

Environmental Health Risks in Bodija and Ojoo Markets, Ibadan, Nigeria

Abosade, P. and Olajide, O. A.

Department of Agricultural Economics University of Ibadan,
Ibadan Oyo State Nigeria

Corresponding author: preciousfunso@yahoo.com

Abstract

Maintaining the hygienic status and nutritional value of food sold in marketplaces is essential for improved health status of people patronizing the markets. However, food marketplaces are always generating organic and inorganic wastes that are detrimental to human health. Little is known about the associated health risks in marketplaces. This study assessed market users' awareness of environmental health risks associated with marketplaces. Primary data were collected with the aid of structured questionnaires from randomly selected 150 market sellers through interviews in Bodija and Ojoo Market. Data were analyzed using descriptive statistics and multinomial regression. There were no differences in the socio-economic characteristics of market users; with similar level of awareness of sanitation and its practices in both markets. Location, educational attainment, the level of infrastructure and the market users' attitudes have a significant probability of affecting the health status of the sellers. Food contamination and sanitation coupled with the level of infrastructure are the potential dangers to consumers and sellers who use the market. An effective market health infrastructural development policy will enhance environmental health in marketplaces.

Keywords: Food, Health, Markets, Market users.

Introduction

Environmental health is regarded as a branch of public health concerned with all aspects of natural and built environment that affect human health (Novick,1999). The World Health Organization defines environmental health specifically as those aspects of the human health and diseases that are determined by factors in the environment. Such ill-health or diseases that are consequences of poor environment and poor hygienic and sanitation practices are for example Diarrhea, Salmonellosis, Gastro-intestinal infection among others. Environmental Health also refers to the theory and practice of

assessing and controlling factors in the environment that can potentially affect health as well as correcting and preventing those factors from adversely affecting human health on one hand; and on the other hand, it refers to the practices of enhancing those aspects of the environment that can improve human health (Briggs, 2008 and Bernhard et al, 2013). These factors have the ultimate purpose of preventing environmental health hazards and the protection and promotion of the public health and environment in the following aspects: food protection, housing, institutional environmental health, land use,

community noise control, recreational and swimming areas (Novick1999).

The intricacies of health implications should arouse the concern of the layman to careful practices that could reduce the risk level associated to the environmental. This is more so in developing countries where the rate of waste generated is high and litters sometimes are kept on the roadsides (Fehr, 1999). The need for environmental health practices is high in market environments in commercial centers of developing countries because of the way some of these markets developed. In Ibadan, market formation is associated with the establishment of branches of multinational firms from Britain during the colonial era and alongside it came infrastructures and amenities (Tomori, 2000). Further, rural-urban drift induces environmental health risks in urban areas; this is evident in marketplaces where the movement of a huge number of people from diverse horizons as well as goods, food items and agricultural products move in and out. Their interactions and time spent exposed them to different kinds and sources of contamination from air, water and ground where some sellers lay their goods, even the surface of those goods sold represents an important source of contamination and infection. All these factors increase the vulnerability of market users to environmental health risks; not to mention the inexistence or inadequacy of environmental facilities and other basic sanitation that could reduce such risks (WHO/GTZ, 2003). Ibadan has suffered a lot from the problem of refuse disposal which resulted in blocking of the few existing drainages especially around the marketplaces and commercial centers, which often culminates to flooding or

inundation of shops and houses along water channels (Tomori, 2000, Fouchard, 2003, Kolawole and Olurotimi, 2009).

The economics of environmental health and marketplaces is of great importance in as much as physical changes in the environment affect human production and consumption as far as ill-health does. In the same vein, environmental improvement brings health benefits to all stakeholders; government, employers, employees, family members, clients and customers, and the one who would have been ill in the absence of such improvement in the environment (Common Wealth of Australia, 2002). Marketplaces have emerged spontaneously at given location in most communities. They have evolved generally with limited involvement on the part of urban planners and little or no consideration for health protection or health promotion. In developing countries like Nigeria, marketplaces reflect community values, traditions and practices and serve as an informal platform for exchange of information, being considered as a commercial and social center; in recent past, which sometimes attract tourists who come to discover and enjoy cultural riches confined in such marketplaces. Unfortunately, the increasing population and the demand for easier access and struggle to ensure food safety is taking the precedence over the need for social interaction that market places provide. Marketplaces that are often essential for maintaining the nutritional value of food sold as well as the health status of the population, most times keep to some beliefs and attitudes that are contrary to practices that protect and promote health. This could be exacerbated

