CHAPTER 16

Accessibility of Sanitary Facilities Among Food Sellers in African Secondary Cities: Implications for Food Safety and Urban Planning Policies

Emmanuel Chilanga and Liam Riley

Introduction

The rapid growth of secondary cities across sub-Saharan Africa has often outpaced the capacity for local governments to ensure the safety of food consumed by their urban populations. Foodborne illness is a major public health hazard that is directly related to the effectiveness of food safety policies, compliance and enforcement (Hoffmann et al., 2019). The

E. Chilanga
McGill University, Montreal, QC, Canada

L. Riley (✉)
Balsillie School of International Affairs, Wilfrid Laurier University, Waterloo, ON, Canada
e-mail: lriley@balsillieschool.ca

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World Health Organization (WHO) estimates that one in every 10 people suffered from foodborne illnesses in 2010 (Sharif et al., 2018). Foodborne diseases are caused by contaminated food or drink, most often from foods containing biological hazards such as bacteria, viruses and parasites (Vipham et al., 2020). African countries have reported a disproportionately high number of children and adults who suffer from foodborne diseases, such as diarrhea and cholera, compared to other countries in the world (Pires et al., 2021).

This chapter contributes to the literature on food safety practices in African secondary cities through two case studies of urban food systems: in Dschang, Cameroon; and in Mzuzu, Malawi. Both cities were studied as part of the African Food Security Urban Network—Food, Urbanization, Environment and Livelihoods project (AFSUN-FUEL), which included a survey of small-scale food traders. The food trader survey followed a household survey conducted in both cities in 2017 that found high rates of dependence on informal and open markets within the food systems (Legwegoh et al., 2020; Riley et al., 2018). Whereas Mzuzu has one large supermarket (of the South African Shoprite chain), Dschang has no similar establishment. Formal sector supermarkets provide some advantages for government safety regulators, such as indoor facilities, a fixed address and potential legal accountability, which are inconsistent factors among small-scale informal traders, making enforcement of safe food practices relatively difficult (Boatemaa et al., 2019). In many African countries, municipal governments of secondary cities have less capacity than primary cities to enforce food safety bylaws (Giroux et al., 2021). There are also gaps in the provisioning of facilities for safe hygiene in most secondary cities, which can negate the best efforts of vendors to protect their customers (Smit, 2018).

Food Safety in Mzuzu's Food System

Mzuzu is the third-largest city, after Lilongwe and Blantyre, and a major urban center in Malawi's Northern Region. Mzuzu was declared a city in 1985 and covers 147 square kilometers at an altitude between 1,200 and 1,370 meters above sea level. In 2018, the city had a population of 220,000, settled across 15 political wards (Manda, 2019). Food safety and hygiene is a known public health concern among residents of Mzuzu city. Current studies demonstrate that a high proportion of products sold in the city are contaminated. For instance, a study by Jazimoni Lazaro,

Fanuel Kaputi and Rochelle Holm (2019) found that almost 100% of fresh fish sold in the open markets of the city were contaminated with *Salmonella spp* bacteria. Another study found that 87% of fresh vegetables sold in the open markets were contaminated with *Escherichia coli* (Holm et al., 2017). The high burden of diarrheal infection in the city may be attributed to poor sanitary services that overstretch the budget of public hospitals (Holm et al., 2018).

Despite the food safety hazards, the majority of Mzuzu residents depend on open-air markets and vendors for their regular food supply. Riley et al., (2018, p. 35) found that, in the previous year, 67% of households had purchased food at the Main Market (partially covered), 57% at Vigwagwa Market (uncovered) and 46% from street vendors. About half (54%) had purchased food at supermarkets (54%), but only 25% purchased food at a supermarket weekly or daily. A study of informal settlements in Lilongwe found even higher rates of patronage of street vendors: all households had purchased food from sellers at least once per week in the previous year and 45% of households averaged five times per week (Chilanga et al., 2017). There appear to be strong linkages between informality, poverty and foodborne illness risk in Malawian cities.

The Government of Malawi recognizes that food safety and sanitation is a policy priority, human rights and social welfare issue, and that policies promoting food safety are a pathway to the attainment of the Sustainable Development Goals (Magamba et al., 2017). Unfortunately, the country has limited food safety and sanitation capacity due to limited infrastructure, food safety knowledge and data (Morse et al., 2018). Political corruption scandals in recent years, which have contributed to urban food insecurity and eroded public trust in governments (Riley & Chilanga, 2018), have further compounded the challenges for governments seeking to ensure food safety for urban residents. These factors are currently undermining social and public health workers to support best food safety and market hygiene practices, such as use of sanitary facilities and personal hygiene.

