

A descriptive cross-sectional study of food hygiene practices among informal ethnic food vendors in Gauteng Province, South Africa

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Abstract

Demand for ethnic foods by the immigrant population has led to proliferation of ethnic food shops (shops selling foods eaten by different ethnic groups). However, the status of the food hygiene practices among these vendors is unknown. This study investigated food hygiene practices among informal ethnic food vendors in Gauteng Province (GP), South Africa. Participants included immigrants managing informal ethnic food shops in GP. Snowball sampling was used to identify participants (n=40). A questionnaire/checklist was used to collect information on hygiene practices. Although majority of ethnic food shops (95%; n=38) operated in permanent structures, just over half (55%; n=22) of these facilities had windows. The remaining 5% (n=2) of the vendors operated from the boot/trunk of cars. None of the participants had a food probe used to monitor the temperature of food. Most of the participants (65%; n=26) did not own freezers, and just above half (55%, n=22) had microwave ovens. Majority (95%; n=38) of the respondents had access to toilet facilities and tap water at their premises. Only two (5%; n=2) respondents brought water from home, and these used public toilets at shopping centers in the vicinity of their businesses. Majority (72.5%; n=29) of the respondents were not aware of the importance of keeping food above 65°C. Slightly over half (55%, n=22) of the respondents did not reheat the food before serving, and only 10 % (n=4) followed proper food reheating procedures.

Poor food hygiene practices and lack of appropriate food handling equipment and facilities are common among ethnic food vendors. The widespread lack of awareness of the importance of holding food above 65°C, and the high prevalence of not reheating the food before serving, and not following proper food reheating procedures, are a major source of concern as these practices are potentially associated with promoting

food contamination with foodborne disease-causing organisms. It is envisaged that findings reported here can guide policy makers to design policies that promote selling safe food by ethnic food vendors. To enhance compliance, it is recommended that such policies should be user friendly to the operators of informal ethnic food shops.

Introduction

The growing immigrant population has led to an increase in the demand for ethnic foods (Verbeke & Lopez, 2005; Leung, 2010). Furthermore, it has been observed that the demand for the immigrants' traditional food has also been augmented by the adoption of these foods by the local people (Roberts *et al.*, 2011), who associate the traditional food of immigrants with delicacy, high nutritive value and trendiness (Adekunle, Filson & Sethuratnam, 2010). A good example, is the popularity of the Thai cuisine around the world (Supawan, Sornsarut & Pimdee, 2019). In America, adoption of the immigrant ethnic foods has increased to the extent that some of these cuisines are now considered part of the American food culture (Roberts *et al.*, 2011).

However, much as there has been an increase in the number of ethnic food restaurants, studies show that the microbial quality of food produced within such food establishments is of concern (Rudder, 2006; Roberts *et al.*, 2011; Stenger *et al.*, 2014). For example, in the USA and Europe, between 1990 and 2000 there was an increase in the outbreak of foodborne illnesses related to safety of ethnic foods from 3% to 11% (Quinlan, 2013). The poor microbial quality of food produced by ethnic food vendors has been attributed to poor hygienic practices (Roesel & Grace, 2014; Harris *et al.*, 2015), poor quality of food (Rudder, 2006; Njomo, 2012, 2013), and failure to comply with food safety regulations (Rudder, 2006; Roberts *et al.*, 2011; Harris *et al.*, 2015). Actually it has been observed that the majority of the ethnic food markets and restaurants tend not to comply with food safety regulations (Rudder, 2006; Roberts *et al.*, 2011; Harris *et al.*, 2015). For example, in a study that was conducted in Borough in Greater Manchester (Rudder, 2006), several ethnic retailers failed to meet the minimum standards of the food legislation related to food premises such as having soap, proper drying methods and a basin. In addition, most businesses operated in structures that had damaged equipment, poor ventilation, and broken floors and ceilings. Failure to adhere to

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Key words: Sub-Saharan immigrants, Food handlers, Ethnic foods, Food safety, Hygienic food production.

Acknowledgements: The authors would like to acknowledge the informal vendors running the ethnic restaurants for accepting to participate in this study. We are indebted to the Department of Language Services of the University of South Africa that assisted with the editing of the manuscript.