by lack of water, inadequate sewage or sanitation facilities which lead to various hazards with respect to food and individuals in marketplaces. The need to assess the current state of the market environment to objectively isolate the lapses in the facilities in place cannot be overemphasized. It is also important to evaluate the level of awareness of market users with respect to their exposure to environmental health risks and their own contribution by their activities, disposal of liquid and solid waste into that environment and other operations within the market. This study therefore, examined the relationship between the market environment and the health condition of market users, in particular, the sellers. The environment (both natural and built) is a key element in human health and sustainable development.

Spear (2002) applied statistical and mathematical modelling to the analysis of complex environmental problems and risk assessment on the premise that current understanding of how different processes and variables are inter-related and the simulation of models which incorporate independent information on the range of values of the model's parameters on the physical, chemical or biological processes give clear experimental interpretation. There by implying that environmental health is better explained by a combination of scientific and by observation of behavior patterns among the study groups. WHO/GTZ (2003) suggested that post market hazards as well as markets infrastructural and operational environment hazards which constitute a risk to market users health can be controlled by Hazards Analysis and Critical Control Point (HACCP) principle;

a comprehensive approach to monitoring and controlling food safety risk factors. Grossman (1972) applied econometric tools to capture factors that simultaneously determine health stock of a population. Using data for the world, Grossman established an econometric model that captures determinants of health as

$$H_t = f(H_{t-1}, G_o, B_t, MC_t, ED) \quad (1)$$

where H_t – current health in time period t , stock of health (H_{t-1}) in previous period, B_t – smoking and excessive drinking, and good personal health behaviors (including exercise – G_o), MC_t – use of medical care, education of each family member (ED), and all sources of household income (including current income).

Smith and Kingston (1997) refined, expanded and modified Grossman's work to include socioeconomic variables as well as some other factors.

$$H_t = H^* (H_{t-1}, P_{mc}, P_o, ED, E_t, R_t, A_t, G_o) \quad (2)$$

Model (2) expresses current health status H_t as a function of stock of health (H_{t-1}), price of medical care P_{mc} , the price of other inputs P_o , education of each family member (ED), all sources of household income (E_t), family background or genetic endowments (G_o), retirement related income (R_t), asset income (A_t). This study also applied an econometric model using the Multinomial Logistic Regression and it tests the hypothesis that market users health status has a significant relationship with market environmental risks as defined by hygiene practices, health risk awareness and infrastructural facilities.

Materials and Methods

Study area

Ibadan the capital of Oyo state is in south-west Nigeria. The city is reputed to be the largest indigenous city in sub-Saharan Africa. It is situated 78 miles (about 130 km) inland from Lagos and is the prominent transit point between the coastal region and the areas of the north. Its population is estimated to be about 2,550,000 according to projections from 2006 census. The principal inhabitants of the city are Yoruba. The strategic location of the railway line connecting Lagos to Kano makes the city a major centre for trade of agricultural products such as cocoa, cassava, yam, rubber, cotton, timber and palm oil. Its status as a major commercial centre in the old western region facilitated the development of municipal facilities but several markets later emerged without proper planning. The study is carried out in Bodija and Ojoo extension markets, both situated at less than 5 km radius from the University of Ibadan. The Bodija market extending to both side of the express road comprises different types of trades, is larger, more structured and organized than the Ojoo market, which has sheds at one side of the road and scattered stalls at the other side. Also, Bodija market is the destination of most farmers and producers within Oyo state and other states within the Federation, where trucks from different states enter and leave as well as farmers from surrounding villages, on daily basis. Ojoo market is relatively smaller and more of a night market, taking advantage of its location such that travelers, passers-by and neighborhood communities can always have their needs met even at late hours. Besides, it also operates periodically and

is at its peak every five day- interval during which farmers and wholesalers meet with buyers from all parts of the city and beyond for a profitable business.

