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ASSESSING KNOWLEDGE OF TUCK SHOP OWNERS ON FOOD SAFETY IN RELATION TO HYGIENE, FOOD POISONING AND CERTIFICATE OF ACCEPTABILITY IN VOSLOORUS, CITY OF EKURHULENI, SOUTH AFRICA

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Abstract: World Health Organization reported on the global burden of food-borne diseases by stating that the high death rates in regions such as Africa, has the highest burden of food-borne diseases per population. The incident that occurred in Soweto and other parts of South Africa over the safety of food being sold at tuck shops led to community uproar and panic. The primary objective of the study was to assess the knowledge of tuck shop owners on food safety in relation to hygiene, food poisoning and Certificate of Acceptability (CoA). A quantitative cross-sectional study was used. Participants without Certificate of Acceptability were included. A self-administered questionnaire was used for data collection. The study population was 324 with a sample size of 100%. Data was captured into Microsoft Excel and exported to Statistical Package for Social Science (SPSS) for analysis. Tuck shop owners with primary and secondary education were significantly likely to be knowledgeable about food safety (OR) 5.88, 95%CI (2.34-14.63), (OR) 1.72, 95%CI (0.89-3.39). Participants who were purchasing food products at a retail shop or food warehouse with a Certificate of Acceptability (n=227; 70.1%) were significantly likely to be knowledgeable about food safety. The participants that did not know food poisoning were significantly more likely males in both crude odds ratio12.03 95% CI (2.87-50.48) and adjusted analysis AOR 8.91, 95% CI (1.89-42.08). About (n=84; 25.9%) of participants did not believe most deaths are also caused by food poisoning from poor hygiene (OR 8.80 95% CI (2.68-28.91) and AOR 8.67, 95%CI (1.83-40.85). The study has shown that tuck shops can be a public health threat in the community due to lack of knowledge of tuck shop owners on food safety and food poisoning which could lead to food poisoning outbreaks and subsequently death.

Keywords: food safety, hygiene, public health, tuck shops

Introduction

Food safety includes the handling, transportation, storing and preparing food to prevent contamination (Ncama et al., 2021). Unsafe food and water that has been exposed to dirt and pathogenic or spoilage microorganisms, or may even be rotten, which can cause infections and lead to diseases such as diarrhea, meningitis etc. (Alsultan et al., 2023). Food Agricultural Organisation, (2019) emphasized the importance of food safety to public health. Food-borne illnesses (FBDs) are inextricably linked to outbreaks and pose a threat to the security of global public health, and are a global issue (Azanaw, Gebrehiwot and Dagne, 2019). Food safety is a major concern for consumers, food industries, and food

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control officials in both developed and developing countries (Mkhungo, Oyedeji and Ijabadeniyi, 2018). In countries where natural disasters, political unrest, food shortages, and other pressing issues take centre stage on government and media agendas, food safety is frequently disregarded (Abegaz, 2022a).

Akabanda et al. (2017) Ghanaian food handlers were frequently blamed for several food-borne disease outbreaks, about 97% of cases of food poisoning that have been documented were caused by people working in the catering industry mishandling food. Food safety and security regulations must be followed, and the ability to recognize and track harmful bacteria is a prerequisite for both food safety and food security (Food poisoning hazards and their consequences over food safety, 2020). Human outbreaks of foodborne illness are widespread in South Africa but rarely reported (Ntshoe et al., 2021). The incident that occurred in Soweto and other areas of the country over safety of food provided at tuck shops was emphasized Damane's (2018). The WHO in 2015 reported on the global burden of foodborne diseases for the first time by estimating the disease burden caused by 31 foodborne agents (bacteria, viruses, parasites, toxins and chemicals) between years 2007-2015 at global and regional level (WHO, 2019).The disease burden caused by foodborne agents could be due to the poor state of food safety and general hygiene in those countries with high deaths rate such as African region(Tasneem Maher Al-Jaberi et al., 2023). To prevent food-borne illness, it is necessary to understand how food becomes unsafe and what proactive measures can be taken to ensure food safety (Abegaz, 2022b). The inadequate food safety knowledge and skills of food handlers can result in unsafe food handling practices and cross-contamination in food service establishments Tefo and Tabit, (2020). some food handlers in many food service establishments often lack basic food safety knowledge when it comes to food hygiene and the prevention of cross-contamination Chellaiyan et al., (2018). middle school students have a wide range of understanding about handling food safely. However, this knowledge is at the knowledge (recall) level with inadequate understanding of why safe food handling is crucial Byrd-Bredbenner et al. (2016). Onyeaka, Dassalegn Daraje Jalata and Solomon Abate Mekonnen, (2023) concluded that the results of their study highlight the importance of consumer education and regulatory compliance in ensuring food safety, providing insightful information for those involved in the food sector. The primary objective of the study was to assess the knowledge of tuck shop owners on food safety in relation to hygiene, food poisoning and Certificate of Acceptability.