Contributions: MTP conceptualized the study, collected the data, interpreted the results, and wrote the manuscript. JWO analyzed the data, interpreted the results, and was a major contributor in writing the manuscript. MCA was a major contributor to the conceptualization of the study and did an extensive review of the manuscript for important intellectual content. All authors read and approved the final manuscript.

Conflict of interest: The authors declare no potential conflict of interest.

Funding: This work was supported by the University of South Africa Academic Improvement Plan (AQIP). The funder did not play any role in the design of the study, collection of data, analysis of data, interpretation of data and in writing the manuscript.

Ethical approval: Ethics clearance for the study was obtained from the College of Agriculture and Environmental Sciences, UNISA (Ref #: 2014/CAES/113). The participants were informed that they were free to withdraw from the study at any time without suffering any consequence. Two research assistants from the Sub-Saharan immigrant community were trained to collect data to enable them to observe the ethical code of primary research. Apart from being experienced in data collection using structured questionnaires, the research assistants were familiar with the ethnic food markets and the languages spoken by the majority of the respondents. This facilitated gaining trust and entry into the community. Written informed consent was obtained from all entrepreneurs who participated in the study. Data were collected from October to December 2015.

Availability of data and material: Data and materials are available by the authors.

Received for publication: 29 May 2021.
Accepted for publication: 16 January 2022.

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Licensee PAGEPress, Italy
Italian Journal of Food Safety 2022; 11:9885
doi:10.4081/ijfs.2022.9885

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regulatory requirements was also observed in studies conducted in the USA (Roberts *et al.*, 2011; Harris *et al.*, 2015).

Even within ethnic food shops or markets, there are variations in the level of adherence to food safety requirements. In a study by Roberts *et al.* (2011) of independent ethnic markets in Kansas, the authors observed more food safety violations compared to chain-ethnic restaurants and non-ethnic restaurants. Furthermore, ethnic restaurants tend not to comply with the USA's Food and Drug Administration legislation prescribed in the Employee Health and Personal Hygiene Handbook (Harris *et al.*, 2015). Lack of compliance has been attributed to cultural differences, and the inability of restaurant operators to understand and comprehend government regulations (Roberts *et al.*, 2011; Harris *et al.*, 2015). Language barrier which, makes it difficult to train the actors in the sector, has been blamed for non-compliance of ethnic food markets and restaurants (Rudder, 2006; Roberts *et al.*, 2011).

Since the dawn of the new dispensation in South Africa that ushered in the new democratic government in 1994, South Africa has experienced an emergence of ethnic food shops and restaurants in major cities to meet the demand for ethnic foods. However, there have been complaints from ethnic food consumers regarding the quality of ethnic foods (Njomo, 2012, 2013). This notwithstanding, there is no evidence of studies that have investigated the adherence to basic food hygiene and food handling practices among shops selling ethnic foods (subsequently referred to as ethnic food markets and/or restaurants). This study therefore assessed hygiene facilities and food handling practices among ethnic food markets and/or restaurants in Gauteng Province (GP), South Africa.

Materials and methods

The study area

The study was conducted in GP and covered the cities of Tshwane and Johannesburg, with a land mass of about 18,178 km². Based on the 2019 mid-year population estimates the population of GP stands at 15,176,115 people, which is 25.8% of the entire population of South Africa. Additionally, GP is the most populated province in South Africa, with a large population of Sub-Saharan immigrants (just under 10% of the population of GP, which makes up >5.25 million migrants) (Landau & Gindrey, 2008; Njomo, 2013).

Study population

Immigrants operating ethnic food markets in the two cities (Tshwane and Johannesburg) of South Africa, who voluntarily consented to participate in the study, constituted the study population. To be included in the study, the participant had to be managing an ethnic food market and/or restaurant. Informal food vendors who were not immigrants were excluded from the study.

