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Original Research

Effect of local authorities' field monitoring visits on awareness of regulation and hygiene practices among street food vendors: The case of two district capitals in Ghana

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ABSTRACT

Background: Street food vending is increasingly popular in Ghana though some studies show their association with high risk of infection. Most studies focus on microbial risks instead of the linkage between officials' field visits and vendors' awareness of the regulation and hygienic practices. This paper therefore assesses the association between perceived rate of authorities' field visits and vendors' awareness of regulation and hygiene practices. **Methods**: A total of 125 street food vendors from two district capitals, Mankranso (50) and Ejura (75), in the Ashanti region of Ghana, were sampled for interview around April-May 2013. Furthermore, a principal environmental health officer from each town was interviewed concerning food vending permit acquisition processes and field monitoring visits. **Results:** The key informants were confident that the existing processes and mechanisms could ensure compliance with food vending regulations and standards among street food vendors. Most vendors from Mankranso (78%, 39/50) reported that officials' field visits were frequent unlike few vendors from Ejura (17%, 13/75). A good number of food vendors (80%, $N = 125$, $P = 0.000$) claimed they have permits but few (19%, $N = 125$, $P = 0.036$) could prove their claims. Meanwhile, almost all vendors (94%, $N = 125$, $P = 0.014$) claimed they knew their trade is regulated by law. However, a good number of vendors could not list two or more regulatory requirements and that consequently affected the overall regulatory consciousness levels to 74% (Mankranso) and 81% (Ejura) below average. Significant association and correlation was established between personal hygiene practice and reported field visits at Ejura ($P = 0.028$; $R = 0.343$ with $P = 0.004$) but not at Mankranso ($P = 0.395$; $R = 0.175$ with $P > 0.05$). The detailed results of all hygiene practices and awareness of food vending regulations are discussed. **Conclusion:** Street food vendors' perception about officials' visits do not necessarily influence hygiene practices since enforcement during visits could be weak or not fully embedded.

KEY WORDS: Awareness, field visits, Ghana, hygiene practices, local authorities, street-food vendors

INTRODUCTION

Street food vending is not new worldwide and it is popular everywhere [1]. Street foods have old historical roots with complex socio-economic and cultural implications [2]. Street foods are generally described as ready-to-eat foods and beverages prepared and/or sold out-of-home by vendors and hawkers especially in streets and other similar public places such as roadside, school premises, motor parks, office premises [2-4]. In the developed world, street food vending is well-established and regulated than in the developing countries. All because in developing countries street food vending is largely seen as an informal sector business and it is usually characterized by tremendous and unregulated growth [5-7]. Meanwhile, Lues *et al*. [7] cite that informal food vending has become a lucrative trade and competes well with the formal sector in developing countries although there are regulatory challenges [8]. The regulatory challenges exist largely because authorities become overwhelmed by the high proliferation of vendors as a result of higher consumer patronage. Unfortunately, poor street food regulation is implicated in an outbreak of diarrheal diseases and deaths especially in low-income countries [9-14]. Even in a developed country like USA, a majority of food-borne illnesses come from vended foods and therefore food safety is a priority in public policy [15].

Ghana is also witnessing increasing patronage and proliferation of street foods. This is linked to the motivation that street foods are readily available, accessible, affordable, serve as means of livelihood for families, etc. [2,4,7-9,16,17]. Figures available