Sampling procedure and data collection

The sample of 150 market users (sellers) was selected using random sampling method. Respondents were drawn from different sections of the market based on existing product lines. Numbers were assigned to stalls from which final respondents were drawn. This ensured that different types of trade were represented in the sample. Responses to questions on knowledge and awareness of environmental health risks were obtained through the use of structured questionnaires. The respondents were requested to fill the questionnaires given to them but those who could not write (majority), had their responses recorded during the interview process. A total of 75 questionnaires were administered at each location to randomly selected respondents; all the questionnaires were properly filled and returned. An equal number of questionnaires was administered in both markets to facilitate a comparative discussion of the analysis. Market leaders, environmental and sanitation agents from whom additional information could be obtained were also purposively selected and interviewed.

Methods of data analysis

Both descriptive and econometric methods were used in this study. The former was used to evaluate and compare the average and percentage values of the socio-economic variables. This facilitated a comparison of socio-demographic variables obtained from the respondents.

The multinomial logistic regression tool was used to evaluate the relationship between the market environment, market users' activities and their health status and predict the characteristics of respondents with different health situations related to the market environment and health habits.

The multinomial logistic regression is preferred for the analysis because it does not make any assumptions of normality, linearity, and homogeneity of variance for the independent variables; because it does not impose these requirements, it is preferred to discriminant analysis when the data does not satisfy these assumptions. The multinomial logit model assumes that the dependent variable cannot be perfectly predicted from the independent variables for any case (So and Kuhfeld, 2010). As with other types of regression, there is no need for the independent variables to be statistically independent from each other. In that case the dependent variable (DV) is assumed to be dependent on or liable to one of the independent variable; in other words, the Health status of the respondent could be as a result of his level of awareness (X1) or Waste disposal habit (X2) or Pollution level, etc. and not all at the same time. The health status of the respondent was computed from the type and frequency of illness experienced within the last 12 months and associated with market/marketing activities. The independent variables were computed from the scores obtained on several item questions associated with health risks exposed to in the market place using the likert scale of 1-5.

$$Y = B_0 (X_1 + X_2 + X_3 + X_4 + X_5 + X_6 + X_n + \varepsilon), \text{ or}$$

Where:

- Y = Health status of respondent.
X₁ = Awareness level of the respondent
X₂ = Waste disposal habits of the respondent
X₃ = Pollution level of the marketplace.
X₄ = State of infrastructural state in the market
X₆ = Population pressure and climate change
X₇ = Market users' attitude towards environment

Two types of tests for individual independent variables were carried out. These are:

- The likelihood ratio test which evaluates the overall relationship between an independent variable and the dependent variable.
- The Wald test which evaluates whether or not the independent variable is statistically significant, in differentiating between the two groups in each of the embedded binary logistic comparisons.

Results

Socio-economic characterization of market users

The market users in both Bodija and Ojoo had similar characteristics except that Bodija had more married people while Ojoo users had some widowers. Also, the respondents at Ojoo spent longer hours in the market than those at Bodija. The educational attainment of market users in both locations was high, an average of 12 years. About 17 percent of market sellers in both markets had tertiary education. This indicates that market usage is not

really differentiated or segregated on socio economic basis. Most of the sellers in the study were women; this is expected because in the region trading or marketing is dominated by females. It is interesting to note that they appeared to have large family sizes. This could be associated with the fact that quite a number of market users particularly traders have apprentices who double up as house helps and live with their masters or mistresses (Table 1).

