOPE

Foods is an international peer-reviewed scientific open access journal covering various aspects of studies related to all aspects of food research. It is published semi-monthly online by MDPI. The journal publishes research articles, reviews, and commentaries related to food research, including Food sciences and technology, Food chemistry and physical properties, Food engineering and production, Food microbiology and safety, Food security and sustainability, Food toxicology, Sensory and food quality, Food analysis, Functional foods, Food and health, Food psychology, Food and environment. There is no restriction on the maximum length of the papers.

ETHICAL REQUIREMENTS

Authors submitting to MDPI journals must ensure that their manuscripts are ethically sound and meet industry-recognized standards that are reflected in MDPI policies. When reporting on research that involves human subjects, human material, human tissues, or human data, authors must declare that the investigations were carried out following the rules of the Declaration of Helsinki of 1975, revised in 2013. According to point 23 of this declaration, an approval from the local institutional review board (IRB) or other appropriate ethics committee must be obtained before undertaking the research to confirm the study meets national and international guidelines. As a minimum, a statement including the project identification code, date of approval, and name of the ethics committee or institutional review board must be stated.

CONFLICT OF INTEREST

Authors are expected to disclose all relationships and interests that could inappropriately influence or bias their work. Authors disclose potential conflicts of interest via the online submission system during the submission process. The corresponding author must include a summary statement in the manuscript in a separate section “Conflicts of Interest” placed just before the reference list. The statement should reflect all the collected potential conflicts of interest disclosures in the form.

CONTRIBUTORS

For complete transparency, all submitted manuscripts should include an author contributorship statement that specifies the work of each author. For research articles with several authors, a short paragraph specifying their individual contributions must be provided.

REVIEW PROCESS

After submission, the editor of the journal performs a pre-check to assess the suitability of the manuscript to the journal and ethical standards to qualify for further review. Once a manuscript passes the initial checks, it is assigned to at least two independent experts for peer review. The paper is accepted after revision based on the reviewer's comments. A suitable time frame is given to authors to resubmit the and the revised version will be returned to the reviewer for further comments. Once accepted, the manuscript will be published on the www.mdpi.com website.

MANUSCRIPT PREPARATION

Submission to Foods is only online and you will be guided stepwise through the creation and uploading of your files. The system automatically converts your files to a single PDF file, which is used in the peer-review process.

Research articles comprise of:

Abstract - The abstract should be a total of about 200 words maximum. The abstract should be a single paragraph and should follow the style of structured abstracts, but without headings.

Keywords -Three to ten pertinent keywords need to be added after the abstract.

Research manuscript sections:

Introduction-The introduction should briefly place the study in a broad context and highlight why it is important. It should define the purpose of the work and its significance, including specific hypotheses being tested. The current state of the research field should be reviewed carefully, and key publications cited.

Materials and Methods - They should be described with sufficient detail to allow others to replicate and build on published results. New methods and protocols should be described in detail while well-established methods can be briefly described and appropriately cited.

Results- They should provide a concise and precise description of the experimental results, their interpretation as well as the experimental conclusions that can be drawn.

Discussion- Discuss the results and how they can be interpreted in perspective of previous studies and of the working hypotheses. The findings and their implications should be discussed in the broadest context possible, and limitations of the work highlighted.

Conclusions (optional)- This section is not mandatory but can be added to the manuscript if the discussion is unusually long or complex.

Acronyms/ Abbreviations: Should be defined the first time they appear in each of three sections: the abstract; the main text; the first figure or table. When defined for the first time, the acronym/abbreviation should be added in parentheses after the written-out form.

References

References must be numbered in order of appearance in the text (including table captions and figure legends) and listed individually at the end of the manuscript. Citations and references in supplementary files are permitted if they also appear in the main text and in the reference list. In the text, reference numbers should be placed in square brackets [] and placed before the punctuation; for example [1], [1–3] or [1,3]. For embedded citations in the text with pagination, use both parentheses and brackets to indicate the reference number and page numbers; for example [5] (p. 10). or [6] (pp. 101–105). The reference list should include the full title, as recommended by the ACS style guide.

References should be described as follows, depending on the type of work:

Journal Articles:

Author 1, A.B.; Author 2, C.D. Title of the article. Abbreviated Journal Name Year, Volume, page range.

Books and Book Chapters:

Author 1, A.; Author 2, B. Book Title, 3rd ed.; Publisher: Publisher Location, Country, Year; pp. 154–196.

Author 1, A.; Author 2, B. Title of the chapter. In Book Title, 2nd ed.; Editor 1, A., Editor 2, B., Eds.; Publisher: Publisher Location, Country, Year; Volume 3, pp. 154–196.

Unpublished materials intended for publication:

Author 1, A.B.; Author 2, C. Title of Unpublished Work (optional). Correspondence Affiliation, City, State, Country. year, status (manuscript in preparation; to be submitted).

Author 1, A.B.; Author 2, C. Title of Unpublished Work. Abbreviated Journal Name year, phrase indicating stage of publication (submitted; accepted; in press).

Unpublished materials not intended for publication

Author 1, A.B. (Affiliation, City, State, Country); Author 2, C. (Affiliation, City, State, Country).
Phase describing the material, year. (phase: Personal communication; Private communication; Unpublished work; etc.)

Conference Proceedings

Author 1, A.B.; Author 2, C.D.; Author 3, E.F. Title of Presentation. In Title of the Collected Work (if available), Proceedings of the Name of the Conference, Location of Conference, Country, Date of Conference; Editor 1, Editor 2, Eds. (if available); Publisher: City, Country, Year (if available); Abstract Number (optional), Pagination (optional).

Thesis

Author 1, A.B. Title of Thesis. Level of Thesis, Degree-Granting University, Location of University, Date of Completion.

Websites

Title of Site. Available online: URL (accessed on Day Month Year).

2.2: FOOD SAFETY KNOWLEDGE AND HYGIENE PRACTICES OF STREET FOOD HANDLERS IN SOUTH AFRICA: A SYSTEMATIC LITERATURE REVIEW (UNDER REVIEW)

The manuscript was prepared based on the “MDPI-Food journal; author guidelines are found at the following link: <https://www.mdpi.com/journal/information/instructions>

Food safety knowledge and hygiene practices of street food handlers in South Africa: A Systematic Literature Review.

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Abstract

Street food handlers are the last line of defence to prevent foodborne diseases. Food safety knowledge is the most influential factor in predicting hygiene practices, therefore, the present systematic review aimed to evaluate food safety knowledge and practices amongst street-food vendors in South Africa. Electronic databases, and institutional web sites were used to extract data following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Ten articles published from 2013 to 2023 on food hygiene knowledge and practices of street vendors were reviewed in the study. The results of the review indicated that 58.05% of the studies respondents were female. Out of the 10 studies, seven employed a cross-sectional design and assessed food safety knowledge. High food safety knowledge was reported in four (57.14%) of the studies. Adhering to hygienic practices were reported in six out of the ten studies, all of these studies also indicated that street vendors had poor food handling practices. The findings of this study recommend for training and education programs to enhance the food handling knowledge and practices of street-food vendors. Proper infrastructure, especially clean water and proper sanitation must be provided to help street food vendors better practise food safety and implement hygiene regulations.

Keywords: Food safety, Food hygiene, Street food vendor, Practice, Knowledge, South Africa

Introduction

Street foods have an enormous impact on the food-supply system of urban low-income communities, economically, socially and nutritionally [34]. According to Sousa et al. [38] the selling and buying of street food is essential for economic and social development; it offers employment opportunities and provides the poor with affordable meals. Selling street food contributes to the food security of many who buy and sell such items, particularly those in the low socio-economic group [34]. A study done by Patel et al. [30] revealed that the street-food sector operated by poor urban vendors selling ready-to-eat healthy meals improved access to nutritious foods and created livelihood opportunities for the urban poor. A study done by Steyn, et al. [39] assert that street foods contribute to the energy and protein intakes of people in developing countries and their use should be encouraged, if they are healthy traditional foods.

Food-handling personnel can play a crucial role in the prevention of foodborne diseases because they are responsible for food-handling practices, from its purchasing to its preparation and sometimes to its sale [11]. They are considered the last and most critical line of defence for preventing the occurrence of foodborne illness [13]. A study done by Kwol et al. [15] stated that food handlers with lack of food safety knowledge pose an increased risk of an outbreak of foodborne diseases, thus, it is essential for food handlers to be knowledgeable about food safety to maintain hygiene practices and to implement that knowledge to bring about behavioural change [11].

Food contamination may occur at any point on the journey through the food chain during processing, transportation, and preparation [12]. Unsafe food can contain harmful bacteria, viruses, parasites, and chemical substances that cause foodborne diseases [28]. According to the World Health Organization [45] over 200 diseases are known to be caused by eating contaminated food. Furthermore, it has also been revealed that climate change influences the risks associated with food production, storage and distribution; this has placed a greater responsibility on food vendors in ensuring the safety of food they prepare for public consumption [41] [10]. According to Chersich et al [3] street food vendors who have limited access to water and cleaning equipment can compromise hand hygiene, as well as cleaning, thereby, creating conditions which favour the persistence of pathogenic microorganisms such as *Listeria monocytogenes*.

Foodborne pathogens such as- *Escherichia Coli*, *Listeria Monocytogenes* and *Salmonella* have been found prevalent in ready-to-eat-foods sold by street-food vendors in Africa [31]. *Escherichia Coli* a common foodborne pathogen is associated with kidney infection [5]. The ingestion of food contaminated with *Listeria Monocytogenes* is known to cause infections such as meningitis and encephalitis [46].

Foodborne pathogens such as Hepatitis A, Noroviruses, Staphylococcus Aureus and Shigella are known to be carried by foodservice workers in their cuts, sores, mouth, and skin [44][35]. Studies done to determine prevalence of food pathogens on the hands of food-handling personnel have revealed that their hands and fingernails may be contaminated by bacteria [23] [17][37]. According to Acikel et al. [1] the presence or absence of bacteria in the hands of food handlers is used as a quantitative indicator of their behaviour regarding personal hygiene.

Food handlers may contaminate their hands when, for instance, using the toilet, smoking, handling money and sneezing [2]; the transmission of microorganisms can take place through wearing jewelry and dirty clothes during food preparation [16]. Microorganisms can be transmitted by food handlers during food preparation through normal automatic hand movements, such as touching one's face, rubbing one's nose, and scratching an itch [40]. According to Kamboj et al. [12] improper food handling may be implicated in 97% of all foodborne illness associated with catering outlets.