Methods

Study design and population.

The study included Tuck shop owners within the Vosloorus area. According to City of Ekurhuleni, Vosloorus Environmental health statistics 2019, there were 324 Tuck shop owners (tuck shops) in Vosloorus (City of Ekurhuleni, 2019). Tuck shop owners with no Certificate of Acceptability (CoA) were targeted because they were not certified in terms of R638 regulations governing general hygiene requirements for food premises, the transport of food and related matters, under foodstuffs, Cosmetics and Disinfectants Act 54 of 1972 (regulations governing general hygiene requirements for food premises, the transport of food and related matters, n.d.). Tuck shop owners who were willing to participate in the study with tuck shops that are operational were included in the study.

Tuck shop owners that were not within the Vosloorus area in the City of Ekurhuleni were excluded. Moreover, tuck shops with valid Certificate of Acceptability in terms of regulation 638 under

Foodstuffs, Cosmetics and Disinfectants act 54 of 1972 were excluded from the study. Tuck shop owners who were not willing to participate were excluded in the study as well as those under the age of 18 years. The research study used a cross-sectional study design and one of a cross-sectional study advantages is that it is frequently employed to quantify the frequency of health outcomes, comprehend health factors, and characterize demographic characteristics. it does not follow individuals over time and Individual change cannot be examined using them as in a cohort study (Wang and Cheng, 2020). The Tuck shop owners of City of Ekurhuleni, Vosloorus were used as dependent variables in the research study. The researcher was interested in the influence and effects of their knowledge concerning food safety. Tuck shop owners of City of Ekurhuleni, Vosloorus were being assessed based on their knowledge of food safety in relation to hygiene, food poisoning and Certificate of Acceptability. Dependent variables for this research study consisted of Tuck shop owners (tuck shop/Spaza shop owners) who own such businesses within the City of Ekurhuleni, Vosloorus.

Data Collection

Data was collected through self-administered questionnaires from respondents. Response rate was 100% (324 participants) as well as sample size. The formulation of questions and answer options was made simple, concise, and extremely specific, ensuring that no ambiguities. Simple terms were used to ensure the questionnaire is suitable for the target population. The sequence of the flow of questions was carefully planned to ensure logic flow with basic demographic information first followed by the rest. Potential participants were approached by the researcher at various tuck shops in the study site and were issued with the information letter containing the details of the study. Those agreed to participate were requested to give consent for participation and were issued with the questionnaires. Participants were given time to complete the questionnaire in their own comfort and pace and the researcher followed up after three days to collect the completed questionnaires. If not completed, a second chance was given, and follow-up was done. A pilot study was carried out on 10% of the sample size to check if the questionnaires measured what was supposed to be measured. Reliability was also tested in terms of checking acceptability and consistency in the flow of responses. If the characteristics in the same group were measured repeatedly higher or repeatedly lower than the real valued that meant the measurement instrument lacked validity. All data entry for computer analysis was double-punched and verified. This means that researcher entered the data twice. To check the degree to which a questionnaire can be depended upon to secure consistent results upon repeated application. Validity provided evidence about how well scores on the new measure correlate with other measures of the same construct or similar underlying constructs that theoretically should be related.

Data Analysis

The data was entered into the statistical package for analysis, it was cleaned before analysis to assess accuracy. That involved editing and correcting unusual figures in coding. Descriptive statistical analysis was used to identify frequencies and percentages to answer all questions in the questionnaire. EPINFO 7.2 was used to calculate crude odds ratios as it visualizes the data. SPSS version 28 was used to calculate the adjusted odds ratios using multivariate and logistic regression to establish the probability or likelihood of factors associated with knowledge, attitude, and beliefs when it comes to food safety. The statistical significance of relationship among variables were determined using the confidence intervals and data is presented in tables and figures.

Ethical Considerations

Permission to conduct research was received from the University of Johannesburg Higher Degree committee (Appendix 1), Research Ethics committee (Appendix 2) and Department of Health, Ekurhuleni Health District Research Forum. All participants were informed about the aim and objectives of the research and permission was requested from Tuck shop owners to participate in the study by signing an informed consent.