show that Ghana's two largest cities, Kumasi, and Accra, respectively had over 10,000 and 60,000 street-food vendors as of 2005/2006 [11,17,18]. There are no public records to show recent figures but based on the occurrence of recent rapid population growth and urbanization dynamics in Ghanaian towns and cities according to Ghana Statistical Service [19], these historical numbers could double or triple by now or soon. This is also possible partly because there is a high demand for street food [11,18]. Meanwhile, street foods have been implicated in diarrheal cases [20]. For instance, Ababio and Lovatt [20] cite that 1 in every 40 Ghanaians suffers serious food-borne illness per year, indicating that 420,000 reported cases result in 65,000 annual deaths, which translate into millions of dollars loss to the nation. In 2013, about 14 deaths in at least three regions were recorded nationwide [16] while the general cholera cases in 2012 were 9542 with 100 deaths [21,22]. In fact, cholera outbreaks in Ghana have become a perennial phenomenon and for instance, there were fears that the 2014 cholera outbreak in the Accra city could be devastating since within a week there were 5 deaths from 150 cases [23]. Street foods in Ghana could persist as threat to public health because of several challenging factors such as ignorance and inadequate knowledge of food handling practices among vendors, prevailed lack of formal education among vendors, poor regulation, neglect of enforcement, and non-compliance with food safety and sanitary practices [7,12,15,17,18]. One of the key efforts that could minimize the health risk associated with street foods is enforcement of regulation during field monitoring visits since food hygiene can be difficult to practice at the street level where resources are scarce and environmental and sanitary standards are low [11]. This paper therefore gives an account of vendors' perception about the rate of officials field visits and the corresponding relationship with awareness of regulation and hygiene practices (personal, food, and environmental) among the street food vendors in two district capitals, Ejura and Mankranso townships in Ghana.

Brief Overview of Food Vending Regulation and Monitoring in Ghana

Regulation of street food vending appears to be more of a multi-agency responsibility in Ghana. The main stakeholders involved in ensuring food safety are local authorities - Metropolitan, Municipal and District Assemblies (MMDAs), Food and Drugs Authority, and technical agencies of ministries (Ministry of Health and Ministry of Local Government) [11,24-26]. The common practice is that local authorities (MMDAs) grant permits to vendors after medical screening (from health facilities) and offering training on food hygiene and safety [18]. In addition, environmental health officers of MMDAs routinely inspect food preparation and distribution joints to monitor existing conditions, educate and provide advice, and also enforce standards by closing down unhygienic places and/or send offenders to court for prosecution [26]. MMDAs in addition to their own bye-laws use other legal documents that have bearing on food safety and hygiene, notably Food and Drugs Law (PNDC law 305b) and its Amendment ActV 523 (Sections 1-10) and the Criminal Code Act (Section 286) Amendment Act 646 (2003) [16]. There are also documents such as Environmental Sanitation Policy [27] and the Public Health Law [24] that present some measures on maintaining high food hygiene and safety standards. In general, authorities combine enforcement with training, awareness creation and promotion to facilitate proper food hygiene, safe behavior and practices among vendors [8].

METHODS

Study Areas

The study was conducted at Mankranso and Ejura towns, which are also the capitals of the Ahafo Ano South District and Ejura-Sekyedumase Municipal Assemblies respectively [Figure 1] all in the Ashanti region of Ghana. Mankranso is about 34 km drive away from Kumasi the capital city of the Ashanti region. Mankranso has a population of about 26,909 [28]. The main economic activities of Mankranso are subsistence farming and petty trading. Diarrheal diseases are among the top diseases in the area and the underlying causes are unsanitary living conditions resulting from inadequate solid and liquid waste disposal facilities and poor personal hygiene [29]. Ejura is the 24th most populous settlements in Ghana, in terms of population with a figure of 70,807 people [30]. Ejura's main economic activities are farming and petty trading like other district capitals within the region. Indeed the agriculture sector at large employs about 68.2% of the entire district population, which is above the national agricultural employment rate of 60% [31].