Research design and sampling

A cross-sectional questionnaire-based study design was adopted to achieve the objectives of the present study. Given the informal nature of ethnic food markets, there was no sampling frame hence snow-ball sampling was adopted to identify participants throughout the two cities of Johannesburg and Tshwane. The researchers were thus able to reach all known immigrants running ethnic food restaurants in the study area. Participants signed the consent form to indicate that their participation was voluntary, and they were also informed that the results were going to be used in publications.

Data collection instrument

A Questionnaire/Checklist developed based on the World Health Organization (WHO) principles outlined in the document "Five Keys to Food Safety" that was used by Oguttu (2015), was adopted for data collection in this study (Supplementary Material). The five keys of food safety include: keeping clean, separation of raw and cooked food, cooking thoroughly, keeping food at safe temperatures, and use of safe water and raw materials (WHO, 2006). Section A of the Questionnaire/checklist comprised of questions related to demographic information of the respondents such as age of the food vendor, age of the business, educational level, nature of the business and country of origin of the entrepreneurs. Section B assessed ownership of hygiene equipment and/or facilities such as thermometers, freezers, microwave, water sources, toilet facilities, waste disposal, and ventilation. Section C assessed variables best captured by observation such as: disinfection of the surfaces areas and knives, washing hands between handling raw and ready-to-eat (RTE) food, keeping utensils for handling raw and cooked food separate, reheating of the food, and the temperature at which ready to eat (RTE) food is kept. If the food was kept on fire and was observed to be simmering (*i.e.*, food was kept just below the boiling point), it was considered to have been held at $\geq 65^{\circ}\text{C}$. Otherwise, if the food was not kept on fire, it was considered to have been held at temperatures $< 65^{\circ}\text{C}$.

Data analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) software version 23. Descriptive statistics were computed and presented as frequency tables and figures.

Results

Socio-demographic details of the respondents

Over half of the respondents (60%; $n=24$) were below the age of 40 years. Just over half of the respondents (57.5%; $n=23$) had businesses that were >3 years old (Table 1).

Majority of respondents (70%; $n=28$) were immigrants from West Africa, and all (100%; $n=40$) owned independent ethnic restaurants. Vast majority of respondents (85%; $n=34$) indicated that they serviced customers from a variety of Sub-Saharan countries including the host country South Africans.

More than half of the respondents (57.5%; $n=23$) had attained tertiary education (Figure 1), while majority (85%; $n=34$) indicated that they were fluent in English (*i.e.*, could read and write fluently). However, only 15% ($n=6$) of the respondents had received training on safe food handling and hygiene practices.

Hygiene facilities and food handling practices

Majority of respondents (95%; $n=38$) operated in permanent structures, and only 5% ($n=2$) operated from the boot/trunk of vehicles. Just over half (55%; $n=22$) of the permanent facilities had windows (Table 2).

None of the restaurants were in possession of thermometers/probes used to monitor the temperature of food (Table 2). Only 35% ($n=14$) of ethnic food shops had freezers that were in proper working condition. The remaining 65% ($n=26$) did not own freezers. Over half (55%, $n=22$) of the restaurants had microwave ovens.

Almost all the vendors (95.0%; $n=38$) had access to toilet facilities and running tap water at their premises. The two (5.0%; $n=2$) respondents who operated from the boot/trunk of the vehicles indicated that they brought water from home and used the public toilet facilities at nearby shopping centers and garages.

Most respondents (85%; $n=34$) disinfected surfaces using bleach and soap. Reheating food before serving was not common. In fact, less than half of the respondents were observed reheating food before serving (Figure 2).

Overall, the majority of the respondents (72.5%; n=29) were not aware of the importance of holding food above 65°C. Only 27.5% (n=11) kept food above 65°C during holding time (Figure 2). Among those who reheated the food, the majority reheated the whole pot (35%), and only 10% (n=4) reheated per serving.

Discussion

Socio-demographic details of the respondents

We observed that the majority of vendors were young people (<40 years old). This was expected given that immigrants tend to be young people willing to take risk

and move to seek out new homes. These findings are comparable to findings of past studies, in which it was observed that food handlers at restaurants are generally young (Pichler *et al.*, 2014; Al-Shabib, Mosilhey & Husain, 2016). Results reported here also confirm that the informal food trade serves as one of the sources of employment opportunities for the increasing young adults who are not able to get employment in the formal sector (Oguttu, 2015).