Results

Socio-Demographic Characteristics of Study Participants

As shown in table 1 the overall number of participants (n=324,100%) out of the total number of participants males (n=262, 80.9%) and females (n=62, 19.1%). Among these participants there were more males aged between 31-40 years (n=116, 81.7%) followed by females (n=26, 18.3%). Most males (n=119, 78.8%) had secondary education and (n=32, 21.2%) were females. Most single participants were males (n=204, 86.8%) with only (n=31, 13.2) of females. Among ethnicity category South Africans males had (n=109, 64.9%) participants with only (n=59, 35.1%) of South African female participants. Among nationalities most participants were South African males (n=111, 64.9%) and South African females were (n=60, 35.1%).

Table 1: Socio-Demographic Characteristics of Tuck Shop Owners Stratified by Genders

	Total		**Males**		**Females**	
Characteristics	**n**	**%**	**n**	**%**	**n**	**%**
Total	324	100%	262	80.9%	62	19.1%
Age						
≤30 years	92	28.4%	76	82.6%	16	17.4%
31 – 40 years	142	43.8%	116	81.7%	26	18.3%
41– 67 years	90	27.8%	70	77.8%	20	22.2%
Education						
Primary	110	34.0%	102	92.7%	8	7.3%
Secondary	151	46.6%	119	78.8%	32	21.2%
Tertiary	57	17.6%	39	68.4%	18	31.6%
Other	6	1.9%	2	33.3%	4	66.7%
Marital Status						
Single	235	72.5%	204	86.8%	31	13.2%
Married	46	14.2%	29	63.0%	17	37.0%
Separated/ Widowed/ Divorced	43	13.3%	29	67.4%	14	32.6%

Ethnicity						
South African*	168	51.9%	109	64.9%	59	35.1%
Pakistani	109	33.6%	107	98.2%	2	1.8%
Bangladeshi and Indian (1)	26	8.0%	26	100%	0	0.0%
Other **	21	6.5%	20	95.2%	1	4.8%
Nationality						
South African	171	52.8%	111	64.9%	60	35.1
Bangladeshi	25	7.7%	25	100%	0	0.0%
Pakistani	109	33.6%	107	98.2%	2	1.8%
Other ***	19	5.9%	19	100%	0	0.0%

Distribution of Research study Participants by whether they knew a Certificate of Acceptability (CoA).

Majority of participants (n=240: 74.1%) believed that most deaths are also caused by food poisoning from poor hygiene of which the majority were males (n=181: 75.1%), however, about half of the study participants (n= 166: 51.2%) did not know if there was a relationship between food hygiene and food poisoning of which (n= 145: 87.3%) were males (see table 2).

Table 2: Distribution of Research Study Participants by whether they knew or have heard about a Certificate of Acceptability (CoA)

	Total		**Males**		**Females**	
Characteristics	**n**	**%**	**n**	**%**	**n**	**%**
Total	324	100%	262	80.9%	62	19.1%
Where do you purchase your foodstuffs/stock?						
Retail shop	60	18.5%	41	68.3%	19	31.7%
Food warehouse	225	69.4%	187	83.1%	38	16.9%
Other	39	12.0%	34	87.2%	5	16.9%
Do you know a Certificate of Acceptability (CoA) or have you heard about it						
Yes	173	53.4%	141	82.5%	30	17.5%
No	151	46.6%	120	80.0%	30	20.0%
Do you purchase foodstuffs/stock at a retail shop or food warehouse with a CoA?						

Yes	227	70.1%	174	76.7%	53	23.3%
No	97	29.9%	88	90.7%	9	9.3%

Distribution of Crude and Adjusted Odds Rations for Hygiene and Food Poisoning of Research Study Participants

About 173(53.4%) of participants knew or have heard about Certificate of Acceptability and Females were (n=30, 17.5%) compared to Males(n=141;82.5%). Most participants (n= 227;70.1%) purchased their foodstuffs/stock where there was a Certificate of Acceptability (see table 3).