Conceptual Framework, Data Collection and Analysis

The understanding is that the various Environmental Health and Sanitation Departments/Units (EHSD/Us) of MMDAs as local authorities monitor the activities of food vendors in Ghana. Local authorities use established regulatory mechanisms to ensure compliance with food hygiene and safety standards [18,26]. The main research question for this study is "Does perceived experiential instances of authorities' field monitoring visits among street food vendors have any association with: (1) The awareness or consciousness of food vending regulation, and (2) fundamental hygienic practices

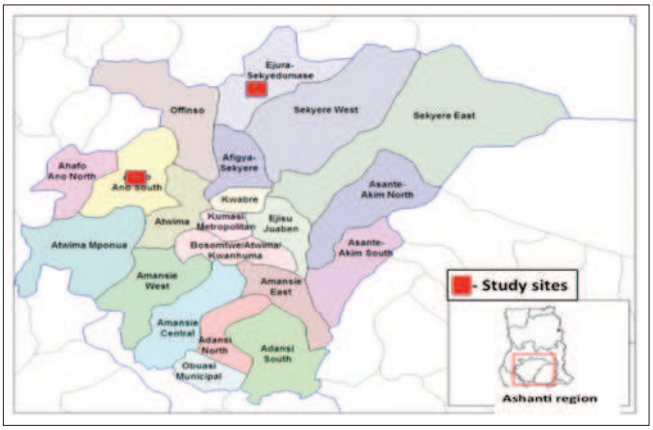

Figure 1: Study sites, adapted from Wikipedia (2013)

among street food vendors?" The data collection involved interviews and observation with 125 randomly sampled food vendors from Mankranso (50) and Ejura (75) towns. The numbers were within the estimated target of 30-40% of all vendors (whether registered or unregistered) where authorities gave figures of around 180-200. The selected vendors were first observed some few meters away from their vending stance or stalls for about 10 min before one-on-one interviews were conducted. Furthermore, key informant (KI) interviews were conducted with a principal environmental health officer from each town.

The surveys which took place around April-May 2013 captured data on variables under the main themes: Perceived experiential instances or rates of authorities field monitoring visits; consciousness or awareness of food vending regulation; and the fundamental hygiene practices related to personal, food and environmental hygiene. The variables were developed as items with responses that were scored on scales including 0-1, 0-3, 0-5, and 0-7 depending on the response structures and expected effects. Based on the summated scores of items under the variable, vendors were placed on simplified ranks as "below average," "average," and "above average." The data analyses involved reliability test on the tools and scales used based on the Cronbach's alpha, inter-total statistics (showing corrected item - total correlation and Cronbach's alpha if item is deleted [Table 9]); Pearson's correlation, descriptive statistics and Fisher's exact test at 5% significance level. The statistical packages used were Microsoft Excel and IBM SPSS Statistics Software (2012 version 21). The reliability statistics gave an alpha value of 0.777, which shows an acceptable level of reliability since it is slightly above 0.7, the minimum recommended level that is reported in literature [32-35] and therefore the survey used appropriate measurement scales.

RESULTS AND DISCUSSION

Results

Profile of food vendors

The profile of street food vendors surveyed is presented in Table 1. A majority, over 90% ($N = 125$) of food vendors interviewed in both towns were females. Most of the respondents (78%, $N = 125$) were youthful vendors with their ages below 40 years, giving the average age of respondents to be 33 years. There were some vendors (18%, 9/50 and 27%, 20/75) who have no formal education. Street food vending is the main source of livelihood for most vendors interviewed (68% and 72%) [Table 1]. The average working experience is around 5 and 6 years. Furthermore, 45% (Ejura) and 58% (Mankranso) translating into 50% ($N = 125$) of all vendors have worked at least 4 years as vendors in their own right. Few vendors (18%, $N = 125$) with 25% (19/75) among Ejura vendors and 6% (3/50) from Mankranso have worked only a year in the two towns and the rest, which is the majority (82%, $N = 125$: Ejura 75% 56/75; and Mankranso 94%, 47/50) have plied the trade in the towns for 2 or more years. While, a vendor at Ejura hires an average of two persons to support business activities, at Mankranso, a vendor hires only one person on average. Roadside is the common food vending site used by vendors in both towns. Sauce/stew-based food is the most vended menu followed by soup-based food and then beverages (non-alcoholic breakfast menus such as tea, porridge, cocoa) [Table 1].

