

## Applying Social Practice Theory for Intervention Targets in Health Risk Behavior: Case Study of Drinking from Orifice of Canned Drinks

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### Abstract

The use of social practice theories for identifying intervention targets in health risk behaviour was investigated using drinking from orifices of canned drinks as a case study in a Nigerian setting. Based on the social practice theory, the elements selected as possible targets for intervention were: canned drinks, sales refrigerators, coolers, retail outlets (materials); occasions for plentiful drinks, risk awareness (meanings); and hygienic habits of retailers, and their surroundings (competence). To determine the association of these elements with risk, orifices of cans from various outlets were screened for risk indicator bacteria (coliforms) while the frequency of drinking from the orifice, education, hygienic habits and risk awareness were ascertained from respondents/retailers with structured questionnaire. Prevalence of drinking from the orifice was 53.5-67.2%, but cleaning before drinking was lower (22.6-59.3%). Consumption of canned drinks was highest (43.5-45.8 vs 5.2-41.3%) at social events and travelling stations while logistic regression showed that orifices of cans from some retail outlets, environment and poorly cleaned/disinfected refrigerators and coolers were associated with risky ( $>10^2$ ) coliform counts ( $P<0.01-0.05$ ). Thus the association indicated them as intervention targets which can prevent contamination of orifices of canned drinks; and substantiates the usefulness of social practice theories in public health programmes.

**Keywords:** Social practice theory; Canned drinks; Orifice; Health risk; Coliform bacteria.

### 1. Introduction

The objective of public health programmes is to prevent illness and disease by intervention and actions such as health campaigns, advice/counselling especially behavioural, and vaccinations. Changing health-risk behaviour has been a major focus of public health researches (Baban & Cracium, 2007; Wakefield, Loken, & Hornik, 2010; Johnson, von Sternberg, & Velasquez, 2018). However, there is a growing interest in extending the social practice theory to public health research (Maller, 2015, Meier, Warde, & Holmes, 2018). This entails shifting from trying to change health-risk behaviour to targeting actions or practices which make up or lead to health-risk for intervention. Social practice has been explained by social practice theorists in different ways. Holtz (2014) defined social practice as ‘every day practices and the way these are typically and habitually performed in (much of) a society’ although the often quoted definition is the lengthier one given by Reckwitz (2002). However Maller’s (2015) more recent definition of social practice as: ‘constituted by meanings about how and why to do things (cultural conventions, expectations and socially shared meanings), materials (objects, tools and infrastructures), and competences both tacit and explicit (knowledge and embodied skills)’ makes it more applicable for research. Despite the varying definitions, social practice theorists agree that the theory focuses on action or practices undertaken and not on individual behaviour (Meier, Warde, & Holmes, 2018; Meier, Holmes, & Warde, 2018). Social practice theories can be useful in public health research because it tends to explain the association between human action and health (Maller, 2015). The theory provides the framework for identifying targets for intervention in actions that predispose humans to illness and diseases. This focus on “actions” has been reported applicable in studies on alcohol consumption (Meier, Warde, & Holmes, 2018), child obesity (Chan, Deave & Greenhalgh, 2010) and tobacco smoking (Blue, Shove, Carmona, & Kelly, 2016).

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Drinking directly from the orifice of canned drinks is a common health-risk practice in Nigeria where environmental hygiene is poor. The orifice surface contact area is exposed to the environment and can be easily contaminated due to unhygienic handling or location in unsanitary environment. Indeed some reports have shown that orifice of canned and bottled drinks were contaminated by pathogenic microorganisms in some Nigerian settings (Kigigha & Jonathan, 2012; Ogofure, Bello-Osagie, Aduba, Ighodaro, & Emoghene, 2018) Canned drinks especially soft drinks are popular and ubiquitous for its convenience and the fact that they are not returnable like bottles. The sweetness of soft drinks appeals to children, adolescents and younger adults (Hector, Rangan, Loie, Flood, & Gill, 2018) hence the patronage of canned soft drinks will be high with attendant public health implication if contaminated. Changing the consumer behaviour by campaigning against drinking from the orifice or urging people to clean the orifice before drinking may not have the desired effect because the cans are mostly taken outside the home. Another approach is to locate the factors, actions or practices that predispose the canned drinks to contamination and take preventive intervention measures in accordance with social practice theories. Thus the objective of the investigation is to test the applicability of social practice theories by ascertaining the elements that can be targeted for intervention in the pathway of the practice. Drawing from Maller's (2015) perspective of social practice theory, the following research questions were developed to guide the study.