In a study of ethnic food restaurants in southeast Texas, a business was considered successful if it had been in operation for over 3 years (Agarwal & Dahm, 2015). We observed in the present study that most businesses had been in operation for a period of less than 3yrs. However, as the number of immigrants from Sub-Saharan Africa

to South Africa increases due to the unstable economic conditions, soaring ethnic conflicts, volatile political situations and drought situations in many African countries, the number of ethnic restaurants that have been in operation for a long period is likely to increase (Adepoju, 2008; Njomo, 2013; Statistics South Africa, 2013).

Results of this study showed that most of the proprietors of the ethnic food shops/markets were mainly of West African descent. This was expected given that West Africans are the dominant immigrant community in South Africa (Statistics South Africa, 2013).

All the ethnic restaurants in the present study were independently owned. This is consistent with the observation by other authors who reported that ethnic restaurants

Table 1. Socio-demographic details of the ethnic food vendors included in this study.

Variable	Levels	No. respondents	Percentage
Age of respondents	Below 40	24	60.0
	Over 40 years	16	40.0
Age of the business	Below 3 years	17	42.5
	Over 3 years	23	57.5
Region of origin	Southern Africa	1	2.5
	West Africa	28	70.0
	Central Africa	7	17.5
	East Africa	4	10.5
Type of the business	Chain	0	0
	Independent	40	100.0
Predominant customers	East Africans	1	2.5
	West Africans	2	5.0
	Central	3	7.5
	All the above (including South Africans)	34	85.0

Table 2. Results of the survey of hygiene facilities at ethnic restaurant establishments showing the levels of compliance to good hygiene practices.

Variable	Levels	No. respondents	Percentage
Premises where businesses are run	Permanent	38	95.0
	Temporal	2	5.0
Windows	Yes	22	55.0
	No	16	40.0
	Not applicable	2	5.0
Thermometer	Yes	0	0.0
	No	40	100.0
Freezer	Yes	14	35.0
	No	26	65.0
Microwave	Yes	22	55.0
	No	16	45.0
Water source available at the premises	Yes	38	95.0
	No	2	5.0
Toilet facilities at the premises	Yes	38	95.0
	No	2	5.0
Disinfecting surfaces	Yes	34	85.0
	No	6	15.0

tend to be small and independently owned (Agarwal & Dahm, 2015; Harris, 2016). Apart from being independently owned, ethnic restaurants are unique and are usually staffed by family members (Harris, 2016). Furthermore, ethnic restaurants are similar to informal food vendors in that they are independently owned, have limited resources and are run by family members (Agarwal & Dahm, 2015; Oguttu, 2015).

The vast majority of respondents in this study did not only serve customers from their ethnic background. They also had South Africans patronizing their businesses. This suggests that the local population was aware and willing to try the immigrants' cuisine. Similar findings by other authors on ethnic foods show that although they start by claiming only ethnic-authentic patronage, with time they gain popularity amongst the locals and sometimes end up being part of the mainstream cuisine (Harris, 2016).

In this study, many participants had attained low levels of education. This observation is of concern, because poor education levels have a negative impact on the ability of ethnic restaurateurs to run successful business ventures (Agarwal & Dahm, 2015; Al-Shabib, Mosilhey & Husain, 2016). Low educational levels together with prohibitive labor laws, force immigrants to resort to small businesses. According to Fatoki (2016), due to difficulties in entering the labor markets in host countries, it is not uncommon for immigrants to resort to small businesses that specialize in ethnic-orientated enterprises.

The low education levels observed in this study contrast with findings of the study conducted in southeast Texas, where it was observed that the majority (75%; n=15) of the respondents were college graduates and/or had postgraduate qualifications (Agarwal & Dahm, 2015). The differences in education levels observed, could be attributed to the origin of the immigrant restaurateurs. Majority of the participants in the Texas study originated in countries like Mexico, Italy and Vietnam that have higher tertiary education enrolments compared to most African countries (The Africa-America Institute, 2015).