Table 1: Profile of the street food vendors surveyed in the study

Profile parameters	Details	Towns distribution - *n* (%)	
		Ejura (75)	Mankranso (50)
Gender	Male	5 (7)	3 (6)
	Female	70 (93)	47 (94)
Age (years)	Maximum (years)	55	53
	Minimum (years)	15	20
	Average (years)	33	34
Years of working experience	Maximum (years)	25	30
	Minimum (years)	1	1
	Average (years)	5	6
Education background	None/no formal education	20 (27)	9 (18)
	Primary	13 (17)	16 (32)
	JHS/middle school	33 (44)	21 (42)
	SHS/college	9 (12)	4 (8)
Type of food vended	Beverages	13 (17)	13 (26)
	Sauce/stew-based food	43 (57)	23 (46)
	Soup-based food	19 (25)	14 (28)
Main household income source	Farming based self-employment	19 (25)	12 (24)
	Food vending	51 (68)	36 (72)
	Formal sector employment-private firm	2 (3)	1 (2)
	Formal sector employment-public firm	2 (3)	1 (2)
	Social assistance/pension/remittances	1 (1)	0 (0)
Place of selling food	By the road side	31 (41)	20 (40)
	Neighborhood	16 (21)	12 (24)
	Transport station/marketplace	17 (23)	6 (12)
	School area/compound	7 (9)	7 (14)
	Other	4 (5)	5 (10)

Description of authorities' field monitoring visits

According to KIs, officials carry out monitoring and inspection activities via field visits in the towns at least once every week. This means that within the first quarter of the year (also at the time of the study), there should be enough official visits (not <12 visits) to food vending sites for vendors to be able to assess such visits. Table 2 presents vendors' perception or description of instances of field visits made by authorities (EHSD/Us) over the first quarter of the year. Most vendors from Mankranso (78%, 39/50) reported that officers visit them more frequently unlike the few who reported same from Ejura (17%, 13/75) [Table 2]. The general observation is that responses of vendors were significant ($P = 0.000$).

Registration and awareness of existing regulations

The KIs from both towns indicated that there are no enacted byelaws by the Assemblies for food hygiene and safety and therefore existing national laws are used. Moreover, there are established permit acquisition processes used by the assemblies. A good number of food vendors (80%, $N = 125$, $P = 0.000$) claim they have registered with authorities. The proportion claiming being registered is higher among vendors from Mankranso (96%, 48/50) than Ejura (69%, 52/75). Meanwhile, few vendors (19%, $N = 125$, $P = 0.036$) were able to support their claims by showing their food vending permits on the spot [Table 3]. Contrary to the low number that proved permit status, a higher number of vendors (94%, $N = 125$ and $P = 0.014$) claimed they were aware that their trade is regulated by law. The highest occurrence was among vendors from Mankranso with 100% (50/50) claimants and 89% (67/75) claims from Ejura. Furthermore, most vendors (92%, $N = 125$) were able to list at least one of the regulatory requirements related to food vending [Figure 2]. However, few vendors were able to list or recall two or more regulatory requirements especially at Ejura [Figure 2]. This therefore translated into low overall regulatory awareness or consciousness levels of 19% (Ejura) against 26% (Mankranso) specifically ranked at average and above [Table 4]. Furthermore, the cross-tabulation of reported perception of authorities' field visits and ability to prove permit-holding status, and regulatory awareness/consciousness are shown in Tables 3 and 4.

Ejura: 8 (11%) listed none, 40 (53%) listed only 1, 13 (17%) listed 2-3, and 14 (19%) listed 4 and more, with Fisher's exact test = 0.028. Mankranso: 2 (4%) listed none, 18 (36%) listed only 1, 17 (34%) listed 2-3 and 13 (26%) listed 4 and more, with Fisher's exact test = 0.746.