1. What kinds of retail outlets are mostly patronized in the practice of drinking from the orifice of canned drinks, and at which occasions/locations do consumers drink more from orifice than cups?
2. Are the retail outlets located in sanitary physical environments?
3. Are consumers who drink directly from the orifice aware of the risk?
4. To what extent are the retailers hygienic?
5. What is the indication of the risk of drinking from the orifice?

## **2.0 Materials and Methods**

### **2.1 Target practice elements**

A preliminary pilot visual observation of canned drinks' retail outlets and their surroundings, handling and display of canned drinks, consumer drinking behaviour during social events and at drinking locations, was undertaken. The purpose was to know the likely practice elements that can be investigated for association with the pathway to drinking from the orifice. Based on this the material elements for subsequent investigations were: canned drinks, retail or sales outlets (hotels, supermarkets, restaurants, roadside small shops, hawkers); and refrigerators and coolers for storage. With regards to "meaning", social constructs involving drinking occasions (home, travelling stations, social events), drinking from the orifice with or without cleaning and risk-taking were the elements while "competence" elements involved retailers' hygienic practice and the physical environmental location of the retail outlets (earth road, tarred road, proximity to refuse dumpsites, 'mummy' markets, and traffic situation).

### **2.2 Source of data for testing the practice elements as potential intervention targets**

A structured questionnaire was used to obtain information from 330 respondents selected by age stratified sampling (13-30, 31-50 and  $\geq 51$  years) from four urban areas of Delta State, Nigeria. The information sought were: prevalence of drinking directly from the orifice of canned drinks; awareness of the health risks; and places/occasions where canned drinks are frequently consumed. Information on hygienic habits was obtained from 50 retailers using refrigerators and 50 users of coolers. Trained assistants administered the questionnaires by one-on-one interview after obtaining the verbal consent of the respondents. Canned drinks were obtained from the 5 retail outlets specified above for microbiological analyses of the orifice areas in order to ascertain the vulnerability of the outlets to health risk contaminations. The total number of retail/sales outlets sampled was 50 at 10/outlet thereby bringing the total number of orifice contact areas analysed to 500.

### **2.3 Measures**

Respondents were requested to chose any of the options (1, I do not; 2, sometimes I do; or 3, I always do) to indicate their frequency of drinking directly from the orifice and cleaning the orifice before drinking. They were also requested to select from the 5 outlets one they frequently patronise and the occasion when they drink from the orifice most of the time from the following options: 1. when at home; 2, at travelling stations (airport, vehicle stations and train stations); and 3, at social events (e.g. burials, marriages, child birth/naming ceremonies, festivals). The awareness of the risk of drinking from the orifice was indicated by 'aware' or 'not aware'. The hygienic habit of the randomly selected 50 retailers was based on the frequency of cleaning or disinfection of the coolers and refrigerators used for storage and sales:

1, none; 2, once a month; 3, once in two weeks; 4, once a week; 5, two or more times in a week; and 6, daily. This was complemented by microbiological analysis of refrigerator shelves and internal surfaces of coolers. The physical environment of retailers' locations (earth road, tarred road, proximity to refuse dumpsites, 'mummy' markets, and traffic situation) was ascertained by visual observation.

## 2.4 Laboratory tests

The microbiological analysis was by enumeration of coliforms as risk warning bacteria using the swab/rinse and McConkey agar plate methods. A 3 x 3 cm orifice contact area of the cans, shelves of refrigerators and internal surface of coolers were swabbed and used for the tests. Coolers in this study refer to plastic containers containing cold water or ice blocks for cooling drinks.

## 2.5 Data analyses

Prevalence was based on percentage of sample size while chi square statistics was used to analyse the association between age, education, and prevalence of drinking directly from the orifice and risk awareness. Indication of the health risk of the practice elements was based on the prevalence of risky coliform bacterial counts ( $>10^2$  cfu/cm<sup>2</sup>) on orifices of canned drinks associated with the practice elements. For the purpose of selecting targets for intervention, logistic regression was used to confirm the relationship between the source elements (canned drinks, retail outlets, physical environment, refrigerator shelves and coolers) as independent variables and coliform counts as dependent variables.