This systematic review aims to evaluate food safety knowledge and practices amongst street-food vendors in South Africa, from existing research studies. The researcher chose to focus only on South Africa because previous reviews that were done did not include studies of street food vendors from South Africa [6][33]. A systematic review study done by Wan Nawawi et al. [43] focused on the knowledge, attitude, and practices (KAP) of food safety among street-food handlers worldwide but did not include South Africa.

A study done by Wallace et al. [43] focused on the street-food vendor's knowledge, attitudes, and practices related to food safety in low and middle-income countries of Africa and Southeast Asia but did not focus on sites in from South Africa. Similarly, another review focusing on Knowledge, Education Level and Food Handling Practices among street food vendors did not include any research from South Africa [4].

Methodology

Inclusion and exclusion

The inclusion criteria for this systematic review focused on studies that meet the following-criteria; a) population of the participants are street-food handlers of ready-to-eat food in South Africa; b) the study evaluated the food safety or hygiene knowledge and food handling practices of street-food vendors; c) all published and unpublished quantitative, qualitative, and mixed method studies; d) availability of full text research articles and grey literature published in English between 2013 and 2023 (within 10 years). Studies that did not evaluate the food safety or hygiene knowledge and food handling practices of street-food vendors in South Africa, as well as those published more than ten years ago were excluded.

Search strategy and data sources

The researcher performed a rigorous search to locate all relevant published and unpublished work of previous investigations of either food safety or hygiene knowledge and food handling practices of street food vendors in South Africa. Search engines such as Google and Google Scholar were used to retrieve articles and reports from databases such as Science Direct, BMC Public Health, African Journal, Taylor Francis and PubMed. The National Institutional Repository (ETD Portal) was used to search for theses and dissertations. The search engine keywords used included- Street food, Street food vendors, Food safety, Food hygiene, Food handling, Safe Food. In addition, the Boolean search was also adapted where the researcher combined different search terms to find similar terms.

Selection process and quality assessment

The researcher identified a total of 33000 articles for potential inclusion during the initial searches' these titles found were reviewed for relevance. The abstracts or summaries for all documents that passed the title-screening stage were reviewed for suitability using inclusion criteria. The publications that were excluded during the abstract screening did not meet the inclusion criteria and publications that did not have full text versions available were also excluded, after this stage, a total of 62 full text publications were downloaded for screening. From this stage, the researcher found only 10 studies that were suitable to be included in this review. The main reasons for exclusion of most of the studies that were assessed for full text were that some of these studies were- not from South Africa, studies were not between 2013 to 2023; selected street-food vendors were selling raw food commodities for example (fresh meat, fruits and vegetables); also, the evaluation of food safety was through sampling and conducting laboratory analyses on foodstuffs. This process is presented in Figure (1) as a PRISMA diagram which gives the summary of the studies selection process.

The quality of the eligible studies was assessed using appropriate appraisal tools for the studies. The researcher used the JBI (Joanna Briggs Institute) checklist for analytical cross-sectional studies to evaluate the quality of cross-sectional studies. For studies that used mixed method studies the MMAT (Mixed methods appraisal tool) was used and the CASP (Critical Appraisal Skills Program) was used to evaluate emergent research

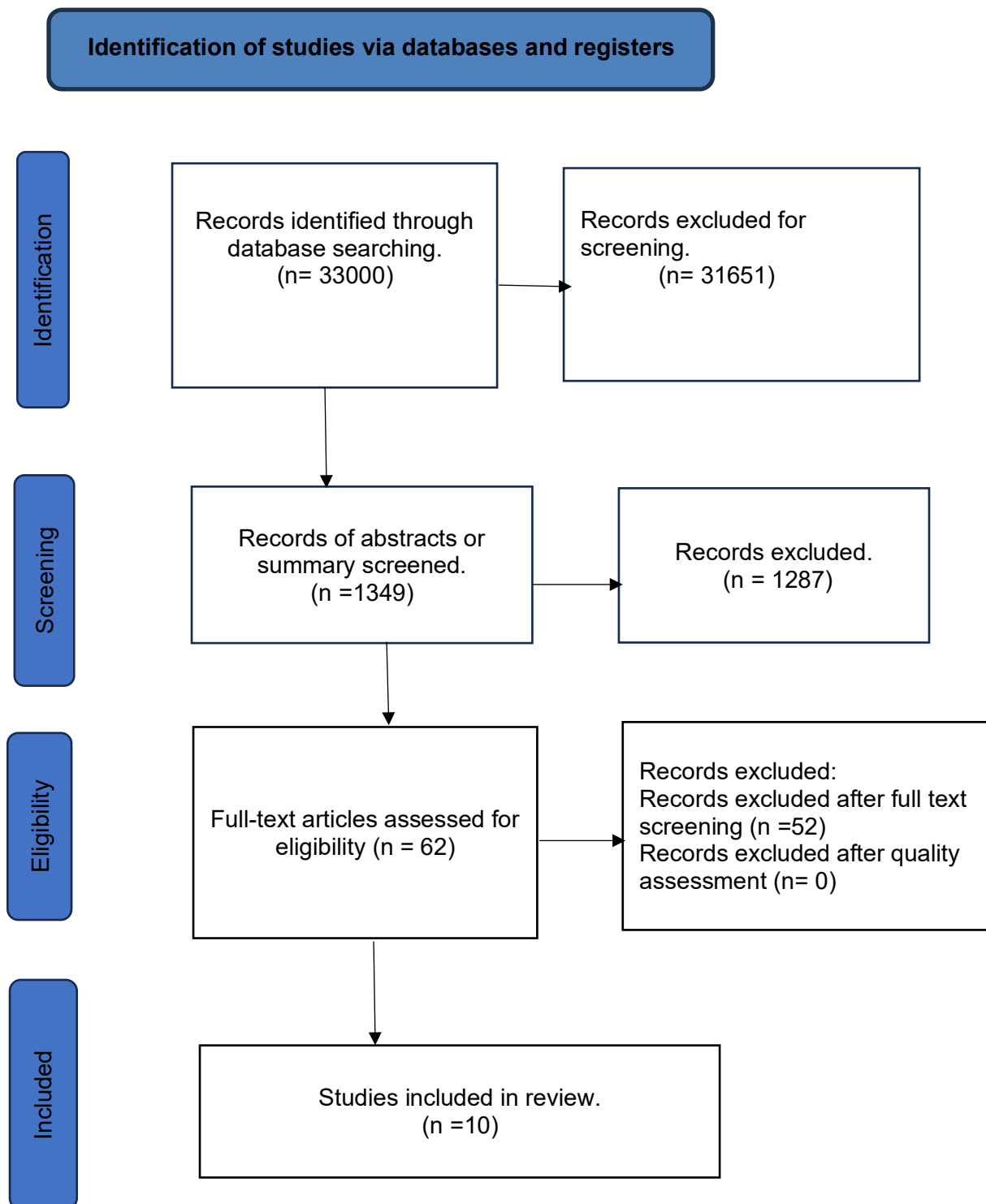


Fig. 1. Preferred reporting items for systematic reviews and meta-analyses (PRISMA) flow diagram.

Results

This section, in Table 1, shows the characteristics of the population, sample size, study design, geographical areas and major findings of the studies included in the review. Three of the ten studies included were Master's theses that had not been peer-reviewed. According to Siddaway et al. [36] it is accepted practice that rigorous research syntheses should include both published and unpublished research that meets relevant inclusion criteria.

Characteristics of included studies

The data extracted relating to the social demographic characteristics of street-food vendors were on gender and educational level. The studies were composed of majority females ($n=1242$) 58.05% females made part of the total sample size of 2138 street vendors from the combined ten studies in comparison to 41.95% male street vendors ($n=896$). The studies further revealed that the highest level of education for most of the street-food vendors was secondary school ($n=5$), two of the studies did not provide data on education.

The location of the studies was only in 5 provinces out of the 9 provinces of South Africa. Majority of the studies were done in Kwa-Zulu Natal ($n=3$) and Limpopo ($n=3$). The provinces that did not have studies done in them included Eastern Cape, North-West, Mpumalanga and Northern Cape. In relation to registration with the local municipalities majority of the street vendors were not registered ($n=4$) of the studies; seven of the studies did not report on the registration status of the street-food vendors. With regard to food safety training, three studies that reported on training revealed that the majority of the street food vendors were not trained, seven of the studies did not report on food-safety training.

The results from the selected studies revealed that majority of the studies ($n=7$) were conducted by a cross-sectional research design approach. The remaining studies were conducted using- emergent design, descriptive design and mixed method design. The sampling methodology was described ($n=8$) of the studies, the most common sampling method was convenience sampling ($n=2$).

Table 1 summary of the characteristics of the included studies

Author and Year	Sample size	Region	Study design	Assessment	Summary of findings
1.Mjoka and Selepe, 2017	8	Kwa-Dlangezwa, Kwa-Zulu Natal Province	Emergent design	Practices	Respondents had no knowledge on correct temperatures to prevent spoilage.
2.Mukwevho, 2018	155	Thulamela municipality, Limpopo Province	Cross - sectional study	Knowledge	Street-food vendors exhibited high levels of knowledge in areas of hand washing.
3.Lenetha, Moloi, and Malebo, 2019	15	Mangaung, Free State Province	Cross-sectional study	Knowledge and practices	Street-food vendors had knowledge on the importance of handwashing and practiced handwashing before food handling.
4.Hill, Mchiza, Puoane and Steyn, 2019	831	Cape Town, Western Cape Province	Cross-sectional study	Practices	Street-food vendors exhibited poor food hygiene and safety practices and 84% of the vendors did not have onsite water supply.
5.Marutha and Chelule, 2020	312	Polokwane, Limpopo Province	Descriptive study	Knowledge and practices	Food safety knowledge was high, but most food handling practised were inadequate.
6.Tleane,2020	19	Turf-loop, Limpopo Province	Cross-sectional study	Practices	Street-food vendors had poor food hygiene practices and washing of hands frequently could not be practised because of time limitations.
7.Khuluse and Deen, 2020	15	Durban, KZN Province	Mixed methods design	Knowledge and practices	Street-food vendors lacked knowledge of proper hygiene and safety.