Most communication regarding food safety standards and regulations in South Africa is written in English. It is easier to train the vendors in food hygiene principles if they understand the language used in the training. Therefore, the fact that majority in this study were able to read and write in English, is a welcome finding from a food safety point of view.

Lack of training in food handling and hygiene practices has been linked to poor

food safety knowledge and practices (Onyeneho & Hedberg, 2013). Previous research has shown that food safety training is very important for informal food vendors such as the ethnic food businesses because they are naturally predisposed to poor food handling practices (Harris, 2016). In view of this, since only a few respondents in the present study had received training in safe food handling and hygiene practices, the observation is a public health concern.

Hygiene facilities and food handling practices

Vendors in this study mainly operated in permanent structures with a few operating in nonconventional structures like the boot of a vehicle. Although preparing food in enclosed structures as observed in this study mitigates against food contamination, this advantage could be negated by the fact that up to 40% (n=16) of the ethnic food premises in this study did not have windows.

This is a critical violation of the minimum standards and requirements of food premises stipulated in the Regulations Governing General Hygiene Requirements for Food Premises and the Transport of Food (No. R. 918 of 1999). Poor ventilation could be detrimental to hygienic food handling, in that the extent to which air is contaminated, influences the safety of food handled in poorly ventilated premises (Republic of South Africa, 1999). However, the results revealed a lower level of violation in terms of the requirement for ventilation of food premises compared to what was reported in a study conducted in Paris amongst European street vendors (Czarniecka-Skubina *et al.*, 2018).

The lack of thermometers or food probes for monitoring the temperature of food among the vendors observed in this study, is similar to findings of other studies that reported that the use of thermometers at food establishments was very low (Roberts

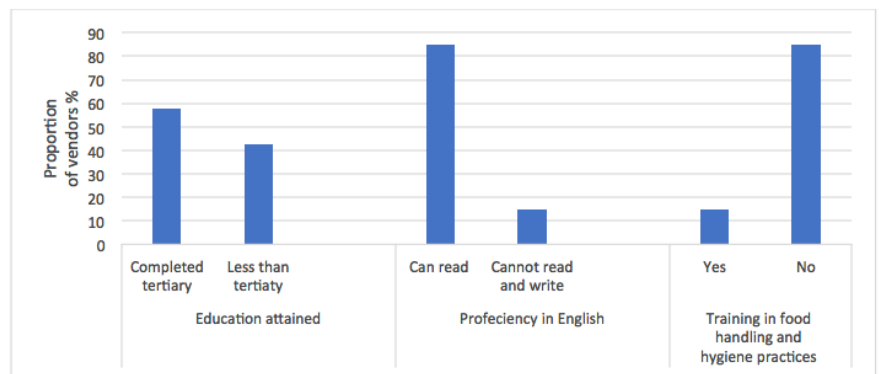


Figure 1. The distribution of respondents by education profile (ability to read and write in English) plus the attendance of food safety training (n=40).

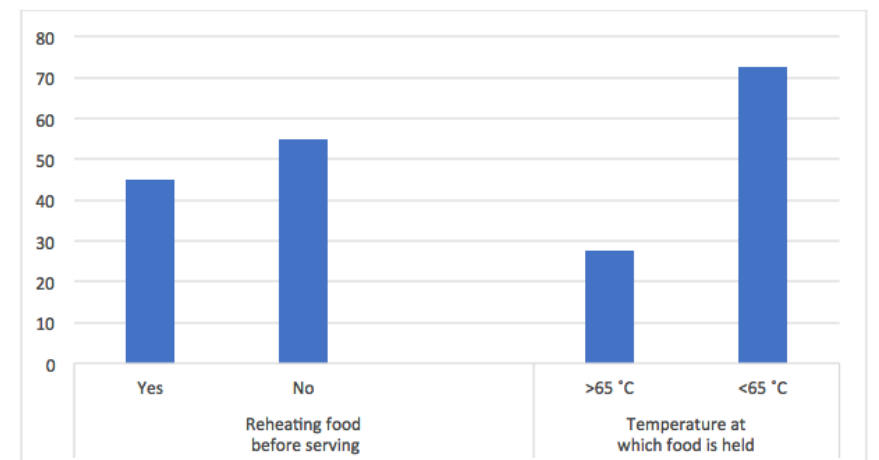


Figure 2. Temperature control measures of ethnic ready-to-eat food showing the number of respondents who reheat food before selling and those that kept food at temperatures above 65°C.