## 3.0 Results and Discussion

The prevalence of drinking directly from the orifice of canned drinks was generally high and was not associated with age groups, but with education where a declining trend with increasing education was observed (Table 1). Although markedly lower, prevalence of cleaning before drinking was associated with both age and education (Table 1). These findings indicate that drinking from the orifice is a common practice with mainly higher education respondents tending to be more aware of the risk (Table 2). This could be attributed to ignorance or the risk is regarded as inconsequential. Hear one of the respondents in the course of administering the questionnaires: "if drinking from the canned drinks can make me sick then many people will be going for treatment because it is a common practice". Another respondent said: "You talk of dusts settling on the cans what of the roasted plantain and corns sold on the streets? Are they not exposed to dust? Are the consumers dying?" This is an indication of the limitations of public health programmes that seek to change health risk behaviour by focusing on the individual. The connection between the findings on prevalence of drinking from the orifice/risk awareness and the study objectives is that it provides justification for the application of the social practice theory.

**Table 1 Prevalence of drinking directly from the orifice of canned soft drinks**

Variables			Prevalence of drinking from orifice				X <sup>2</sup>
			N	I do not [n(%)]	Sometimes I do [n(%)]	I always do [n(%)]	
<b>*Drinking directly from orifice</b>	Age group	13-30	125	19(15.2)	22(17.6)	84(67.2)	5.830
		31-50	104	21(20.2)	19(18.3)	64(61.5)	
		≥51	101	19(18.8)	28(27.7)	54(53.5)	
	Education	None/primary	97	14(14.4)	33(34.0)	50(51.6)	5.479 <sup>a</sup>
		Secondary	130	20(15.4)	46(35.4)	64(49.2)	
		Tertiary	103	22(21.3)	43(41.7)	38(37.0)	
<b>**Cleaning before drinking</b>	Age group	13-30	106	48(45.3)	34(32.1)	24(22.6)	5.729 <sup>b</sup>
		31-50	83	31(37.3)	27(32.5)	25(30.1)	
		≥51	82	24(29.3)	30(36.6)	28(34.1)	
	Education	None/primary	83	40(48.2)	30(36.1)	13(15.7)	44.510 <sup>c</sup>
		Secondary	110	45(40.0)	39(35.5)	26(23.6)	
		Tertiary	81	12(14.8)	21(25.9)	48(59.3)	

\*N=all respondents in each variable. \*\*N=only respondents that sometimes or always drink directly from canned soft drinks' orifice. Significant: <sup>a</sup>P=0.038; <sup>b</sup>P=0.020; <sup>c</sup>P=0.000

**Table 2 Awareness of the risk of drinking directly from the orifice of canned soft drinks**

Background variables		N	Prevalence [n(%)]		X <sup>2</sup>
			Aware	Not Aware	
<b>Age</b>	13-30	125	76(60.8)	49(39.2)	0.753
	31-50	104	65(66.3)	39(37.5)	
	≥51	101	67(63.3)	34(33.7)	
<b>Education</b>	None/primary	97	24(24.7)	73(75.3)	50.112*
	Secondary	130	55(42.3)	75(57.7)	
	Tertiary	103	76(73.8)	27(26.2)	

\*Significance,  $P=0.000$

Consumption of canned drinks was most prevalent in social events and travelling stations (Figure 1). Consciousness of hygiene is likely to be low in these two venues. For example marriages and burials especially of elderly people attract crowds in Nigeria and indeed in many sub-Saharan countries (Lawal, Lawal, & Adeyinka, 2013; Ukeh, 2013) and such occasions are usually characterized by plentiful bottled and canned drinks that are often taken without drinking glasses/cups. Thus social events and travelling stations can be targeted for interventions that focus on sanitary inspection of event venues and travelling stations, and routine hygiene checks of sales/storage coolers and refrigerators. Risky coliform counts were substantial (>55%) in refrigerators and coolers (Table 3).