Table 3: Crude and Adjusted Odds Rations for Hygiene and Food Poisoning

Characteristics	**Crude Odds ratios**	**95% CI**	**Crude Odds ratios**	**95% CI**
Do you believe that most deaths are also caused by food poisoning from poor hygiene?				
Yes	Reference	Reference	Reference	Reference
No	8.80	2.68 – 28.91	8.67	1.83 – 40.85
Do you know what food hygiene is?				
Yes	Reference	Reference	Reference	Reference
No	7.30	0.97 - 54.72	2.79	0.33 – 23.31
Do you know what food poisoning is?				
Yes	Reference	Reference	Reference	Reference
No	12.03	2.87-50.48	8.91	1.89 – 42.08
Is there a relationship between food hygiene and food poisoning?				
Yes	Reference	Reference	Reference	Reference
No	2.42	1.36-4.32	1.88	0.97 – 3.67
Do you believe that proper hygiene can prevent most food poisoning outbreaks?				
Yes	Reference	Reference	Reference	Reference
No	2.05	0.99 - 4.22	Undefined	undefined
"**The cleaner the environment the safer the food" do you believe in this saying?**				
Yes	Reference	Reference	Reference	Reference
No	13.20	1.78 - 97.68	Undefined	undefined

* CI is the 95% Confidence Intervals

** Adjusted for age, gender, education, and marital status

Distribution of Food Poisoning of Study Participants by Gender

Most participants (n=247: 76.2%) knew what food poisoning was, Males (n=187:75.7%) and Females (n=60;24.3).

Tuck shop owners with primary and secondary education were significantly more likely to be males Odds Ratios (OR) 5.88, 95%CI (2.34-14.63), OR 1.72, 95%CI (0.89-3.39), respectively, but the association did not hold in adjusted analysis. Tuck shop owners with marital status married, separated/widowed/divorced were less likely to be males in both crude and adjusted analysis adjusted odds ratios OR 0.26, 95% CI (0.13-0.53) and (AOR) 0.31, 95%CI (0.13-0.73). For the separated OR 0.31, 95%CI (0.15-0.67) and AOR 0.39, 95%CI (0.16-0.69) respectively. Tuck shop owners from Pakistani, Bangladeshi and Other ethnicity was significantly more likely to be males in the crude analysis only OR 2.89, 95% CI (1.63-5.14); OR 14.07, 95% CI (1.86-106.33); and OR 10.83, 95% CI (1.42-82.69), respectively. And for Other, in adjusted analysis AOR 11.24, 95%CI (1.35-93.04). For nationality, tuck shop owners of Bangladesh, Pakistan, and other nationalities were significantly more likely to be males OR13.51 95% CI (1.79-102.21); OR 28.92, 95% CI (6.10-121.28); and OR 10.27, 95% CI (1.34-78.61), respectively. For Pakistan nationality the estimates were significant in adjusted AOR 29.83, 95%CI (5.63-134.05).

Discussion

Tuck shop owners with education were more likely to be knowledgeable about food safety. The study further compared the level of education according to gender of participants and found that most of participants with primary education were males (92.7%) followed by female participants (7.3%). About (78.8%) of participants were males with secondary education followed by female participants with (21.2%) who also had secondary education. This finding was contrary to the study by (Mshelia et al., 2022) which found that postgraduates at public university in Selangor, Malaysia had poor knowledge on food safety. However, Ozilgen, (2010) stated that the more educated the person is, the more he or she is empowered with knowledge. (Ncube et al., 2019) revealed that higher educated food handlers were frequently observed to follow safe food handling procedures more often than lesser educated ones. Fortune et al, 2017 emphasized that Ghanaian institutional food handlers possessed adequate understanding of cleaning, sanitation practices, general and personal hygiene, and food safety. However, they further stated that ongoing food safety training and encouragement for food handlers from diverse backgrounds with a focus on those with less education would be a beneficial addition to other initiatives aimed at improving Ghana's food safety framework.

The study also revealed that Tuck shop owners with marital status; married, separated/ widow/divorced were less likely to be knowledgeable about food safety. However, this finding is arguable based on the lack of scientific proof that links food safety and marital status; hence a further study could be necessary to find the direct link between marital status and food safety. The study further compared the gender of participants according to their marital status and found that most married participants were males (n=29; 63, 0%) with only few female participants (n=17; 37.0%). The higher proportion of participants who were either separated/widowed/ divorced were males (n=29; 67, 4%) followed by female participants with (n=14; 32, 6%). Participants with Pakistani, Bangladeshi and Indian nationality were more likely to be knowledgeable about food safety in adjusted odds ratios. This finding was inconsistent with what was reported by (Wan Nawawi et al., 2022), in their study which assessed the level of knowledge, attitude, and practices in relation to food safety among food truck vendors and the respondents were

predominantly Malaysians with few other nationalities and had at least secondary education and work experience in food industry. The study found that they had fair knowledge, a positive attitude, and good practices relating to food safety. Participants with Bangladesh, Pakistan and other nationalities were more likely to be knowledgeable about food safety in adjusted odds ratios. Bangladeshi nationalities were only males (n=25; 100%). The higher proportion of participants with Pakistani nationality in the study were males (n=107; 98, 2%) with only few female participants (n=2; 1, 8%).