Food Safety in Dschang's Food System

Dschang has grown rapidly since the establishment of the University of Dschang in 1994 (Mboua et al., 2021). While accurate demographic data is not available, the 2020 extrapolated data suggests that the city is home to more than 200,000 people (Legwegoh et al., 2020). Food

safety and sanitation is a topical public health and policy issue in Dschang. Empirical studies in the city have found that a large proportion of domestic water that is supplied and used in the city is not safe for human consumption in accordance with WHO water quality standards (Emile, 2011). Lack of potable water has been linked to a high prevalence of waterborne outbreaks that exacerbate morbidity and mortality (Fusi-Ngwa et al., 2014). Other studies attributed the high prevalence of intestinal parasites in children to consumption of salads that are watered by fecal-contaminated water (Ntangmo Tsafack et al., 2012). A national study that assessed the quality of meat and meat products produced in Cameroon found that most foods of animal origin were contaminated with pathogenic bacteria and aflatoxins (Pouokam et al., 2017).

Informal traders are critical actors in Dschang's food system. There are two major markets in the city center: Marché A specializes in non-food items and services and Marché B is the food market. Marché B operates daily, with variable numbers of vendors and customers. Every eighth day is Big Market Day (*ngam*) and the market area swells with traders and customers. The fifth day between Big Market Days is Small Market Day (*metah*), while the days in between are attended only minimally by vendors and customers (Fouepe et al., 2017). Other markets located in residential areas also follow the market day pattern, mainly accommodating rural traders and customers (ADEID, 2011). The household survey conducted in 2017 found that nearly all households (91%) had purchased food at open markets in the past year and for about one in four households open markets were their sole food source. There is no major supermarket outlet in Dschang and only 10% of households had purchased food at a supermarket in the past year, perhaps at a supermarket in another city (Legwegoh et al., 2020). Bread and meat were the only popular foods to be purchased, and these purchases were made mostly at places other than open-air markets (small shops and butcheries, respectively) (Legwegoh et al., 2020).

Given the widespread use of open-air markets, an understanding of sanitary practices among food vendors in Cameroon is critical in order to inform food and sanitation policies and programs (Montet et al., 2021). Research in Fako found that many food traders were not following hygienic food handling practices and thus caused bacterial contamination of vegetable products (Akoachere et al., 2018). In Yaoundé, it was observed that most street food vendors had compromised personal

hygiene standards, with up to 45% of the vendors carrying feco-orally transmissible parasites (Blaise, 2014).

There is a dearth of studies exploring the predisposing factors of poor hygienic practices among food traders in secondary cities of Africa. There are also too few studies situating the issue in a social context that links food safety to food security and governance in African secondary cities. To address this gap in knowledge, and to provide a window onto the international differences in food safety, our study examined factors that are associated with access to sanitary facilities, with a focus on toilets, potable water, waste disposal and food inspections to reduce the risk of foodborne pathogens spread by food traders in Mzuzu and Dschang. The focus on vendors' access to both information about food safety and hygiene-promoting facilities is also relevant to the public health problems that have emerged in the context of COVID-19, since many of the challenges of raising awareness and changing routine behaviors are common to both campaigns.

Methods

A multistage descriptive cross-sectional study design was used to select a representative sample of diverse food traders in each city. Prior to this study, municipal governments in Mzuzu and Dschang did not have lists of all food traders, which posed a challenge in drawing a representative sample size. To address this problem, our survey teams mapped out all food traders in targeted areas of each city, using a rapid survey that recorded GPS coordinates and types of businesses, providing a basis for understanding the relative prevalence of different types of small-scale food trading businesses in each of the targeted neighborhoods. These maps were the basis for sampling targeted percentages of different types of small-scale food sellers in different areas of each city, achieving the objective of studying food trading activities in commercial and residential areas.

The survey was conducted in Mzuzu in April 2019 and in Dschang in August 2019. The survey questionnaire was adapted from the survey instrument developed by the Hungry Cities Partnership (HCP) (Chikanda et al., 2020). It captured information related to vending location, demographic and enterprise characteristics (structure, practices and business environment), food production patterns and sanitation. The sanitation questionnaire was in addition to the HCP questionnaire

and was based on a validated questionnaire used in previous studies in urban areas of developing countries (Abdul-Mutalib et al., 2012; Aluko et al., 2014). It gathered information relating to access to sanitation resources, knowledge and practices. The survey questionnaire was designed on kobotoolbox.org and loaded onto GPS-enabled tablets using OpenDataKit software.