Table 1: Percentage distribution of marker users by socio-economic characteristics

Item	Bodija	Ojoo
Age		
0- 19	13.3	18.7
20- 39	58.7	61.3
40- 59	22.7	14.7
>60	5.3	5.3
Total	100	100
Sex		
Male	33.3	32
Female	66.7	68
Total	100	100
Marital status		
Single	36	47
Married	64	49
Widow (er)	0	4
Total	100	100
Household size		
1- 5	69	77
6- 10	25	22
11- 15	3	1
16- 20	3	0
Total	100	100
Educational status		
0	5	5
1-6	9	13
7-12	69	65
13-17	17	17
Total	100	100
Hours in market		
<=5	3	5
>5 <= 10	68	49
>10 <=15	29	45
>15<= 20	0	1

Total	100	100
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Source: Field survey, 2012; n = 75

Awareness of health risks associated with the marketplace

The level of awareness includes the knowledge of market users on the concept of sanitation, maintenance of public health, and of the presence of waste disposal and toilet facilities. The most frequently observed health practice is the washing of hands at intervals but majority leave food stuff displayed openly. The use of public sanitation facilities such as toilets and pipe borne water or borehole is reported to be poor.

Factors influencing market user’s health status in relation to practices

In comparing the survey responses of market users in respect of the independent variables grouped as covariates, we see that the probability of the Wald statistic (8.000) is $0.005 < 0.05$ (the level of significance) for the infrastructural state of market whereas the Wald statistic probability (5.197) for the variable attitude of market sellers is $0.023 < 0.05$, which confirms that the null hypothesis that there is no relationship between those two variables and the health of market sellers is to be rejected and the alternative accepted.

As shown in Table 3, the chi-square value of 44.580 supported the rejection of the null hypothesis that there was no difference between the model without independent variables and the model with independent variables at 10 percent level of significance. In other words there was relationship between the health status of respondents and the postulated independent variables (level of awareness, waste disposal methods, environmental pollu-

tion, infrastructure, population pressure and climate change, as well as market users' attitudes). From Table 3, infra-structural state of the market and the market users attitudes are significant at 5 and 10% levels respectively.

Table 2: Percentage distribution of market user's by health practices and awareness of sanitation/health facilities

Item	Bodija		Ojoo	
	Yes	No	Yes	No
Health practices				
The definition of sanitation	96	4	95	5
Washing of hands after the use of convenience	96	4	97	3
Displayed food items are always covered	37	63	52	48
Waste bins are emptied	77	23	93	7
Sanitation/health facilities				
Waste collection by authorities is regular	51	49	88	22
Presence of waste disposal	71	29	84	16
Public toilets are conveniently located	79	21	53	47
Water supply facilities are conveniently located	52	48	55	45
Well manned health facilities are available	43	57	56	44
Government program on sanitation and health exist	65	35	59	41

Source: Field Survey 2012; n = 75

Table 3: Determinants of Health Status of Sellers

Item	-2 log likelihood	Chi-square	Df	Sig.
Model fitting information				
Intercept only	183.26			
Final	183.26	4.58	3	0.08
Effects				
Intercept	1.38E2			
Awareness	141.81	3.13	5	0.68
Waste disposal	140.99	2.31	4	0.68
Pollution	148.97	10.29	6	0.11
Infrastructure	151.75	13.07	6	0.04
Population and Climate	147.76	9.08	5	0.11
Market Attitude	151.06	12.38	7	0.08

Source: Computed from Field Survey Data, 2012.

The analyses in Table 4a was done on the assumption that the independent variables (awareness, waste disposal, pollution, infrastructure, population and climate, as well as market users attitude) were not moving together, thus did not

affect each other. But, in reality these variables moved together and therefore should be considered as covariates; when re-analyzed the results in Table 4b were obtained.

Table 4a: Test of relationship between dependent and independent variables as covariates model fitting information

Item	-2 log likelihood	Chi-square	Df	Sig.
Model fitting information				
Intercept only	183.26			
Final	166.26	16.85	6	0.01
Effects				
Intercept	180.36	13.93	1	0.00
Awareness	168.24	1.82	1	0.18
Waste disposal	166.75	0.33	1	0.57
Pollution	166.56	0.14	1	0.71
Infrastructure	174.93	8.51	1	0.00
Population and Climate	167.82	1.39	1	0.24
Market attitude	171.97	5.55	1	0.02

Source: Computed from Field Survey Data, 2012.