8.Nkosi, and Tabit, 2021	399	Ulundi Aba-Qulusi local municipalities, Kwa-Zulu Natal, Province	Cross-sectional study	Knowledge	The overall assessment of food safety knowledge revealed that majority of street-food vendors have 76 % low levels of food safety knowledge.
9.Oladipo-Adekeye, and Tabit, 2021	315	City of Johannesburg Gauteng Province	Cross-sectional study	Knowledge	The overall food safety assessment knowledge of street-food vendors revealed that street-food vendors have 52% moderate, 46% low and 2% high food safety knowledge.
10.Rohith, 2021	30	City of Cape Town, Western Cape Province	Cross-sectional study	Knowledge	Food safety knowledge of street-food vendors was found lacking, 60% of street-food vendors did not understand the importance of using safe products.

Food safety knowledge of street food vendors.

Out of the 10 studies, seven evaluated the knowledge of street-food vendors; high food safety knowledge was reported in four (57.14%) of the studies. Among the seven studies, two studies (8 and 9) had a similar three-tier scoring system to determine the level of food safety knowledge for example, Low (any score below 50%), Moderate (any score from 50 to 75%), and High (any score above 75%). The overall assessment of the knowledge of respondents was low (study 8) and moderate (study 9).

The remaining five studies (2, 3, 5, 7 and 10) did not specify their scoring system. The findings on food safety knowledge of street food vendors were reported to be lacking knowledge for two studies (7 and 10), three studies reported high knowledge (2, 3 and 5). Food safety knowledge covered the respondents understanding of topics related to food safety, such as, personal hygiene (n=6), cross-contamination (n=5), causes of foodborne diseases (n= 3), temperature control (n=5), and storage facilities (n=5).

Four out of the six studies that assessed personal hygiene revealed that street-food vendors had adequate knowledge of personal hygiene. In relation to cross-contamination, four of the studies revealed that the vendors had inadequate knowledge of cross-contamination. In relation to food borne diseases, all the studies revealed that street-food vendors had adequate knowledge of this topic. Out of the five studies that assessed temperature control, four studies revealed poor knowledge and the five studies that assessed knowledge on storage facilities, three revealed that street food vendors had lack of knowledge.

The study of Nkosi and Tabit [25] reported that only 25.1% of the respondents had the knowledge that a food display container should be clean and rust free. Rohith [34] reported that (60%) of the street-food vendors did not understand the necessity of using safe ingredients during food preparation. A study done by Marutha and Chelule [19] reported that (89%) of the street food vendors acquired food safety knowledge through observation. Oladipo-Adekeye, and Tabit [29] found that older respondents had better food safety knowledge as it seems food safety experience is acquired overtime.

Food safety practices of street food vendors.

Street-food vendor practices were reported in six out of ten studies, of which six (100%) of these studies indicated that street-food handlers had poor food-handling practices; the assessment of the practices was through observation of respondents (studies 3 and 4) or self-reporting and observation (studies 1, 5, 6 and 7). These studies did not specify any scoring system of practices, rather the findings were descriptive.

Two out of six studies reported that the majority of street food vendors had poor food hygiene and safety practices (studies 4 and 6). Two studies reported that their food-handling practices were inadequate (studies 3 and 5) as revealed by Khuluse and Deen [14] who discovered that these vendors lacked knowledge on hygiene practices. Mjoka and Selepe [21] concluded in their study that street-food vendors were ignorant of basic food hygiene practices.

In most studies, street food vendors were found with unhygienic practices such as handling food with bare hands, handling food and money simultaneously, no washing of hands after smoking or using toilet, re-using dirty water (studies 1, 4, and 7). Khuluse and Deen [14] concluded that street-food vendors did not practise the knowledge they had effectively.

The physical environment where street-food vendors operated their business was also observed for any incompliances to food safety regulations. Hill et al. [8] reported that the vending stalls did not have washing basins nor and soaps. Several studies reported that the vendors did not have access to portable water on their vending site (studies 1 and 6). Lenetha et al. [16] also observed that the vendors have limited access to potable water because 99% of the vendors obtained water from nearby stores.

Some other prevalent environmental features included- dirty preparation areas, use of open-air vending structures, being close to blocked water drainage systems, food being exposed to dust and flying insects, inadequate storage facilities, not separating raw and cooked foods (studies 1, 3, 4, 5, 6 and 7). One study done by Marutha and Chelule [19] revealed that the number of years in business was associated with better food handling practices. The other remaining studies did not find any association between- age, gender and experience- and food handling practices.

Discussion

This systematic review aimed to evaluate food safety knowledge and practices amongst street-food vendors in South Africa. Studies that focused on vending of ready-to-eat foods were limited, highlighting a clear gap as these foods have high prevalence of pathogens. The findings of this systematic review indicated that most of the street food vendors were female, although men were also involved. This finding concurs with a review by Wallace et al. [42] who reported women to be the majority of street vendors. A similar point was made by Mahopo et al. [18] concerning the street-vending scene in South Africa where women depend on the vending business for financial relief to enhance the income of their households.

In this study the highest level of education for most street food vendors was attendance at secondary school. Hakwenya [7] in Namibia found that respondents with secondary level of education were more likely to have better knowledge on food safety compared to respondents with primary and lower levels of education. This finding correlates with the findings of this study that have revealed the prevalence of high food safety knowledge among vendors with secondary school as their highest level of education.

In this current study it was found that street-food vendors were not registered with the municipalities. Vendors who are registered are issued with a certificates to indicate that their places of business operation have been inspected by authorities and are compliant to national food safety regulations [32]. Nemer [24], in a study in India reported that street-food vendors were afraid of being registered and licensed due to the potential enforcements of regulations, which if ignored, have financial penalties. Regulatory compliance is essential in ensuring that food safety risks are eliminated [22]. This study also found that most of the street-food vendors were not trained in food and hygiene practices. A review by Young et al. [47] found evidence that training and education interventions are effective in improving food handlers' food safety knowledge.

The majority of these studies were done using cross-sectional design and questionnaires were used to assess knowledge while self-reporting and observation checklist were used to assess practices. Nordhagen [26], however, cautions that a heavy reliance on cross-sectional designs that rely on self-reported practices, may have results that may be influenced by social desirability bias and other response biases that tend to provide optimistic picture of observed food-safety behaviours than other methods. The practices in this review, however, were assessed using both self-reported and observed practices, or only observed practices.

These findings further demonstrated that the knowledge of street food vendors was high, although, practices were poor. These results are comparable to a study done in Bangladesh by Hossen et al. [9] where street food vendors had good knowledge and poor practices in food handling. These conclusions are supported by a review done by Zanin et al. [48] who reported that 50% of the studies reflected that food safety knowledge has not been translated into practice. Food safety knowledge is essential in predicting food hygiene practices, however, the findings in this study highlight that there is a clear gap between theoretical knowledge and its practical application. It seems the underlying factors that are contributing to poor transformation of knowledge into practice might be- the lack of food safety training, and resources such as portable water and proper infrastructure [41][20] [8]. This state of affairs might also be due to the fact that street-food vendors do not consistently implement food safety guidelines, such as- observing good personal hygiene, proper cleaning and sanitization of equipment and surrounding environment, avoiding cross-contamination, storing foods at inappropriate temperatures, and avoiding purchasing of ingredients from potentially unsafe sources [49].

Limitation

There were certain limitations on this study. Firstly, only records written in English were reviewed because English is the most used language for research in South Africa. Second, this review excluded food handlers from other settings, such as, restaurants, households, hospitals, prisons and retailers. The review focused on studies of street-food vendors of ready-to-eat- foods, excluding those of vendors of other items such as fruits, vegetables and other commodities; third, the study was limited to a small number of available studies. Finally, good food hygiene practices have no standard definition, hence, it seems to vary between studies. This lack of standardization hindered absolute comparisons between studies.

Conclusion and recommendations

In conclusion, the food safety knowledge of street-food vendors in South Africa was not reflected in their practices. High knowledge and poor practices highlight a disconnect between the theoretical knowledge and implementation. It is concluded that street food safety in South Africa would benefit from more research on this topic due to the limited number of studies on this topic. This study highly recommends mandatory food handling training and certification programs to enhance the knowledge and practices of street food vendors. It is also recommended that the vending environment should be continually monitored by authorities to prevent foodborne diseases in communities.

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2.3: Safe Food Handling Knowledge and Practices of Street Food Vendors at Louis Trichardt Makhado Local Municipality, South Africa (Under Review)

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Safe Food Handling Knowledge and Practices of Street Food Vendors at Louis Trichardt Makhado Local Municipality, South Africa

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Abstract

Street-food vendors are an essential component of the food supply chain; however, street food vendors have been implicated in the spreading of foodborne diseases. Street food often pose a risk to the health of consumers as they are usually prepared and sold in unhygienic conditions that attract microbial and environmental contamination. The purpose of this study is to investigate food handling knowledge and practices of street-food vendors in Louis Trichardt, South Africa. The study was conducted using a cross-sectional survey design, and purposive sampling technique to sample 61 street food vendors. Data was collected using a validated questionnaire and an observational checklist. The results showed that majority of the respondents 85.25% were females between the age range of 36-45, years with a high school education level with Grades 10-12. About 68.85% of the vendors knew the correct way to wash hands, however, 52.46% were observed as not washing their hands before food preparation, which may compromise the safety of the street food. Majority, 60.66%, of the respondents had moderate food safety knowledge. This study recommends the enforcement of municipal policies and the implementation of targeted health promotion campaigns to create awareness on food safety standards. This study recommends the enforcement of municipal policies and the implementation of targeted health promotion campaigns to create awareness on food safety standards.

Keywords: Food Safety, Knowledge Attitude Practice (KAP), Safe Food, Street Food, Street Food Vendors.

Introduction

The street-food industry is a significant economic activity offering opportunities for self-employment for unemployed individuals and low-income households [13]. The street food micro-enterprise requires little capital investment to establish and has negligible taxation, hence, attracts many people into the industry [18]. Street food is popular amongst consumers for being low-cost, and easy to access [2]. Generally, street food consumption occurs in countries where people earn little money and are typically more concerned with ease of access than safe-food standards [24].