The Kolmogorov–Smirnov and Shapiro–Wilk tests were used to determine the normality of the distribution of the data. These include starting capital, average sales, number of employees and age. Bivariate and multivariate logistic regressions were performed to examine significant predictors of access to basic hygienic resources, practices and knowledge. The data was not normally distributed, so the nonparametric Mann–Whitney U test, Kruskal–Wallis test and Spearman's correlation were applied. The multicollinearity of explanatory variables obtained a variance inflation factor of 5,143, which indicated independence among the explanatory variables both at the individual and the cluster level. Consequently, a fixed-effects model was used to account for the clustering effect. The results of the multivariable analysis have been reported as crude and adjusted odds ratios with a 95% confidence interval (CI). A p-value of less than 0.05 was considered statistically significant. The data was analyzed using an IBM Statistical Package of Social Sciences for Windows, version 23.0 (IBM Corporation, Armonk, NY).

Sociodemographic Characteristics of Traders

Sociodemographic and sanitation data for Mzuzu ($n = 497$) and Dschang ($n = 848$) selected food traders are presented in Table 16.1. Most food traders in both cities were women: 67.6% in Mzuzu and 63.7% in Dschang. There was significant difference in education attainment between the cities. In Mzuzu, most food traders (47.3%) had a primary school education, while in Dschang, the majority of traders (62%) had a secondary education. It was also observed that fewer food traders in Mzuzu (3.2%) had post-secondary education qualification compared to Dschang (15.9%). In both cities, a significant number of food traders did not pay city taxes: 72.2% in Mzuzu and 74.1% in Dschang. About 36% and 66% of food traders in Mzuzu and Dschang, respectively, operated in a permanent structure.

Table 16.1 Sociodemographic characteristics of food traders in Mzuzu and Dschang

Variable	*Mzuzu*	*Dschang*
Sample size	$n = 497$	$n = 848$
Gender		
Male	161 (32.4%)	307 (36.2%)
Female	336 (67.6%)	541 (63.7%)
Business type		
Permanent	179 (36.0%)	558 (65.8%)
Temporary	298 (59.9%)	113 (13.3%)
Mobile vendor	18 (4.0%)	175 (20.6%)
Pay city rates		
Yes	138 (27.8%)	220 (25.9%)
No	354 (72.2%)	628 (74.1%)
Education level		
No formal education	19 (3.8%)	41 (4.8%)
Primary	235 (47.3%)	145 (17.1%)
Secondary	224 (45.1%)	526 (62.0%)
Post-secondary	16 (3.2%)	135 (15.9%)

Access to Sanitary Resources among Food Vendors

Table 16.2 summarizes the findings in terms of access to hygiene facilities and information about hygienic practices. Regarding access to facilities, the study found that 22.7% of food traders in Mzuzu and 76.7% in Dschang reported having limited access to toilet facilities. More than half (56.5%) had limited access to potable water at their main place of business in Mzuzu and about three-quarters (76.8%) of traders in Dschang reported the same. Almost half (48.3%) of the traders had difficulties accessing waste disposal facilities in Mzuzu, while 56.2% in Dschang reported having challenges of accessing waste disposal facilities. It was reported that 45.9% and 81% of food traders in Mzuzu and Dschang, respectively, had limited access to handwashing facilities at their business premises.

Regarding access to information, almost all the food traders in Mzuzu (97.4%) and two-thirds in Dschang (66.3%) reported having no formal food safety and hygiene training. It was reported that 69.2% and 74.6% of food traders in Mzuzu and Dschang, respectively, had never attended a food safety public awareness campaign. In terms of food and premises inspection, it was reported that only 19.3% of the food traders had been inspected in Mzuzu, while 27.2% of food traders had been inspected in