From Tables 3 and 4, there are no significant association ($P = 0.084$-0.598) and correlation ($R = -0.06$-0.169 with $P > 0.05$) between instances of field visits, and ability of vendors to prove permit-holding status, and also awareness levels of food vending regulation. The correlation is weaker and also negative with the results from Mankranso. Few vendors (13% from Ejura and 28% from Mankranso) were able to prove permit claims by showing the document on the spot [Table 3]. Again the majority of vendors (74% from Mankranso and 81% from Ejura) are ranked below average in terms of awareness or consciousness of food vending regulation [Table 4].

Observed practices among food vendors

Results on vendors' hygienic practices are presented under the themes personal hygiene, food hygiene, environmental hygiene, and the composite of all three hygiene practices. Table 5 shows an association of field visits with vendors' personal hygiene practices. The results show a significant association and correlation of personal hygiene practice levels with vendors' description of field visits at Ejura ($P = 0.028$) ($R = 0.343$ with

Table 2: Vendors' description/perception of authorities field visits to vending sites/spots

Perceived instances of authorities' field visits	Towns *n* (%)	
	Ejura	Mankranso
[a]Frequent visits	13 (17)	39 (78)
[b]Infrequent visits	55 (73)	10 (20)
[c]No visits	7 (9)	1 (2)
Total	75 (100)	50 (100)

Fisher's exact test ($P=0.000$), [a]Visits are more often/most of the time, [b]Visits are once in a while, [c]No visits as far as I know/I cannot remember any visits

Table 3: Instances of field visits and ability to show proof of vending permits

Towns	Perceived instances of authorities' field visits	Ability to show vending permits *n* (%)		
		No	Yes	Total
Ejura*	No visits	6 (8)	1 (1)	7 (9)
($N=75$)	Infrequent visits	50 (67)	5 (7)	55 (73)
	Frequent visits	9 (12)	4 (5)	13 (17)
Mankranso**	No visits	1 (2)	0 (0)	1 (2)
($N=50$)	Infrequent visits	6 (12)	4 (8)	10 (20)
	Frequent visits	29 (58)	10 (20)	39 (78)
Total***	No visits	7 (6)	1 (1)	8 (6)
($N=125$)	Infrequent visits	56 (45)	9 (7)	65 (52)
	Frequent visits	38 (30)	14 (11)	52 (42)

*Exact significance=0.084, Pearson's $R=0.169$ with $P=0.187$,
**Exact significance=0.598, Pearson's $R=-0.060$ with $P=0.744$,
***Exact significance=0.168, Pearson's $R=0.155$ with $P=0.091$

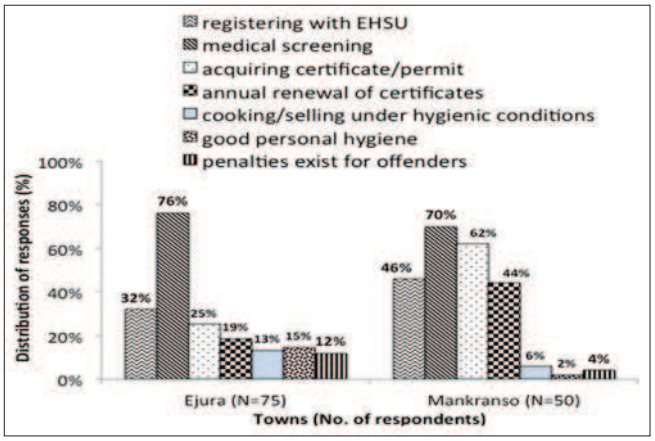

Figure 2: Basic regulatory requirements listed by street food vendors

Table 4: Instances of field visits and awareness/consciousness of food vending regulation