The street food trade is perceived, by some, as a threat to public health because of food's potential risk of contracting foodborne diseases [14]. According to the World Health Organization (WHO) [39], foodborne disease cases are estimated at 600 million and 420 000 deaths each year worldwide with 30% of foodborne deaths occurring among children under 5 years of age. These foodborne diseases cost developing countries at least \$100 million a year ([27]. It has been established that, the risk of microbial and environmental contamination depends on the personal hygiene, knowledge, and hygiene practice of food handling personnel [38].

In 2020, the European Union (EU) reported a total of 3086 foodborne outbreaks and 20 017 individual human cases [7]. A study done in the Southern European country of Portugal indicated that issues of street food contamination were linked with the poor personal hygiene of food handlers. This was confirmed by the presence of pathogenic microbes on food samples and the hands of food handlers [6]. According to Ncube et al. [23] the rate in prevalence of foodborne diseases is higher in underdeveloped countries than in developed ones. Trafialek, et al. [37] in their study which evaluated street-food vendors' hygienic practices in two Asian and two EU countries revealed that the highest levels of compliance with international food safety regulations were shown in the EU. This was largely because street vendors in Asian countries lacked portable water supply and had poor infrastructure that often created a potential risk for cross-contamination. The burden of foodborne disease is estimated to be highest in the African and South-East Asia regions, usually occurring among susceptible populations such as infants, children, pregnant women, aged people, and the immune-compromised, according to WHO [39]. Studies done in South Asia, Bangladesh and Pakistan reported that street-food vendors were found to have low food safety knowledge; 96.7% did not have food safety training; as well as 61% of vendors did not cover their food at all and more than 80% of food vending stalls were exposed to flies [1] [2].

This mainly occurred because food handlers lacked food safety knowledge, which translated to low levels of food safety consciousness during food handling.

Foodborne diseases incidences in the African continent are usually connected to contaminated food and water [26]. Letuka et al. [13] conducted a study in Lesotho where they observed that only 21% of food handlers washed their hands in clean water before handling, preparing, and serving food. In Namibia, only 36% of the street vendors who participated in a study had adequate knowledge of food safety [9].

In South Africa, foodborne diseases are often underreported and underestimated [34]. The outbreak of listeriosis, in the country, from 2017 to 2018 highlighted a societal need to strengthen food safety management systems throughout the food chain [30]. In a study conducted by Moloi et al. [21] in the Free State Province, it was found that street food samples contained pathogenic microorganisms and were non-compliant with microbial standards for foodstuffs according to regulations in South Africa. In Kwa-Zulu Natal, results from research by Nkosi and Tabit [25] concluded that street-food vendors constitute a food safety risk to consumers, primarily due to their possession of inadequate food safety knowledge and non-compliant infrastructure. Another study in Limpopo Province by Marutha and Chelule [18] concluded that street-food vendors food handling practices were mostly inadequate as they were not in line with recommended practices.

In the Vhembe District Municipality, foodborne disease is considered a biological risk to the communities [16]. Massyn et al. [19] reported that diarrhea a symptom of foodborne disease is a high cause of death for children under the age of 5, in the Vhembe District Municipality with a 21% mortality rate. At Thulamela Municipality, only 50% of street-food vendors knew that expired and spoiled foods can cause foodborne illnesses [24]. Mukwevho [22] assert that a high food safety knowledge of street vendors at Thulamela Municipality did not, necessarily, translate to safe food handling practices. Majority of vendors displayed poor hygienic practices and prepared food at unhygienic sites. Kazaji [12] researching in the Vhembe District Municipality revealed that the lack of adequate hygiene practices, lack of safe food preparation and handling, inadequate sanitation systems were the major risk factors associated with cholera outbreaks. The purpose of this study is to investigate safe food handling knowledge and practices of street food vendors at Louis Trichardt, Makhado Local Municipality, Limpopo Province, South Africa.

Materials and methods

Study design, setting and sample size

This study was conducted using a cross-sectional survey design. It was conducted in the town of Louis Trichardt, situated in the proximity of the Soutpansberg Mountain range in Makhado Local Municipality, Limpopo Province. The respondents were requested to voluntarily provide information required for the survey, via self-administered questionnaires. An observational checklist was used to also collect data on the nature of the vending environments as well as their hygiene aspects. A non-probability purposive sampling technique was used to select the study population and a total of 61 street food vendors consented to participate in the study.

Measuring instruments

The questionnaire consisted of multiple-choice questions. It had two parts- Section A which analyzes the socio-demographic characteristics of the vendors and Section B which analyzed their food safety knowledge. The food safety knowledge section evaluated the food handlers' knowledge on personal hygiene, microbial hazards and food handling practices during food preparation. The observational checklist is divided into three sections focusing on: environmental practices around the stall, personal hygiene practices, and food storage practices. The measuring instrument had been adapted and modified from previously validated studies to suit this research study [25][28]. The measuring tools were pre-tested for validity with a group of 20 random street food vendors from neighboring villages.

Data Analysis

The results of the survey were collected in Microsoft excel sheet and descriptive statistics was employed to summarise the data in the form of frequencies and percentages and presented in Tables. The analysis was performed using SPSS software version 19.0. To calculate the food safety knowledge score of street food vendors, a correct response was attributed a score of 1 and a 0 for an incorrect answer with a total score from 9 food-safety questions (which was converted to 100 percent) and categorized as follows: scores of 1–3 = low, scores of 4–6 = moderate and scores of 7–9 = high.

Ethical issues

This research received ethical approval from the University of Venda Research Ethics Committee, clearance certificate number FHS/23/PH/12/1809. Participants signed informed consent forms to attest voluntarily participating in this study.

RESULTS

Socio-demographic data of street-food vendors

A total of sixty-one (61) street food vendors gave consent to participate in the study. The results of the study indicated that many street food vendors were female (85.25%) and 49.18% of the street food vendors were unmarried living without a partner. Most of the vendors were in the age range of 36-45 years (29.51%) followed by those within the age range of 46-55 (27.87%). Most street food vendors (80.33%) were registered with their local municipality; had an education level of High School, having completed Grades 10 to 12 (60.65%). Majority of the respondents had less than 5 years of work experience (40.98%). The results are presented in Table 1 below.

Table 1: Socio-demographic characteristics of street food vendors

Characteristics	Demographic data	Frequency	%
Gender	Male	9	14.75%
	Female	52	85.25%
Age (Years)	18- 25	4	6.56%
	26-35	13	21.31%
	36-45	18	29.51%
	46-55	17	27.87%
	56-65	8	13.11%
	66-75	1	1.64%
Marital status	Married	18	29.51%
	Unmarried living with a partner	5	8.20%
	Unmarried living without a partner	30	49.18%
	Separated	2	3.27%
	Divorced	1	1.64%
	Widowed	5	8.20%
Registration details	Yes	49	80.33%
	No	12	19.67%
Educational level	No formal education	3	4.92%
	Junior Primary (grade 1-3)	0	
	Senior Primary grade (4-6)	2	3.28%
	Secondary school (grade 7-9)	7	11.48%
	Secondary school (grade 10-12)	37	60.65%
	Tertiary education	12	19.67%
Years of working experience	Less than 5 years	25	40.98%
	5-10 years	18	29.51%
	More than 10 years	18	29.51%

Table 2 below shows that the point of sale of most street-food vendors was at transport terminals (49.18%), and most of the respondents (91.80%) prepared the food at the vending site.

Table 2: Vending stall and production-related characteristics

		Frequency	%
Point of sale	Transport terminal	30	49.18%
	Along roadside/street	17	27.87%
	Markert area	14	22.95%
Point of food preparation	Prepared them at home	4	6.56%
	Buy and sell pre-cooked foods	0	
	Prepared at vending site	56	91.80%
	Other	1	1.64%

Personal hygiene knowledge of street food vendors

About 68.85% of the street food vendors knew the correct way to wash hands; most the 88.52%, knew that hands should be washed always after visiting the toilet and picking your nose. Only 45.90% knew that to stop a wound from bleeding you cover it with a bandage then wear latex gloves; Most 65.57%, knew that they should not handle food and money when they are sick with illnesses like colds, coughs and flu.

Table 3: Knowledge of personal hygiene of street-food vendors

		Frequency	%
Which of the following is the correct way to wash your hands during the preparation and serving of foods?	Wash hands with warm running water and wipe dry with a clean cloth	3	4.92%
	Wash hands with cold running water and wipe dry with a clean cloth	4	6.56%
	Wash hands with soap and cold running water and then wipe dry with a clean cloth	12	19.67%
	Wash hands with soap and warm running water and then wipe dry with a clean cloth	42	68.85%
Which of the following compels you to wash your hands when you are involved in the preparation and serving of food?	After visiting the toilet only	2	3.28%
	After picking your nose	2	3.28%
	None of the above	3	4.92%
	All the above	54	88.52%
If you have a cut on your hand, you must stop the bleeding, cover it with bandage and wear latex gloves	True	28	45.90%
	False	33	54.10%
I must not handle food and money when I have flu, colds, cough or diarrhea	True	40	65.57%
	False	21	34.43%

Microbial hazards of street food

Most street-food vendors (83.61%) were aware that some microorganisms can cause foodborne diseases, however, 93.44% had not heard of salmonella and about 83.61% had not heard of listeria, while nearly 93.44% had not heard of staphylococcus.

Table 4: Knowledge on microbial hazards of street-food vendors.

		Frequency	%
Are you aware that some microorganisms can cause foodborne diseases to humans that may lead to death?	Yes	51	83.61%
	No	10	16.39%
Have you heard of salmonella?	Yes	4	6.56%
	No	57	93.44%
Have you ever heard of Listeria?	Yes	10	16.39%
	No	51	83.61%
Have you ever heard of staphylococcus?	Yes	4	6.56%
	No	57	93.44%

Knowledge on safe food-handling practices during preparation and serving of food.

Among the respondents, 55.75% of them knew that the safest way to thaw frozen foods was to put them in a sink at room temperature; about 47.54% knew that the best way to destroy any harmful germs that may be present in food is to cook the food to the right temperature. A few of the respondents, 9.84% knew that the safest way to use cutting boards to avoid cross-contamination is to use separate cutting boards for meat and salad and to wash each of them in between usage. Nearly 19.67% of the respondents knew that the correct internal cooking temperature for stuffed chicken and 36.07% knew the correct temperature for cold ready-to-eat foods, such as salads. The results are represented in Table 5.