Hawkers and small shops were the outlets used most of the time (Figure 1) because they are ever present on the streets, social events and travelling stations. Although it varied, the orifice of cans obtained from hawkers and roadside small shops had the highest prevalence of risky coliform counts (Table 3). The physical environment of retailers was also indicated to be a target for intervention because of the risky coliform counts found on orifices of cans (Table 3) sold in some locations (earth roads, refuse dumpsites and high traffic areas). Bioaerosols from refuse dumps or dusty roads may be moved by wind (Kaźmierczuk & Bojanowicz-Bablok, 2014; Ambrose, Braid, & Essien, 2015) and eventually settle on the surfaces of canned drinks. Domestic wastes are indiscriminately dumped in nooks and corners of towns in sub-Sahara Africa (Boadi, Kuitunen, Raheem, & Hanninem, 2005; Efe, 2013), yet some retailers often leave drinks exposed to the environment (Kigigha & Jonathan 2012). Further analyses by logistic regression confirmed that risky coliform counts were more likely to be associated with orifice of cans obtained from hawkers and roadside small shops as well as those from retail outlets by earth roads, in mammy markets, vicinity if waste dumpsites or in high traffic areas (Table 4). This makes hawkers, small shops and unsanitary physical environments suitable targets for intervention. Physical observation showed that the retail outlets located in unsanitary environments were mainly small shops.

**Table 3 Prevalence of coliform bacteria on orifice of canned soft drinks, refrigerator shelves and coolers**

Source of coliform bacteria	n	Prevalence of coliform bacteria (%)	
		Low ( $<10^2$ cfu/cm <sup>2</sup> )	High [risky] ( $\geq 10^2$ cfu/cm <sup>2</sup> )
<b>Orifice of canned drinks purchased from:</b>			
<b>Hotels</b>	100	85.0	15.0
<b>Restaurants</b>	100	52.0	48.0
<b>Supermarkets</b>	100	78.0	22.0
<b>Roadside small shops</b>	100	34.0	66.0
<b>Hawkers</b>	100	23.0	77.0
<b>Orifice of canned soft drinks from retail outlets located by:</b>			
<b>earth roads</b>	66	48.5	51.5
<b>tarred roads</b>	68	54.4	45.6
<b>blocked drainages,</b>	63	52.4	47.6
<b>refuse dumpsites,</b>	58	37.9	62.1
<b>“mammy” markets</b>	86	29.1	70.9
<b>High traffic area</b>	94	36.2	63.8
<b>Low traffic area</b>	65	64.6	35.4
<b>*Sales refrigerator shelves</b>	50	42.0	58.0
<b>*Coolers</b>	50	38.0	62.0

\*Location of canned soft drinks for sales (only shelves of refrigerator and internal surfaces of coolers were tested); n, number of canned soft drinks tested for coliform bacteria.