Table 16.2 Access to sanitary resources in Mzuzu and Dschang

Variable	*Mzuzu*	*Dschang*
Access to toilet facility		
Yes	383 (77.1%)	198 (23.3%)
No	113 (22.7%)	650 (76.7%)
Access to water facility		
Yes	213 (42.9%)	197 (23.2%)
No	281 (56.5%)	651 (76.8%)
Access to waste disposal		
Yes	257 (51.7%)	371 (43.8%)
No	240 (48.3%)	477 (56.2%)
Attended food safety training		
Yes	13 (2.6%)	286 (33.7%)
No	484 (97.4%)	562 (66.3%)
Attended food safety campaign		
Yes	153 (30.8%)	215 (25.4%)
No	344 (69.2%)	633 (74.6%)
Business facility inspected		
Yes	96 (19.3%)	231 (27.2%)
No	399 (80.3%)	617 (72.8%)
Available hand washing facility		
Yes	267 (53.7%)	161 (19.0%)
No	228 (45.9%)	687 (81.0%)
Food safety knowledge		
Yes	228 (45.9%)	511 (60.3%)
No	267 (53.7%)	337 (39.8%)

Dschang. Regarding food safety knowledge, 45.9% of the participants in Mzuzu and 60.3% in Dschang correctly answered most of the knowledge section questions, such as the effects of eating semi-cooked food, the role of insects in spreading food poisoning, rapid multiplication of harmful bacteria at room temperature and use of leftover food.

Correlates of Access to Sanitation Resources

Univariate logistic regression analyses suggest that women food traders were less likely to report having access to toilet facilities in Mzuzu (OR = 0.21, $p < 0.001$) and Dschang (OR = 0.41, $p < 0.002$). Traders that had permanent business spaces were more likely to report having access to a toilet facility in Mzuzu (OR = 2.13, $p < 0.000$; and in Dschang (OR = 2.16, $p < 0.000$) than mobile food traders. Similarly, food traders

who were operating at a permanent structure were more likely to have access to a waste disposal facility in Mzuzu (OR = 1.25, $p < 0.000$) and in Dschang (OR = 2.10, $p < 0.000$) than mobile food traders.

Food traders in Mzuzu who pay city rates were more likely to report having access to a toilet facility (OR = 2.41, $p < 0.01$) and waste disposal (OR = 2.19; $p < 0.03$, respectively). Similar odds ratios were observed in Dschang (OR = 2.24, $p < 0.01$; and OR = 2.39, $p < 0.02$, respectively). Food traders who reported that they were inspected in the past 12 months were more likely to have access to a toilet, water and waste disposal facilities than their peers that were not inspected in Mzuzu (OR = 2.74, $p < 0.01$; OR = 1.32, $p < 0.03$; OR = 2.81, $p < 0.03$, respectively) and in Dschang (OR = 2.19, $p < 0.01$; OR = 1.22, $p < 0.02$; OR = 2.41, $p < 0.03$, respectively). In both cities, there were no significant differences in the odds of reporting access to sanitation facilities based on education attainment or access to food safety training.

In multivariable analysis (Table 16.3), the odds of reporting having access to toilet facilities was much lower among women than men in Mzuzu (OR = 0.18, $p < 0.001$) and in Dschang (OR = 0.14 $p < 0.001$). Traders who operated in permanent structures were more likely than mobile traders to report having access to toilet facilities in Mzuzu and Dschang (OR = 2.03, $p < 0.000$; OR = 2.11, $p < 0.000$ respectively). Similarly, food traders who had permanent structures were more likely than mobile traders to have access to waste disposal facilities (OR = 1.19, $p < 0.000$; OR = 1.25, $p < 0.000$ respectively). Similar differences were observed among trades that pay city rents or not, and also among the trades whose business facilities were inspected or not. Those that paid city rates, and those that had their facilities inspected, had a higher likelihood of accessing sanitary facilities such as water, toilet and waste disposal.

Discussion

The findings of this study reveal that the majority of food traders in Mzuzu and Dschang cities are constrained from accessing critical sanitary facilities such as toilet, waste disposal and water facilities. These findings have numerous implications to gender equality, public health and urban planning.