et al., 2011; Sibanyoni, Tshabalala & Tabit, 2017). This suggests widespread lack of monitoring of the temperature of food during cooking, holding and storage among the ethnic food vendors. Yet time and temperature control have been reported to be critical in managing or limiting microbial growth in food (Garayoa *et al.*, 2016).

The fact that few respondents in this study owned freezers in proper working condition, and that the majority of the ethnic food shops did not own freezers, raises questions about the ability of the food vendors to properly store perishable foods and maintain recommended holding temperatures for cooked food, especially the leftovers. This finding was however, expected. For example, researchers in Owerri, Nigeria also observed that the majority of the under-resourced restaurants did not own refrigerators or freezers (Onyeneho & Hedberg, 2013).

It is a norm for most informal food establishments to prepare food early and leave it on the shelves or tables to cool down (Abdul-Mutalib *et al.*, 2012). Therefore, owning a microwave could help to control multiplication of harmful microorganisms by allowing reheating of food in small quantities thus preventing uneven heating and contamination that is associated with reheating large amounts of food.

Although the percentage of ethnic restaurants that did not have access to potable water in this study was low, it is a cause for concern. Access to potable water by informal vendors has been identified as a critical risk factor for food safety (Oguttu *et al.*, 2014). Lack of access to potable water compromises the hygienic quality of containers used to hold food. We are of the view that bringing and holding water in containers predisposes the vendor to a risk of running out of water before the end of business day, which further compromises the ability to maintain hygiene at the vending site.

Although only a small number of ethnic restaurants in this study did not observe disinfection of working surfaces, these findings are significant because they suggest that there is still potential for cross-contamination during food preparation. The fact that reheating of food was rarely practiced by the vendors under study, and that reheating food involved heating the whole pot suggests that the risk of food going bad is high. Practices such as heating for insufficient time and at insufficient temperatures are important risk factors for foodborne illnesses. The problem of not reheating food is not limited to the vendors who participated in this study. A study conducted in Australia

also reported that reheating leftovers was not done correctly (Worsely *et al.*, 2013).

It is concerning that some vendors (27.5%; n=11) did not adhere to the principle of holding food at temperatures above 65°C so as to minimize food spoilage. Absence of thermometers at the food stalls suggests lack of monitoring of the temperature of food during preparation and holding. Poor monitoring of the temperature at which food is held, has been observed as a general problem among many food establishments (Kwon *et al.*, 2012; Pichler *et al.*, 2014). For example, Kwon *et al.* (2012) reported that time and temperature control were persistent problems among both ethnic and non-ethnic restaurants in Kansas. Pichler *et al.* (2014), found vast knowledge gaps concerning holding and storing of food among food handlers in catering businesses and restaurants in Vienna, Austria.

Conclusions and recommendations

To the best of our knowledge, this is the first study to investigate the hygiene practices among vendors of ethnic foods in South Africa. Poor food hygiene practices and lack of appropriate food handling equipment and facilities are common among ethnic food shops. The observed widespread lack of awareness of the importance of holding food above 65°C, not reheating the food before serving and not following proper food reheating procedures on the part of the ethnic food vendors, are a source of concern because of the potential to promote contamination of food with foodborne disease-causing organisms. However, practices such as preparing food in closed structures and access to potable water that were observed among the food vendors, should be encouraged because of their inherent potential to enhance food safety. Findings of this study can guide policy makers to design policies that promote production of safe food. Furthermore, findings reported here can be used as guidelines when developing training manuals for informal ethnic food markets on food hygienic practices that need to be prioritized. Given the poor compliance with food hygiene principles observed in this study, concomitant studies that will investigate the microbiological quality of ethnic foods sold by vendors of ethnic foods in South Africa are highly recommended.

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