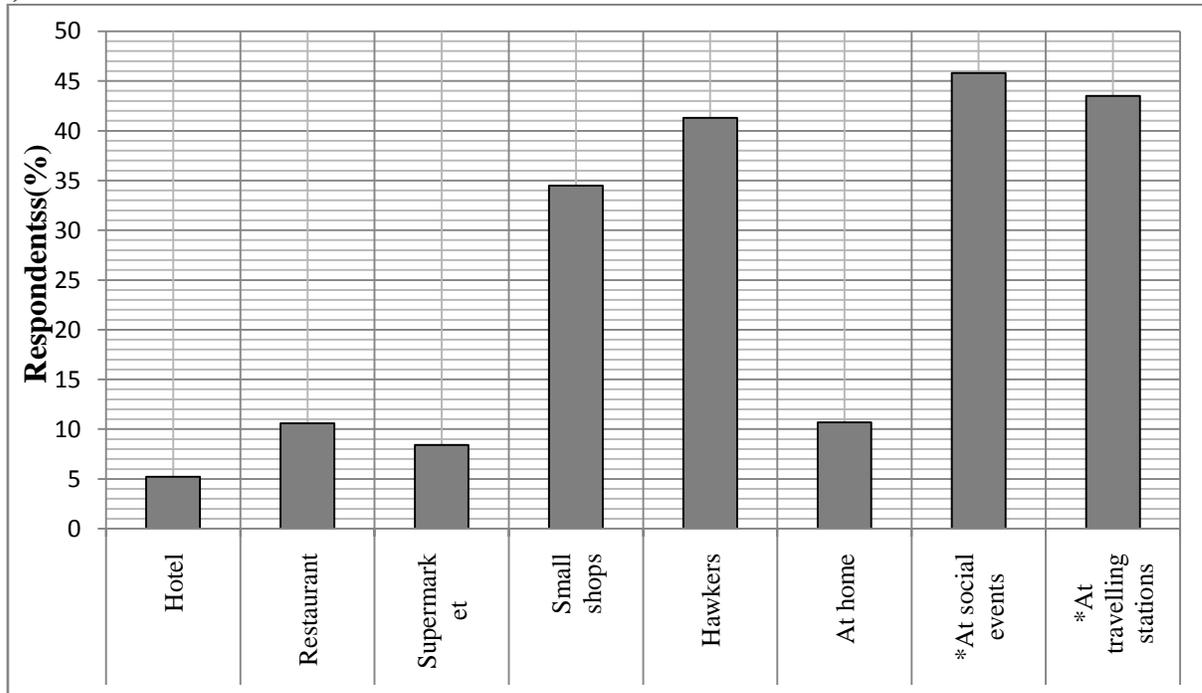


Figure 1 Patronage of retail outlets for drinking directly from the orifice and places for taking canned drinks most of the time

Table 4. Logistic regression analyses of the relationship between source of canned soft drinks and coliform bacterial counts on the orifice area.

Source	Risk of coliform counts***	OR	95% CL
<b>Hotels</b>	Low	1	
	High	0.72	0.15-2.5
<b>Restaurants</b>	Low	1	
	High	1.25	0.52-2.50
<b>Supermarkets</b>	Low	1	
	High	0.78	0.33-1.80
<b>Roadside small shops</b>	Low	1	
	High	3.20**	1.65-6.04
<b>Hawkers</b>	Low	1	
	High	4.55**	2.20-7.82
<b>Retail outlets by:</b>			
<b>Earth road</b>	Low	1	
	High	2.50*	1.05-4.20
<b>Tarred road</b>	Low	1	
	High	1.15	0.52-3.08
<b>Blocked drainages</b>	Low	1	
	High	1.52	0.48-2.75
<b>Refuse dumpsites</b>	Low	1	
	High	3.2**	1.50-5.66
<b>"Mammy" market</b>	Low	1	
	High	4.5**	2.35-7.22
<b>High traffic area</b>	Low	1	
	High	2.35*	0.84-5.22
<b>Low traffic area</b>	Low	1	
	High	1.22	0.44-2.95
<b>Refrigerator shelves</b>	Low	1	
	High	1.23	0.25-3.64
<b>Coolers</b>	Low	1	
	High	2.05*	0.87-5.26

\*P,>0.05; \*\*P<0.01; \*\*\*Low, ≤10<sup>2</sup> cfu/cm<sup>2</sup>; High, >10<sup>2</sup> cfu/cm<sup>2</sup>

The prevalence of routine hygienic habits of cleaning or disinfection of coolers and refrigerators by retailers tended to follow a sigmoid curve with the weekly habit as the most prevalent while the daily habit was the lowest (Figure 2). The finding that less than 5% of retailers undertook daily cleaning or disinfection of storage/sales refrigerators and coolers, suggests poor hygienic practice that needs to be targeted for intervention. Succinctly, in the context of Maller's perspective of social practice theory the targets for intervention are presented in Table 5. This was based on the analyses of the findings. The table shows that the environment of the retailers, type of retail outlets, hygienic habits and crowded drinking locations are areas for intervention that can prevent contamination of the outer surface of the canned drinks. The table also includes suggestions of intervention measures aimed at preventing contaminations thereby minimising or preventing contamination of the surface areas of canned and even bottled drinks.