First, even though most food traders in Mzuzu and Dschang are women, women face significant gender discrimination in access to toilet facilities. The results add further evidence to observations that women

Table 16.3 Adjusted odds ratios (95% CI) for factors associated with access to food safety and practice resources

Variables	*Model 1 Access to toilet facilities*		*Model 2 Access to water*		*Model 3 Access to waste disposal*	
	AOR-Dschang	*AOR-Mzuzu*	*AOR-Dschang*	*AOR-Mzuzu*	*AOR-Dschang*	*AOR-Mzuzu*
Gender						
Male	1	1	1	1	1	1
Female	0.14***	0.18***	0.52	0.16	1.23	1.09
Business type						
Mobile trader	1	1	1	1	1	1
Permanent structure	2.11***	2.03***	1.34**	1.41**	1.15**	1.19**
Business tenure						
Do not pay rent	1	1	1	1	1	1
Pay city rent	2.21**	2.26**	1.14**	1.12*	2.19*	2.12*
Business inspected						
No	1	1	1	1	1	1
Yes	2.34**	2.66**	1.22*	1.21*	2.31*	2.69*
Food safety education						
No	1	1	1	1	1	1
Yes	1.35	1.29	1.23	1.19	1.32	1.24
Food safety campaigns						
No	1	1	1	1	1	1
Yes	1.16	1.12	1.17	1.11	1.52	1.41

*$p < 0.05$, **$p < 0.01$, ***$p < 0.00$

in the Global South who work in informal market spaces have inadequate access to toilet facilities (Schmitt et al., 2018). "Toilet insecurity" refers to a situation when individuals do not have access to safe and usable toilets, and it is increasingly recognized as a serious indication of—and contributor to—gender inequality (Caruso et al., 2017). Inadequate access to sanitary facilities by women working as food traders is linked to their low productivity and poor health outcomes. It is also an infringement of their rights to an adequate standard of living, which includes access to sanitary facilities. From the food systems standpoint, it also creates a hazard for consumers whose food safety would be enhanced if women vendors' toilet insecurity were systematically addressed. Our study therefore contributes to the advocacy for a decent work environment for women in the informal urban sector in Mzuzu and Dschang, where there is urgent need for sanitary facilities.

Second, our study suggests that for sanitation knowledge and education programs to be effective tools to improve food safety practices among food traders, they need to be supported by sanitary infrastructures and inspection services. This point resonates with Warren Smit's (2018, p. 99) argument that public education and bylaw enforcement are important, "but it is arguably even more important to ensure that the necessary infrastructure and facilities are available." It has been observed that there were no significant statistical differences in utilization of sanitary resources between food traders that had formal food hygiene knowledge compared to those that had limited knowledge. The finding supports studies in developing countries that found that provisioning of sanitary facilities increases hygienic practices among food traders with higher education as compared to those with basic education attainment (Abdi et al., 2020; Rietveld et al., 2016).

The pathways in which food inspection is associated with access to sanitary facilities should be interpreted with caution. Potential mediating and moderating factors could weaken the observed association in Mzuzu and Dschang. For instance, city planners usually inspect food in formal markets where there are well developed and planned marketing infrastructures, leaving out the majority of food traders operating in informal markets, on roadsides and from home (Lazaro et al., 2019; Temgoua et al., 2009). Therefore, food safety regulatory frameworks in these cities should be inclusive, as leaving out informal food traders may have negative implications for the management of foodborne outbreaks, which are linked to unhygienic standards in many developing cities (Imathiu, 2017).

Finally, the findings of the study suggest that city planners can adopt system approaches to increase access to sanitary facilities, which can, in turn, improve food safety practices among food traders in Mzuzu and Dschang. System approaches consider multifaceted interrelationships between connected systems and allow for the integration of knowledge across a broad array of disciplinary and policy domains (Rietveld et al., 2016). In these cities, there is a need for collaborative efforts among social service delivery sectors, such as departments of water, infrastructure, public health and urban governing institutions to ensure that food traders have access to sanitary facilities. These planning activities can gain traction by linking their objectives to several relevant Sustainable Development Goals (Ilieva, 2017), almost all of which are connected in some way to the intersecting concerns with health, economic development, gender equality, urban sustainability and fair working conditions that surface in discussions of food safety in African cities. Building on the observation that food safety in cities relies on regulations at national and international levels (Boatemaa et al., 2019), there is ample potential to tie local efforts to promote food safety with larger-scale development efforts.

Conclusion

In developing countries, small-scale urban food traders play a significant role in food systems, as they are in proximity to the majority of low-income consumers. Unfortunately, these traders are often linked to poor food hygiene practices that compromise public health safety. In Mzuzu and Dschang, access to sanitary facilities such as toilets, water and waste bins are a problem of public concern. The intersection of social and structural factors such as gender, socio-economic status and city management influences access to sanitary facilities, with women facing extra challenges. To address these challenges, a systems approach has been proposed whereby diverse stakeholders across multiple levels of governance should work together to improve access to sanitary facilities.

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