Towns	Perceived instances of authorities' field visits	Awareness levels *n* (%)				*Fisher's test **Pearson's *R* (*P*-value)
		Above average	Average	Below average	Total	
Ejura (*N*=75)	Frequent visits	3 (4)	0 (0)	10 (13)	13 (17)	0.463*, 0.084** (>0.05)
	Infrequent visits	5 (7)	5 (7)	45 (60)	55 (73)	
	No visits	1 (1)	0 (0)	6 (8)	7 (9)	
Mankranso (*N*=50)	Frequent visits	3 (6)	7 (14)	29 (58)	39 (78)	0.419*, −0.012** (>0.05)
	Infrequent visits	0 (0)	2 (4)	8 (16)	10 (20)	
	No visits	0 (0)	1 (2)	0 (0)	1 (2)	

Table 5: Instances of field visits and vendors' personal hygiene practice level

Towns	Perceived instances of authorities' field visits	Personal hygiene practice levels *n* (%)				*Fisher's test **Pearson's *R* (*P*-value)
		Above average	Average	Below average	Total	
Ejura (*N*=75)	Frequent visits	10 (13)	2 (3)	1 (1)	13 (17)	0.028*, 0.343** (0.004)
	Infrequent visits	32 (43)	11 (15)	12 (16)	55 (73)	
	No visits	1 (1)	1 (1)	5 (7)	7 (9)	
Mankranso (*N*=50)	Frequent visits	38 (76)	1 (2)	0 (0)	39 (78)	0.395*, 0.175** (>0.05)
	Infrequent visits	9 (18)	0 (0)	1 (2)	10 (20)	
	No visits	1 (2)	0 (0)	0 (0)	1 (2)	

P = 004) but not at Mankranso (P = 395, R = 0.175 with $P > 0.05$). The observed association ($P = 0.000$) and correlation (R = 0.446 with P = 0.000) are more pronounced when all vendors (N = 125) from both towns are combined.

The results of personal hygiene practices on the upkeep of fingernails, unhygienic use of the hand while serving food, and use of appropriate dress code are presented. A good number of vendors (78%, N = 125) observe proper upkeep of fingernails with high incidence among vendors from Mankranso (96%, 48/50) compared to Ejura (65%, 49/75). From Figure 3, 32% (N = 125) of all vendors were "half dressed" referring to those with "hair cover/cup only" and "apron/overall only," and with this Ejura has comparatively lower dress code compliance (17%, 13/75) than Mankranso (44%, 22/50) which is significant (P = 0.001). The average incidence of unhygienic use of hands is 34% (N = 125) and vendors from Ejura dominated this observation, where their incidence ranged from 5% to 27% [Figure 4].

The results of four food hygiene conditions (handling money and serving food, control of houseflies from the food, invasion of the food distribution joint by houseflies, and nearness of food to open drains or other unhygienic spots) are presented in addition to a cross-tabulation of perceived instances of field visits. In general, more than half of all vendors (54%, N = 125) were serving food appropriately, thus, "bare hands for handling money and spoon for dishing food." This appropriate practice was observed more among vendors from Mankranso (70%, 35/50) than those from Ejura (43%, 32/75). Minority 6% and 8% were found dipping hands into water in attempt to wash the hands after using bare hands for handling money, and the rest (24% and 49%) used bare hands for both handling money and dishing food. Furthermore, a good number of vendors 40% (N = 125); 37% from Ejura and 44% from Mankranso were found selling their food very close to open drains or unhygienic spots. On fly (notably housefly) controls, close to half of vendors from Ejura (48%, 36/75) have made provisions for fly screens/