Table 5: Knowledge on safe-food handling practices during the preparation and serving of food.

		Frequency	%
Which of the following is the safest way to thaw frozen perishable foods such as meat, fish, dairy, and poultry products?	In a sink at room temperature	34	55.74%
	In a sink in hot water	16	26.23%
	In the lower shelf of the refrigerator	11	18.03%
Which of the following is the best way to destroy any harmful germs that may be present in food?	Add salt	22	36.07%
	Cook food to the right temperature	29	47.54%
	Keep food below 5 ⁰ C at all times	10	16.39%
Which of the following is the safest way to use cutting boards to avoid cross contamination between them?	Use separate cutting boards for meat and salads but wash each of them, in between usage.	6	9.84%
	Use any cutting boards for meat and salads but wash them, in between usage	3	4.92%
	Use the same cutting board for meat and salad but wash them, in between usage	40	65.57%
	All the above ways are correct	12	19.67%
Which of the following is the correct minimum internal cooking temperature for stuffed chicken?	90°C	16	26.23%
	65°C	15	24.59%
	100°C	18	29.51%
	78°C	12	19.67%
Which of the following is the correct temperature guideline for cold holding of ready-to-eat foods, such as salad, during serving?	At about 25°C	13	21.31%
	At about 10°C	25	40.98%
	At about 5°C	22	36.07%

Overall assessment of knowledge

The majority, 60.66% of street-food vendors were in the moderate category of food-safety knowledge, a few were in the low category (21.31%) and only 18.03% were in the category of high food-safety levels.

Table 5: Food hygiene practices using observational checklist

Observation checklist item				
	Yes		No	
	#Y	%	#N	%
Food Handlers' Personal Hygiene				
1.Are personnel wearing neat protective clothing dedicated for foodservice?	36	59.02%	25	40.98%
2. Do food handlers wash their hands in clean water each time before the handling, preparation and serving of food?	29	47.54%	32	52.46%
3.Do food handlers handle money while serving?	51	83.61%	10	16.39%
4. Are food handler's hair covered when handling, preparing and serving food?	37	60.66%	24	39.34%
5.Are fingernails clean, cut short and without jewelry?	32	52.46%	29	47.54%
UTENSILS				
6. Are utensils cleaned and without cracks?	49	80.33%	12	19.67%
7. Are utensils cleaned adequately every time after use?	52	85.25%	9	14.75%
8. Do food handlers use the same utensils, knives and boards to prepare raw and cooked food?	52	85.25%	9	14.75%
9. Do food holding containers have proper lids or seals to protect food from dust?	53	86.89%	8	13.11%
STORAGE				
10. Are displayed foods in direct contact with floor or ground surface?	13	21.31%	48	78.69%
11. Are displayed case or food storage containers free of dust or any other impurity?	52	85.25%	9	14.75%
12. Are food storage containers damaged or rusted?	9	14.75%	52	85.25%
13. Is there any cooling and freezing storage equipment at the vending site?	11	18.03%	50	81.97%
14. Is there any ready-to-eat hot food-holding equipment at the vending site?	5	8.20%	56	91.80%
Environment surrounding of vending site				
15. Are vending site free of insects?	24	39.34%	37	60.66%
16. Is there a proper wastewater removal mechanism on the vending site?	19	31.15%	42	68.85%
17. Are there a dedicated garbage disposal bins with lid at the vending site?	4	6.56%	57	93.44%
18.Toilet facilities are available around vending sites?	25	40.98%	36	59.02%
19. Hand washing basins are available at vending sites?	51	83.61%	10	16.39%
20. Is there sufficient space for hygienic storage of food, utensils and separate area for storage of refuse?	38	62.30%	23	37.705
21. Is there electricity power supply at your vending facility?	19	31.15%	42	68.85%
22. Is there a tap water supply in the facility?	25	40.98%	36	59.02%

Observational checklist results

The results of the observational checklist are displayed in Table 4. Regarding the street-food vendors personal hygiene, it was observed that most of the vendors (59.02%) were wearing neat clean clothing dedicated to food service; 52.46% were able to wash their hands in clean water each time before the handling, preparation and serving of food. Majority of the respondents (60.66%) had their hair covered when handling, preparing and serving food. Furthermore (52.46%) had fingernails which were clean, cut short and were not wearing jewelry, however, a total of 83.61% of the food handlers did not refrain from activities such as handling money, while serving food.

On the issue concerning the utensils used during handling, preparing and serving food, 80.33% of the utensils were cleaned and without cracks; 85.25% of the utensils were adequately clean every time, after use. It was also noted that 86.89% of the food holding containers had proper lids or seals to protect the food from dust, however, there was a concern that 85.25% of the street-food handlers used the same utensils, knives and boards to prepare raw and cooked food.

The observation of the storage facility in the vending stalls revealed that 78.69% of the food displayed were not in direct contact with the floor or ground surface, and a majority (85.25%) of the displayed case or food storage containers free of dust or any other impurity. The results also indicated that (85.25%) of the food storage containers were not damaged or rusted; however, one concern that 91.80% did not have any equipment for hot ready-to-eat-food at the vending site, hence, hot food was kept in a container at room temperature and 81.97% of the stalls did not have any cooling and freezing storage equipment at the site.

In this current study, the observation of the surrounding environment of the vending site revealed that 60.66% of all the vending sites had insects and rodents in the vending stalls and, 68.85% of the sites did not have a proper wastewater removal mechanism. About 93.44% of the vending site did not have garbage disposal bins with lid and 59.02% did not have toilet facilities available around the vending sites; 59.02% did not have tap water supply in the facility and 68.85% of the vending stalls did not have electricity power supply. It was, however, observed that 83.61% of the sites had hand washing basins available and 62.30% of the stalls had sufficient space for hygienic storage of food and utensils, as well as a separate area for storage of refuse.

Discussion

The socio-demographic characteristics of the respondents showed that most were women between 36-45 years. Women have been reported to enter this work due to financial need after the death of a spouse or a marriage breakdown [20]. This is supported by the fact that majority of the street-food vendors in this study are unmarried and living without a partner. These results were found to be consistent with study findings obtained in other countries such, as Ethiopia [5], Haiti [33] and Lesotho [13] where females were 72%, 88.7% and 60% respectively; however, contrary to the findings of this study, in Bangladesh, 96% of the respondents were male and 91.5% of them were married [10]. The reason for differences may be due to gender norms, since in South Africa, food preparation has traditionally been a skill that is commonly taught to women at a younger age, as compared to men; however, the presence of males in the South African industry reflects a change in tradition which may have been influenced by economic dynamics [10].

Majority of the businesses were located near transport terminals where passengers board their buses and taxis; however, these results are not surprising, since transportation sites are major food outlets, particularly in Africa; similar findings were reported in Lesotho, and Philippines [13][4]. Most of the vendors in this study had secondary school education, concurring with other studies done in South Africa, where street-food vendors had obtained some level of secondary education [18] [35]. According to Alamo-Tonelada et al. [4] most street food vendors may have lacked opportunities to complete a higher education as most of them belong to socio-economically disadvantaged groups. The results of this current study found that 60,66% of the street food vendors had a moderate level of food-safety knowledge.

Oladipo-Adekeye [28] also found that street-food vendors in Johannesburg, South Africa had (52%) moderate level of food safety knowledge. The respondents in this study showed they were knowledgeable on proper personal hygiene practices; hence, they answered correctly that hands should be washed with soap and warm water. Similar findings were reported in other studies, that street food vendors are aware that proper hand washing is necessary for the prevention of foodborne diseases [15][2]. The street-food vendors also understood the necessity of handwashing after using the toilet and picking your nose. This suggests that vendors recognize activities that may contaminate hands, thereby, pose a risk to food safety, however, However, this knowledge was not translated into practice, as more than half of the vendors were observed as not washing their hands before handling, preparing and serving food. A similar situation where the knowledge is not implemented in practice was observed in the Philippines [15].

According to the South African general hygiene requirements for food premises and the transporting of food and related matters [31], food should not be handled by any person who has not washed his or her hands thoroughly with soap and water. This regulation applies to all food establishments where food is handled, prepared, stored, distributed and transported. In this study, most of the vendors were aware that they should not handle food and money together and when they are sick with colds, coughs, flu and diarrhoea. Similar results were found in Ghana, where 81.7% of the food handlers had the knowledge that typhoid fever is transmitted by food and 87.7% knew that diarrhoea is transmitted by food [3]. The vendor's awareness to avoid food handling during respiratory illnesses shows their recognition of the transmission risks associated with these conditions.

Most of the vendors knew never to handle food and money at the same time, despite this 83.61% of the vendors did not apply this in practice as they were observed handling food and money, simultaneously. Similar findings were observed in a study conducted in Lesotho where 98% of the street food vendors handled money while serving food [13]. Contact with inanimate objects and dirty surfaces can transfer pathogens to food handlers during food preparation [11]. Surprisingly, 54.10% of the respondents in the current study were unaware of the procedure of covering a wound to stop it bleeding, although such knowledge is necessary because it ensures that food will not become contaminated by bodily fluids, during food preparation and sale [36]. The Food Agriculture Organization recommends that cuts and wounds are covered by waterproof plasters and gloves to ensure they do not become a source of contamination for food [8].

Majority of the vendors were aware that some microorganisms can cause foodborne diseases; however, when asked if they have heard of microbial pathogens such as salmonella, listeria and staphylococcus, they had not heard of them. These findings are comparable to those obtained in Haiti where 98.7% of the vendors had not heard that salmonella and staphylococcus are pathogens responsible for foodborne diseases [33]. Only a few vendors 9.84% knew that the safest way to use cutting boards to avoid cross contamination was to use separate cutting boards for meat and salads and to wash each of them, in between usage. These results concur with those from Polokwane, South Africa where 95% of the vendors used the same utensils and cutting boards for meat and salads, during food preparations [35]; in Ethiopia also, 72.4% of the participating vendors reported that they do not make use of separate utensils when preparing raw and cooked foods [5]. Using, for instance, the same chopping boards during food preparation for different ingredients, provides an opportunity for cross contamination as well as a risk for food borne diseases [11]. To prevent cross-contamination, raw foods must be prepared separately away from other foods especially cooked foods [29],

however, these findings disagree with a previous study conducted in Johannesburg, South Africa where 61.9% of the vendors knew that to avoid cross-contamination, separate cutting boards, for instance, should be used for raw and cooked foods [28]. These differences in the findings might be a result of variations in the study participants geographical locations as the current study was done in a small town in a different province, while the latter study was done in the largest city in South Africa where resources for educating street-food vendors might be prevalent. From this current study's findings, vendors were not aware of the correct temperatures for cooking stuffed chicken and holding salads. These findings are consistent with a study done by Makhunga et al. [17] who also found that 92.5% of food handlers did not understand the value of thorough cooking and temperature control.