Table 4b: Parameter estimates of independent variables as covariates

Item	B	Std. Error	Wald	Sig	Exp (B)
Intercept	10.13	2.938	11.906	0.001	
Awareness	-0.231	0.174	1.766	0.184	0.794
Waste disposal	0.105	0.183	0.329	0.566	1.110
Pollution	-0.053	0.143	0.136	0.712	0.949
Infrastructure	-0.313	0.111	8.000	0.005	0.731
Pop. & climate	-0.162	0.139	1.368	0.242	0.850
Market attitude	-0.348	0.152	5.197	0.023	0.706

Source: Computed from Field Survey Data, 2012.

There exists a relationship between the health status of market users and the set of covariates used in the study. There were two independent variables that had statistical relationship with the health

status. These were the state of infrastructure or quality in the market and the attitude of market users towards environment and their health. Thus, the hypotheses that there is no relationship

between infrastructures in the market, the attitudes of market sellers and their health status were rejected and the alternative that there was a relationship between them was supported. The value of 0.731 for infrastructure, revealed that for each unit increase (improvement) in the quality of the infrastructures in the marketplace the odds or probability for poor health status decreased by 26.9%. Likewise the value of market users attitude of 0.706 showed that for each unit increase (improvement) in the behavior of market users the chances of being in the group of those who think that health status is related to poor attitude or behavior in the market decreased by 29.4%. Also, the values of standard error of B for all variables considered are all less than two except for the intercept which is not taken into account. A standard error larger than 2.0 indicates numerical problems, such as multi-collinearity among the independent variables.

Discussion

Women make up a large proportion of traders at Bodija and Ojoo markets. This is in line with Balogun (2012) who stated that market is a business institution which has given a large measure of economic opportunity and social security to women, who form a bulk of the traders. Also the fact that a number of the traders in both markets have live-in apprentices who are not necessarily blood relations lends credence to the fact that markets enhance social institutions. According to Balogun (2012), markets create links with other people-irrespective of sex, ethnic groups, racial background and cultural traits. Health practices and level of awareness of market users to environmental health risk

is poor. Kolawole and Olurotimi (2009) in a similar study found that increasing population and increasing urbanization led to environmental and health risks. They examined the population-health-nexus-structural functionalism. And concluded that available facilities in market places were grossly inadequate; and that people were inadvertently exposed to health hazards from attempts by market users to adjust or cope with these inadequacies.

Markets attract physical development which enhances economic growth of the city but also creates management challenges. It encourages rapid urbanization which leads to a mismatch of infrastructural provision and maintenance (Coker et al. 2007; Babadoye and Fakere 2013). As such, undue pressure is exerted on existing public utilities and services because the demand for utilities far exceeds the services available. In a study, on Ibadan Metropolitan area, Tomori (2006) found that there was insufficient organized waste disposal in markets; access roads were without drainage; while the access road within the markets were in poor conditions; waste disposal facilities were insufficient; and water facilities were non-existent. Coker et al (2007) posited that waste generated in markets contributed to environmental degradation; people pay less attention to clean and safe environment thus making sustaining a hygienic market environment difficult.

Market users attitude to environmental health issues and practices as well as availability of appropriate infrastructural facilities influence the health effect of the environment on individuals. This is underscored by Adewole (2009) who stated that the major effect of waste management on the quality of life is in

two perspectives, that is, environmental and health effect. Environmental effect is air pollution and waste pollution; health effects include flies which carry germs, mosquitoes breed in stagnant water in blocked drains, rats spread salmonella, leptospirosis and other diseases.

Conclusion

It is possible the study does not depict the whole relationship between the designated variables; nevertheless, it shows that health status of market sellers is influenced by the level of infrastructures in the marketplaces attitude to market. In other words, the tendency for market users to fall sick is greatly dependent on the quality of existing infrastructures in both marketplaces and the attitude of market users. It is true that a marketplace is more than a space where people come to buy and sell, and go back to their homes. A Healthy Marketplace is a setting in which everyone works together to achieve an agreed vision for health and safety of the market community. A market infrastructural development policy within the context of a Healthy Marketplace Program will insure the health of all market users, enhance agricultural marketing and the agricultural transformation process.

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