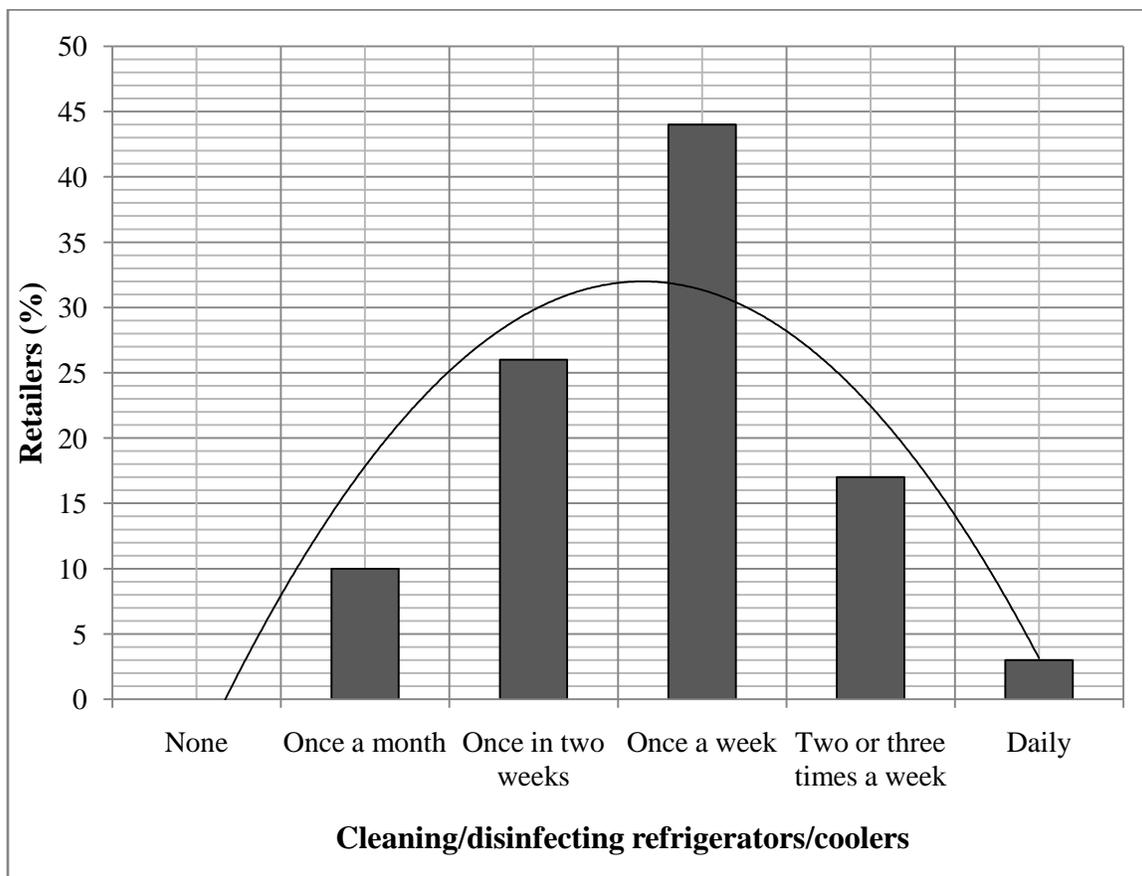


Figure 2. Frequency of cleaning and disinfecting refrigerators and coolers used for the sale of canned soft drinks

#### 4.0 Conclusion

The results of the study indicate that the practice of drinking from the orifice of canned drinks is a health risk that can be prevented by intervening at steps or actions leading to it. The steps/actions include physical environment, sales outlets and materials and hygienic practice. The interventions can prevent the spread of infectious diseases especially diarrhoea which remains a burden in sub-Saharan Africa (Fletche, Stack, & Ellis, 2011, Gouda, et al., 2019). The targets for intervention are controllable by appropriate legislations and diligent supervision of retailers and their environment by public health agencies. Thus the findings substantiate the applicability of the social practice theory for preventing illness in a Nigerian setting, which is the cornerstone or goal of public health programmes.

**Table 5 Targets indicated for intervention in the practice of drinking from the orifice of canned drinks based on respondents/retailers' actions and logistic regression analyses**

Practice elements	Intervention	Suggested intervention measures
<b>Materials</b> (retail outlets)		
Hotel	No	NA
Restaurant	No	NA
Supermarkets	No	NA
Small roadside shops	Yes	Enforcement of hygienic practice*
Hawkers	Yes	Enforcement of hygienic practice*
Refrigerator	No	NA
Coolers	Yes	Enforcement of hygienic practice*
<b>Meaning</b> (drinking occasions)		
Home	No	NA
Social events	Yes	Enforcement of sanitation*
Travelling stations	Yes	Enforcement of sanitation*
<b>Competence</b> (location of retail outlets)		
Earth road	Yes	Automatic doors, air conditioner**
Tarred road	No	NA
Low traffic	No	NA
High traffic	Yes	Automatic doors, air conditioner**
Mammy market	Yes	Relocation
Refuse dumpsites vicinity	Yes	Relocation
Retailers' hygienic habit	Yes	Diligent supervision*

NA, not applicable; \*by public health agencies; \*\*to be enforced in retail outlets following appropriate legislation

### Conflict of interest

The authors declare that there is no conflict of interest.

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