Furthermore, it was observed that a majority of the vendors did not have any cooling and hot food-holding storage equipment at the vending sites. The vendors claimed that they do not need any equipment because leftover food is taken home to be eaten by their family. It is essential to maintain ready-to-eat-foods at correct holding temperatures to limit growth of microorganism at room temperature [11]. It was also observed that most vendors used fire to cook, with only a few using electrical or gas stoves. This was highlighted by the observation that (68.85%) of the vending stalls did not have electricity power supply.

An observation of the surrounding environment clearly demonstrated that food is being sold in unsanitary conditions. This is because majority of the vending sites had insects and rodents present at the vending sites; similar findings were observed in Haiti where 60% of the vending sites had insects and flies [33]. This was largely attributed to the lack of wastewater disposal facilities; vendors were observed disposing wastewater right next to the stalls; In addition, majority of the vending sites did not have garbage disposal bins with lids, hence, this situation attracted insects and rodents to the vending sites.

Other infringements observed at the vending environments, included a lack of access to services, such as water and ablutions as most of these vending sites did not have water and ablution facilities, in proximity to their stalls. The vendors claimed that the water used during their daily operations is bought, similar to the situation in Polokwane, South Africa where Marutha [18] revealed that majority of the street-food vendors bought the water they used for cooking and washing from water vendors. The risks of food contamination and cross contamination become higher due to these unsatisfactory environmental conditions and insufficient water supplies [9].

Limitation to the study

This study only focused on a specific area within the Makhado Local Municipality, while other areas within the Municipality were not included in the study, due to time constraints. Furthermore, the street-food vendors were aware that they are being observed and as a result may have implemented activities which they normally did not. In addition, the study was limited to the street-food vendors who were willing to participate and were present on the day of the observation, hence, the unwillingness of some vendors to participate in the study may have limited the richness of the data, to some extent.

Conclusion

This study concludes that the knowledge of street-food vendors was not reflected in the food-handling practices. Consequently, although having the knowledge, street-food vendors practiced unsatisfactory hygiene and sanitary practices, which could pose serious dangers to the health and safety of consumers. During food preparation, these vendors did not always follow all the hygiene and food-safety requirements. Some of the major improper food handling practices were- cross contamination from different food ingredients; lack of temperature of raw and cooked food, lack of hand washing, inadequate infrastructure including ablution and waste disposal facilities- all of these can become a risk factor for foodborne disease. This study recommends the enforcement of municipal policies and by-laws for the street-food sector in the Makhado Local Municipality, so as to ensure that food-safety standards are adhered to for the communities that live in this Municipality. It is also recommended that food handlers are imparted with knowledge through targeted health education and promotion; such initiatives should be implemented periodically to ensure desired food-handling practices are implemented and sustained. There is a great need, thus, for local governments to assist the street-food vending businesses to comply with recommended food-safety legislation.

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Section 3: Conclusion, Recommendation and Limitations

3.1 Introduction

In this section the conclusions, recommendations and limitations emanating from the findings of this study are given. The purpose of the study was to investigate the safe food handling knowledge and practices of street food vendors at Louis Trichardt, Makhado Local Municipality, Limpopo Province, South Africa.

3.2 Conclusion

Street food micro-enterprise is not without its own problems as food safety is a major public health concern resulting in foodborne diseases. Additionally, there is a paucity of studies focused on safe food handling knowledge and practices of street food vendors in South Africa. The findings of the systematic literature review revealed that there were no studies done to determine the safe food handling knowledge and practices of street food vendors at Louis Trichardt, Makhado Local Municipality. This study concludes that the overall knowledge of the participants was moderate, most food handlers knew the proper hand washing methods.

It is also concluded that knowledge of street food vendors did not reflect the food handling practices of the food handlers. Consequently, street food vendors practiced unsatisfactory hygienic and sanitary practices, which could pose serious dangers to the health and safety of consumers. During food preparation, the street food vendors did not always follow all hygiene and food safety requirements. Some of the major inconsistencies of improper food handling practice were cross contamination, temperature control, hand washing, adequate infrastructure including ablution and waste disposal facilities these can become a risk factor for foodborne disease. Thus, there is a great need to further support street food vendors to comply with recommended food safety legislation. The necessary recommendations have been drafted.

3.3 Study limitations

This study only focused on a specific area within the Makhado local municipality other areas within the municipality were not included in the study due to time constraints it was not possible. The observations and findings could be different from other regions in the country. Furthermore, street food vendors were aware that there are being observed and as a result may have performed more consistently in their activities. Moreover, the study was limited to the street food vendors who were willing to participate and were present on the day of the observation. The unwillingness of some street food vendors to participate in the study, this made the sample size small, which may have limited the richness of data to some extent.

3.4 Recommendations

The findings of this study reinforce the need for interventions that could improve food safety practices among street food vendors. This could enhance the food safety and hygiene culture within the small micro-enterprises. The following recommendations are made based on the results of this study.

3.4.1 Vhembe District Municipality

This study recommends the enforcement of municipal policies and by-laws for the street food sector in the Makhado Local Municipality, to set the necessary food safety standards that are urgent to protect the health and welfare of the consumers. To bring order and regularity because, for instance, points of sale of some vendors are spread sporadically along the streets. Most of the street food vendors in this study stated that they are registered with their municipality, thus, it is recommended that when vendors are registering for Certificates of Operations, they should include their points of sale which should be reviewed periodically for any change in locations. The local government should consider the establishment of street food centers with adequate facilities and utility services. These centers should provide basic hygiene infrastructure, such as- water outlets, toilets, drainage systems and waste disposal facilities.

3.4.2 Municipal health services

Food safety training is universally recognized as one of the critical aspects to prevent unsafe food handling practices. The Municipal Health Services should impart food handlers with knowledge through targeted health education and promotion. These initiatives will promote food safety and could occur during the registration of the businesses. In addition, there should be campaigns in the markets to attract audiences of all ages to understand the concept of food safety and its importance. The education of food handlers as well as consumers may reduce chances of contracting food-borne diseases and preventing outbreaks of food-related illnesses. Furthermore, these recommended health education and promotion should be implemented periodically to constantly reinforce food safety and hygiene message to ensure desired food handling practices are implemented and sustained.

The message of the health promotion campaigns may be centered around the WHO five keys to safer food are listed below:

- *Keep Clean*
 - ✓ Wash hands before handling food and often during food preparation.
 - ✓ Wash hands after going to the toilet.
 - ✓ Wash and sanitize all surfaces and equipment used for food preparation.
 - ✓ Protect kitchen areas and food from insects, pests and other animals.

- *Separate Raw and Cooked Food*
 - ✓ Separate raw meat, poultry and seafood from cooked foods.
 - ✓ Use separate equipment and utensils such as knives and cutting boards for handling raw foods.
 - ✓ Store food in containers to avoid contact between raw and prepared foods.
- *Cook Thoroughly.*
 - ✓ Cook food thoroughly, especially meat, poultry, eggs and seafood.
 - ✓ Bring foods like soups and stews to boiling to make sure that they have reached 70°C.
 - ✓ Reheat cooked food thoroughly.
- *Keep Food at Safe Temperatures.*
 - ✓ Do not leave cooked food at room temperature for more than 2 hours
 - ✓ Refrigerate promptly all cooked and perishable food (preferably below 5°C)
 - ✓ Keep cooked food hot (more than 60°C) prior to serving.
 - ✓ Do not store food too long, even in the refrigerator.
 - ✓ Do not thaw frozen food at room temperature.
- *Using Safe Water and Raw Materials.*
 - ✓ Use safe water from a trusted source.
 - ✓ Select fresh and wholesome foods.
 - ✓ Choose foods processed for safety, such as pasteurized milk.
 - ✓ Wash fruits and vegetables thoroughly, especially if eaten raw
 - ✓ Do not use food beyond its expiry date.

Summary

This chapter presented the conclusions, limitations and recommendations of the study. This is also the final chapter of this dissertation. The way forward was stated in terms of recommendations based on the implications study resulting from the findings. Recommendations will be submitted to the Vhembe District Municipality and the Makhado Local Municipality for possible implementation. It is hoped that the findings of this study will help to improve food safety in Louis Trichardt.

ANNEXURES

Annexure 1: Ethical Clearance Letter

ETHICS APPROVAL CERTIFICATE

RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:

Ms R Mudogwa

STUDENT NO:

18021421

PROJECT TITLE: Safe Food Handling Knowledge and Practices of
Street Food Vendors At Louis Trichardt, Makhado Local
Municipality.

ETHICAL CLEARANCE NO: FHS/23/PH/12/1809

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Dr S Tshilvase	UNIVEN, Public Health	Supervisor
Prof. NS Mashau	UNIVEN, Public Health	Co-supervisor
Ms R Mudogwa	UNIVEN, Public Health	Investigator – Student

Type: master's Research

Risk: Minimal risk to humans, animals, or environment (Category 2)

Approval Period: September 2023 – September 2024

The Research Ethics Social Sciences Committee (RESSC) hereby approves your project as indicated above.

General Conditions

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following.