Tuck shop owners who did not know a Certificate of Acceptability or have not heard about it were more likely to be less knowledgeable about food safety. The finding related to the study inclusion criteria that only food premises without Certificate of Acceptability (CoA) were included because those with Certificate of Acceptability were given health education in relation to food safety and food premises requirements before Certificates of Acceptability were issued to them and were regarded as knowledgeable. The study further showed a higher proportion of male participants with (n=120; 80, 0%) who did not know or have not heard about Certificate of Acceptability compared with female participants (n=30; 20, 0%). This finding correlated with other studies by Ismail, et al,(2016) which stated that studies conducted by Food Agriculture Organization (1995) recorded that poor knowledge led to poor practices in food handling base on the assessment of microbial contamination of food sold by the mobile food handlers. Tuck shop owners who did not think contaminated food can make a person sick were significantly more likely to be less knowledgeable about food safety. The study further revealed that a smaller number of female participants (n=2; 3, 4%) who shared the same sentiment compared with high number of male participants (n=57; 96, 6%). Both significant findings related to lack of knowledge about food safety. (Nguyen et al., 2018) highlighted the necessity of improving consumers' defence mechanisms, the ability of local authorities to monitor and inspect the food processing process, and the need for consumers to be aware of the environmental standards that food facilities must meet. The report went on to say that both food processors and patrons must have enough awareness of cleanliness and safety regulations to prevent foodborne illnesses in food facilities.

Tuck shop owners who said there was no relationship between food hygiene and food poisoning were significantly more likely to be less knowledgeable about food safety with most male participants (n=145; 87, 3) and least females ((n=21; 12, 7%). “When you know better, you do better,” the study findings were a true reflection of lack of knowledge by Tuck shop owners on food safety. Khuluse, and Deen, (2020) revealed in their study that food vendors lack the knowledge of proper hygiene and safety which relates to any informal food premises. Nyawo, Kesa and Onyenweaku, (2021) found that one of the reasons food handlers disregarded food safety and hygiene regulations was a lack of education and awareness. The results also showed that to stop the transmission of pathogens (cross-contamination) during food preparation and avoid foodborne illnesses, food workers should be required to complete training. Manafe, Gordon and Ncube, (2023) further emphasized the importance of education by stating that most foodborne illness cases have a domestic origin.

The study revealed that Tuck shop owners who did not believe that most deaths are also caused by food poisoning from poor hygiene were significantly more likely to be less knowledgeable about food safety. The study further showed that most male participants (n=81; 96, 4%) did not believe that most deaths are also caused by food poisoning from poor hygiene compared with the number of female participants (n=3;3,6%). The Tuck shop owners who did not know about food poisoning were significantly more likely to be less knowledgeable about food safety. Most (n=75; 97, 4%) of male participants did not

know food poisoning compared with female participants (n=2; 2, 6%). Tuck shop owners who said there is no relationship between food hygiene and food poisoning were significantly more likely to be less knowledgeable about food safety with most male participants (n=145; 87, 3) and female participants (n=21; 12, 7%) who share the same sentiment.

Study Limitations

Lack of previous studies, both national and international, on the study topic made it a challenging to get a relevant literature review. Language barrier was one of the limitations of the study which in turn impacted on the data collection. Not enough data was one of the most limitations in the study. Participants sometimes were busy serving their clients. The element of crime in the study area made the participants sceptical of allowing a researcher to enter their food premises. The study was limited to one area within the Ekurhuleni metropolitan municipality and future studies can be expanded to more areas and wider municipalities in South Africa.

Abbreviations

FBD: Food-borne diseases; SPSS: Statistical package for social sciences; CoA: Certificate of Acceptability; WHO: World health organization; OR: Odds ratio; AOR: Adjusted odds ratio; CI: Confidence interval.

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Author's Contributions

The Author wrote a research proposal for approval, data collection tool, collected data, entered data into Microsoft Excel, cleaned data and exported it into SPSS software, entered data into Epi-info, analyse and interpreted the data, and wrote the paper with the assistance of Dr M. C. Mokoatle.

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Availability of Data and Materials

Data and materials are available upon request.

Consent to Publication

The manuscript does not contain any confidential information.

Competing Interest

The Author declares that they have no competing interests.

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