- The project leader (principal investigator) must report in the prescribed format to the REC:
 - Annually (or as otherwise requested) on the progress of the project, and upon completion of the project.
 - Within 48hrs in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.
 - Annually a number of projects may be randomly selected for an external audit.
- The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, the project leader must apply for approval of these changes at the REC. Would there be deviation from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.
- The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date; a new application must be made to the REC and new approval received before or on the expiry date.
- In the interest of ethical responsibility, the REC retains the right to:
 - Request access to any information or data at any time during the course or after completion of the project,
 - To ask further questions; Seek additional information; Require further modification or monitor the conduct of your research or the informed consent process.
 - withdraw or postpone approval if:
 - Any unethical principles or practices of the project are revealed or suspected.
 - It becomes apparent that any relevant information was withheld from the REC or that information has been false or misrepresented.
 - The required annual report and reporting of adverse events was not done timely and accurately,
 - New institutional rules, national legislation or international conventions A II necessary

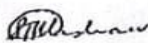
ISSUED BY:

UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE

Date Considered: August 2023

Name of the RESSC Chairperson of the Committee: Prof TS Mashau

Signature



UNIVERSITY OF VENDA OFFICE OF THE DIRECTOR RESEARCH AND INNOVATION 2023 -09- 1 R Private Bag X5050 Thohoyandou 0950
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PRIVATE BAG X5050, THOHOYANDOU, 0950 LIMPPO PROVINCE, SOUTH AFRICA
TELEPHONE (015) 962 804 8213 FAX (015) 962 804
"A quality driven financially sustainable, rural-based Comprehensive University"

Annexure 2: Approval letter from Vhembe District Municipality

VHEMBE DISTRICT MUNICIPALITY
PRIVATE BAG X5006, THOHOYANDOU, 0950
TEL: 015 960 2000, FAX: 015 962 1017
Website: www.vhembe.gov.za



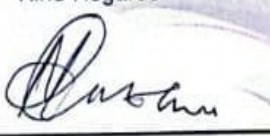
Ref: 4/2/1
Enq: Tshikovha N.C
Date: 21 February 2024

Attention: Ms Mudogwa Ronewa 18021421

RE: APPLICATION TO CONDUCT ACADEMIC RESEARCH: YOURSELF

1. Your undated application refers.
2. It is with pleasure to inform you that your application to conduct research on "Safe Food Handling Knowledge and Practices of Street Food Vendors at Louis Trichardt, Makhado Local Municipality, Limpopo South Africa" within the Vhembe District Municipality is hereby granted to you.
3. Please contact General Manager: Community Services at 015 964 4532 in order to arrange the starting date.
4. Should there be anything you need clarity on, feel free to call our office at 015 960 3558/015 960 3541.

Kind Regards



MUNICIPAL MANAGER
KUTAMA Z.N

22/02/2024
DATE



Annexure 3: Questionnaire

English QUESTIONNAIRE

SECTION A: SOCIO-DEMOGRAPHICS OF RESPONDENTS

Please mark the appropriate box with X

1. Gender

Male	Female
(1)	(2)
☐	☐

2. Age (Years)

18-25	26-35	36-45	46-55	56-65	66-75
1	2	3	4	5	6

3. Marital status

Married	(1)	☐
Unmarried living with a partner	(2)	☐
Unmarried living without a partner	(3)	☐
Separated	(4)	☐
Divorced	(5)	☐
Widowed	(6)	☐

4. Registration details

	(1)Yes	(2)No
Has this street food vending facility been authorized or issued with a license to sell foods?	☐	☐

5. Education level

No formal education	1	☐
Junior primary (Grades 1-3)	2	☐
Senior primary (Grades 4-6)	3	☐
Secondary school (Grades 7-9)	4	☐
Secondary school (Grades 10-12)	5	☐
Tertiary education	6	☐

6. Years of working experience

Less than 5 years	(1)	☐
5–10 years	(2)	☐
More than 10 years	(3)	☐

7. Point of sale

Transport terminal	(1)	☐
Along roadside/street	(2)	☐
Town center in a market area	(3)	☐

8. Point of Food Preparation

Prepared at home	(1)	☐
Buy and sell precooked foods	(2)	☐
Prepared onsite in vending facility	(3)	☐
Other	(4)	☐

SECTION B: FOOD SAFETY KNOWLEDGE OF STREET FOOD VENDORS

Part 1. Personal hygiene

1. Which of the following is the correct way to wash your hands during the preparation and serving of foods?

Wash hands with warm running water and wipe dry with a clean cloth	(1)	☐
Wash hands with cold running water and wipe dry with a clean cloth	(2)	☐
Wash hands with soap and cold running water and then wipe dry with a clean cloth	(3)	☐
Wash hands with soap and warm running water and then wipe dry with a clean cloth	(4)	☐

2. Which of the following compel you to wash your hands when you are preparing and serving food?

After visiting the toilet only	(1)	☐
After picking your nose	(2)	☐
None of the above	(3)	☐
All of the above	(4)	☐

3. True or false, food handlers are compelled to do the following when they are involved in the preparation and serving of food.

	TRUE	FALSE
If you have a cut on your hand, you must stop the bleeding, cover it with bandage and wear latex gloves	1 ☐	2 ☐
As a food handler, I must not handle food and money when I have flu, colds, cough or diarrhea.	1 ☐	2 ☐

Part 2. Knowledge on microbial hazards

Variables		Yes (1)	No (2)
4.	Are you aware that some microorganisms can cause foodborne diseases to you that may lead to death?	☐	☐
If your answered Yes, continue to 4.1, 4.2, 4.3, 4.4 & 4.5.			
4.1	Have you ever heard of <i>Salmonella</i> ?	☐	☐
4.2.	Have you ever heard of <i>Listeria</i> ?	☐	☐
4.3	Have you ever heard of <i>Staphylococcus</i> ?	☐	☐

Part 3. Knowledge on safe food handling practices during preparation and serving of food

5. Which of the following is the safest way to thaw perishable foods such as meat, fish, and poultry products?

In a sink at room temperature	(1)	☐
In a sink with hot water	(2)	☐
In the refrigerator	(3)	☐

6. Which of the following is the best way to destroy any harmful germs that may be present in food?

Add salt to the food	(1)	☐
Cook food to the right temperature	(2)	☐
Keep food below 5°C at all times	(3)	☐

7. Which of the following is the safest way to use cutting boards to avoid crosscontamination between them?

Use <u>separate cutting</u> boards for meat and salad but wash them in between usage.	(1)	☐
Use <u>any cutting boards</u> for meat and salad but wash them in between usage	(2)	☐
Use <u>the same cutting board</u> for meat and salad but wash them in between usage	(3)	☐
All of the above ways are correct	(4)	☐

8. Which of the following is the correct minimum internal cooking temperature forstuffed chicken?

90°C	(1)	☐
65 °C	(2)	☐
100 °C	(3)	☐
78 °C	(4)	☐

9. Which of the following is the correct temperature for cold holding of ready- to-eat foods such as salad during serving?

At about 25 °C.	(1)	☐
At about 10 °C	(2)	☐
At about 5 °C	(3)	☐

OBSERVATIONAL CHECKLIST

S/N	Variables	Yes	No
		(1)	(2)
	SECTION A: FOOD HANDLERS' PERSONAL HYGIENE		
1.	Are Personnel wearing neat protective clothing dedicated for food service?	☐	☐
2.	Do food handlers wash their hands in clean water each time before the handling, preparation and serving of food?	☐	☐
3.	Do food handlers handle money while serving food?	☐	☐
4..	Are food handler's hair covered when handling, preparing and serving food?	☐	☐
5.	Are finger nails clean, cut short and without jewelry?	☐	☐
	SECTION B: UTENSILS		
6.	Are utensils cleaned and without cracks?	☐	☐
7.	Are utensils cleaned adequately every time after use?	☐	☐
8.	Do food handlers use the same utensils, knives and boards to prepare raw and cooked food?	☐	☐
9.	Do food holding containers have proper lids or seals to protect food from dust?	☐	☐
	SECTION C: STORAGE		
10.	Are displayed foods in direct contact with floor or ground surface?	☐	☐
11.	Are displayed case or food storage containers free of dust or any other impurity?	☐	☐
12.	Are food storage containers damaged or rusted?	☐	☐
13.	Is there any cooling and freezing storage equipment at the vending site?	☐	☐
14.	Is there any ready-to-eat hot food-holding equipment at the vending site?	☐	☐

	SECTION D: ENVIRONMENT SURROUNDING OF VENDING SITE		
15.	Are vending site free of insects?	☐	☐
16.	Is there a proper wastewater removal mechanism on the vending site?	☐	☐
17.	Are there a dedicated garbage disposal bins with lid at the vending Site?	☐	☐
18.	Toilet facilities are available around vending sites?	☐	☐
19.	Hand washing basins are available at vending sites?	☐	☐
20.	Is there sufficient space for hygienic storage of food, utensils and separate area for storage of refuse?	☐	☐
21.	Is there electricity power supply at your vending facility?	☐	☐
22.	Is there a tap water supply in the facility?	☐	☐

XITSONGA: Questionnaire

Xiyenge A: SOCIO-DEMOGRAPHICS YA VAHLAYISI

Hi kombela u fungha bokisi leri faneleke hi X

2. Rimbewu

Xinuna	Xisati
(1)	(2)
☐	☐

3. Vukhale

18-25	26-35	36-45	46-55	56-65	66-75
1	2	3	4	5	6

4. Xiyimo xa ku tekana

Vukatini	(1)	☐
A nga tekiwanga a tshama na munghana wa vukati	(2)	☐
A nga tekiwanga ku hanya handle ka munghana	(3)	☐
Swi hambanisiwile	(4)	☐
Va dlaye vukati	(5)	☐
I noni	(6)	☐

5. Vuxokoxoko bya ku tsarisa

	(1)Ina	(2)Hia
Xana ndhawu leyi yo xavisa swakudya swa le xitarateni yi pfumeleriwe kumbe yi nyikiwile layisense yo xavisa swakudya?	☐	☐

6. Xiyimo xa dyondzo

Ku hava dyondzo ya ximfumo	1	☐
Xikolo xa le hansi xa le hansi (giredi ya 1-3)	2	☐
Xikolo xa le henhla xa le henhla (giredi ya 4-6)	3	☐
Xikolo xa le sekondari (giredi ya 7-9) .	4	☐
Xikolo xa sekondari (giredi ya 10-12) .	5	☐
Dyondzo ya le henhla	6	☐

7. Malembe ya ntokoto wa ku tirha

Ehansi ka 5 wa malembe	(1)	☐
Malembe ya 5–10	(2)	☐
Malembe yo tlula 10	(3)	☐

8. Ndhawu yo xavisa

Xitichini xa swo famba	(1)	☐
Etlhelo ka patu/xitarata	(2)	☐
Xikarhi ka doroba eka ndhawu ya makete	(3)	☐

9. Yinhla Ya Ku Lunghiselela Swakudya

Swi lunghiseleriwa ekaya	(1)	☐
Xava ni ku xavisa swakudya leswi swekiweke ka ha ri emahlweni	(2)	☐
Yi lunghiseleriwe endhawini yoleyo eka ndhawu yo xavisa	(3)	☐
Swin'wana	(4)	☐

XIYENGE XA B: VUTIVI BYA VUHLAYISEKI BYA SWAKUDYA BYA VAXAVISI VA SWAKUDYA YA LE XItarateni

Xiphemu xa 1: Vuhlayiseki bya munhu hi xiyexe

1. Hi yihi ndlela leyinene yo hlamba mavoko ya wena hi nkarhi wa ku lunghiselela na ku phamela swakudya eka leswi landzelaka?

Hlantswa mavoko hi mati yo kufumela yo khuluka kutani u sula hi lapi ro basa	(1)	☐
Hlantswa mavoko hi mati yo titimela yo khuluka kutani u sula hi lapi ro basa	(2)	☐
Hlantswa mavoko hi xisibi na mati yo titimela yo khuluka kutani u sula u oma hi lapi ro basa	(3)	☐
Hlantswa mavoko hi xisibi na mati yo kufumela yo khuluka kutani u sula u oma hi lapi ro basa	(4)	☐

2. Hi xihi lexi ku sindzisaka ku hlamba mavoko loko u ri karhi u lunghiselela ni ku phamela swakudya?

Endzhaku ko endzela xihambukelo ntsena	(1)	☐
endzhaku ko khumba nhompfu	(2)	☐
A ku na xin'we xa leswi nga laha henhla	(3)	☐
Hinkwaswo leswi nga laha henhla	(4)	☐

3. I ntiyiso kumbe mavunwa, vafambisi va swakudya va boheka ku endla leswi landzelaka loko va katseka eku lunghiseleleni ni ku phamela swakudya

	Ntinyiso	Mavunwa
Loko u tsemiwiwe evokweni ra wena, u fanele ku yimisa ku huma ngati, u yi funengeta hi bandhi naswona u ambala magilavu ya latex	1 ☐	2 ☐
Tanihi mufambisi wa swakudya, a ndzi fanelanga ku khoma swakudya na mali loko ndzi ri na mukhuhlwana, mukhuhlwana, khohlola kumbe ku pfimba ka khwiri.	1 ☐	2 ☐

Xiphemu xa 2. Vutivi eka makhombo ya ti microbial hazards

Variables		Ina (1)	Hai (2)
4.	Xana wa swi tiva leswaku switsongwatsongwana swin'wana swi nga ku vangela mavabyi lama tluletiwaka hi swakudya lama nga ha ku vangelaka rifu?	☐	☐
Loko u hlamule Ina, yana emahlweni to 4.1, 4.2, 4.3, 4.4 & 4.5.			
4.1	Xana u tshame u twa hi Salmonella?	☐	☐
4.2.	Xana u tshame u twa hi Listeria?	☐	☐
4.3	Xana u tshame u twa hi ta vuvabyi bya Staphylococcus?	☐	☐

Xiphemu xa 3. Vutivi eka maendlelo yo khoma swakudya hi ndlela leyi hlayisekeke hi nkarhi wa ku lulamisiwa na ku phamela swakudya

10. Hi yihi ndlela leyi hlayisekeke yo n'okisa swakudya leswi onhakaka swo tanihi nyama, nhlampfi ni swilo leswi endliweke hi huku eka leswi landzelaka?

Eka sinki leyi nga eka mahiselo ya kamara	(1)	☐
Eka sinki leyi nga ni mati yo hisa	(2)	☐
Eka firiji	(3)	☐

11. Hi yihi ndlela leyinene yo herisa switsongwatsongwana swihi na swihi leswi nga ni khombo leswi nga ha vaka kona eka swakudya?

Hlanganisa munyu eka swakudya	(1)	☐
Vuka swakudya eka mahiselo lawa ya faneleke	(2)	☐
Hlayisa swakudya ehansi ka 5°C minkarhi hinkwayo	(3)	☐

12. Hi yihi ndlela leyi hlayisekeke yo tirhisa ti cuttingboards ku papalata ku cross contamination exikarhi ka tona?

Tirhisa ti cutting boards to hambana eka nyama na saladi kambe hlamba exikarhi ka matirhiselo.	(1)	☐
Tirhisa ti cutting boards tihi na tihi eka nyama na saladi kambe hlamba exikarhi ka matirhiselo	(2)	☐
Tirhisa cuttingboard yin'we yo tsema eka nyama na saladi kambe swihlantswi exikarhi ka ku tirhisiwa	(3)	☐
Tindlela leti nga laha henhla hinkwato ti lulamile	(4)	☐

13. Hi rihi eka leswi landzelaka leri nga kahle ra mahiselo yale hansi ya le ndzeni yo sweka ya huku?

90°C	(1)	☐
65 °C	(2)	☐
100 °C	(3)	☐
78 °C	(4)	☐

14. Hi rihi eka leswi landzelaka leri nga mahiselo lama faneleke yo khoma swakudya leswi lulameleke ku dyiwa swo fana na saladi hi nkarhi wo phamela hi xirhami?

Kwalomu ka 25 °C.	(1)	☐
Kwalomu ka 10 °C	(2)	☐
Kwalomu ka 5 °C	(3)	☐

Annexure 4: Turnitin Similarity Report

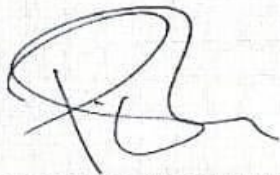


Annexure 5: Editor Letter

PROOF OF EDITING

26 August, 2024

This is to certify that I, Dr P Kaburise, have proofread the dissertation titled - **SAFE FOOD HANDLING KNOWLEDGE AND PRACTICES OF STREET-FOOD VENDORS AT LOUIS TRICHARDT MAKHADO LOCAL MUNICIPALITY, SOUTH AFRICA** - by Mudogwa Ronewa (Student number: 18021421). I have indicated some amendments which the student has undertaken to effect before the final dissertation is submitted.



Dr P Kaburise (0794927451/ 0637348805; email: phyllis.kaburise@gmail.com)

Dr P Kaburise: BA (Hons) University of Ghana (Legon, Ghana); MEd University of East Anglia (Cambridge/East Anglia, United Kingdom); Cert. Teaching English as a Foreign Language (Cambridge University, United Kingdom); Cert. English Second Language Teaching, (Wellington, New Zealand); PhD University of Pretoria (South Africa).

Annexure 6: Univen informed consent form

RESEARCH ETHICS COMMITTEE

LETTER OF INFORMATION

Title of the Research Study : *Safe Food Handling Knowledge and Practices of Street Food Vendors at Louis Trichardt, Makhado Local Municipality, Limpopo South Africa*

Principal Investigator/s/ researcher : *Mudogwa R, PGD Primary Health Care*

Co-Investigator/s/supervisor/s : *Tshivhase S, Phd Public Health*

Brief Introduction and Purpose of the Study: I am a student at the University of Venda and this study is part of my project to complete my Master's degree in Public Health. The aim of this study is to investigate safe food handling knowledge and practices of street food vendors at Louis Trichardt, Makhado Local Municipality. The study will involve street food vendors who sell ready to eat food.

Outline of the Procedures : Respondents will be provided with a questionnaire to complete pertaining to their socio-demographics, location, and their food safety knowledge. The researcher will also collect data on the hygiene conditions of the street food vending facilities. Respondents will be spending approximately 20 minutes in completing the questionnaire.

Risks or Discomforts to the Participant: There are no questions in this study that may cause harm and discomforts to the participants.

Benefits: The outcome of this research will be made available to relevant government authorities which may assist them in making decisions that can improve the safety of street vended foods and which may in turn boost consumers' confidence in purchasing street these foods.

Reason/s why Participant may withdraw from the Study: Respondents may withdraw from this study at any time because participation is voluntary.

Remuneration: There will not be any remuneration for participation

Costs of the Study: This study will not cost the respondents anything.

Confidentiality: Information will be kept confidential; no names of the individual will be used in this study.

Research-related Injury: No harm will result to the respondents from this research study.

Persons to Contact in the Event of Any Problems or Queries:

Please contact the researcher **Mudogwa R** at (061 620 2361), my supervisor **Dr Tshivhase S.** (082 441 5959) or the University Research Ethics Committee Secretariat on 015 962 9058. Complaints can be reported to the Director: Research and Innovation, Prof GE Ekosse on 015 962 8313 or Georges.Ivo.Ekosse@univen.ac.za

General:

Potential participants must be assured that participation is voluntary and the approximate number of participants to be included should be disclosed. A copy of the information letter should be issued to participants. The information letter and consent form must be translated and provided in the primary spoken language of the research population

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher (**Ronewa Mudogwa**), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number:
- I have also received, read and understood the above written information (*Participant Letter of Information*) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

Full Name of Participant Date Time Signature

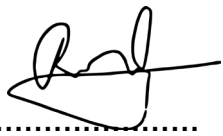
I, ...

(**Ronewa Mudogwa**) herewith confirm that the above participant has been fully Informed about the nature, conduct and risks of the above study.

Full Name of Researcher

Mudogwa Ronewa

..... Date.....

Signature.....


Full Name of Witness (If applicable)

..... Date Signature.....

Full Name of Legal Guardian (If applicable)

..... Date..... Signature.....

Please note the following:

Research details must be provided in a clear, simple and culturally appropriate manner and prospective participants should be helped to arrive at an informed decision by use of appropriate language (grade 10 level- use Flesch Reading Ease Scores on Microsoft Word), selecting of a non-threatening environment for interaction and the availability of peer counseling (Department of Health, 2004)

If the potential participant is unable to read/illiterate, then a right thumb print is required and an impartial witness, who is literate and knows the participant e.g. parent, sibling, friend, pastor, etc. should verify in writing, duly signed that informed verbal consent was obtained (Department of Health, 2004).

If anyone makes a mistake completing this document e.g. a wrong date or spelling mistake, a new document has to be completed. The incomplete original document has to be kept in the participant's file and not thrown away, and copies thereof must be issued to the participant.

References:

Department of Health: 2004. *Ethics in Health Research: Principles, Structures and Processes*

<http://www.doh.gov.za/docs/factsheets/guidelines/ethnics/>

Department of Health. 2006. *South African Good Clinical Practice Guidelines*. 2nd Ed.
Available at:

http://www.nhrec.org.za/?page_id=14