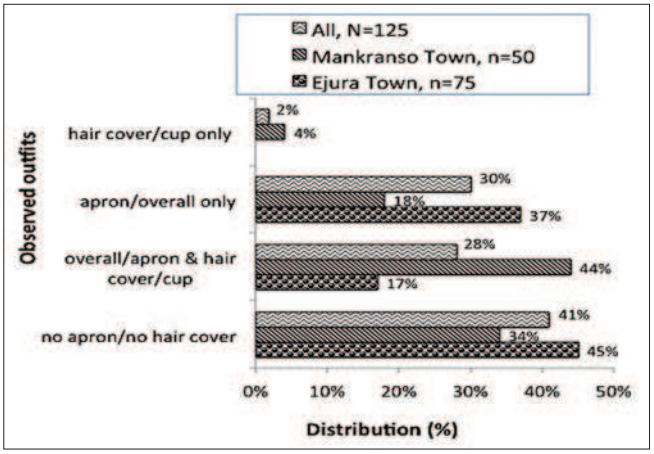

Figure 3: Wearing of required outfit (dress code), Fisher's test is 0.001

nets as recommended by authorities against 22% (11/50) of vendors from Mankranso. All the vendors from Mankranso have some form of fly controls, both the recommended control (22%) and largely improvised options (78%), but some vendors (23%, 17/75) from Ejura have no fly controls in place. The fly controls are important to be put in place because houseflies had invaded most of these food distribution joints - 88% (66/75) among vendors from Ejura and 70% (35/50) of those from Mankranso. Moreover, the general food hygiene levels show no significant association and correlation with description of authorities' field visits [Table 6]. Clearly, the majority of vendors, 54% and 72% from Mankranso and Ejura, respectively scored below the average rank of food hygiene levels [Table 6].

The environmental hygiene focused on onsite wastewater and solid waste handling practices. Significantly high numbers of vendors in both towns (83%, 62/75 for Ejura and 86%, 43/50 for Mankranso) inappropriately disposed off wastewater generated onsite. Thus, the disposals are mainly by throwing into the open or bushes or nearby drains with the minority 14%

and 17% storing the wastewater in containers for disposal later at home. For solid waste handling, again over half of vendors are involved in poor practices like leaving waste in the open or keeping in bins without lids/covers - with high incidence 60% (45/75) among Ejura vendors as against 54% (27/50) from Mankranso. The overall environmental hygiene levels are shown in Table 7. The environmental hygiene levels show no significant association and correlation with a description of authorities' visits [Table 7]. Half and slightly above half of vendors, 50% and 54%, respectively from Mankranso and Ejura were below average rank for environmental hygiene.

The composite (overall) hygiene practice levels are presented in Table 8. While, the majority of vendors from Ejura (57%, 43/75) have the composite hygiene levels below average, the figure for Mankranso is lower - 42% (21/50). The composite hygiene levels are significantly associated and correlated with the instances of authorities' field visits at Ejura ($P = 0.025$; $R = 0.272$ with $P = 0.025$) but not at Mankranso ($P > 0.05$; $R < 0.05$) [Table 8].

Discussions

The female food vendors interviewed were the majority with over 90% representation and this supports the assertion that street food vending in Ghana appears to be dominated by women, and probably more so in other African countries [1,26]. In general, more youth (with ages below 40 years) were engaged in this trade and it has the potential to be developed into gainful employment to the growing youth population since most respondents (70%) claimed the food vending trade is their main source of livelihood [Table 1]. The job creation potential with this trade is recognizable from the number of persons hired by the vendors. It is realized that 203 people - 74 from Mankranso and 129 from Ejura were hired by the 125 vendors, and thus a total of 328 jobs (vendors included) were identified in this study. The low educational level (low formal education) of vendors is comparable to other published findings [16,26]. The paradox is that street food vending is largely seen as job for those with low and/or no formal education because the trade is one of the self-employment opportunities commonly available for those unschooled [36]. Unfortunately, according to Ackah *et al*. [37] low and/or no educational background could be a prerequisite for poor food hygiene practices. The potential advantage is that vendors were not bereft of working experience, including experience of currently doing business in the two towns for 1 or more years. Thus, it could be expected that the vendors with their experience should be aware of some basic regulations governing their trade.

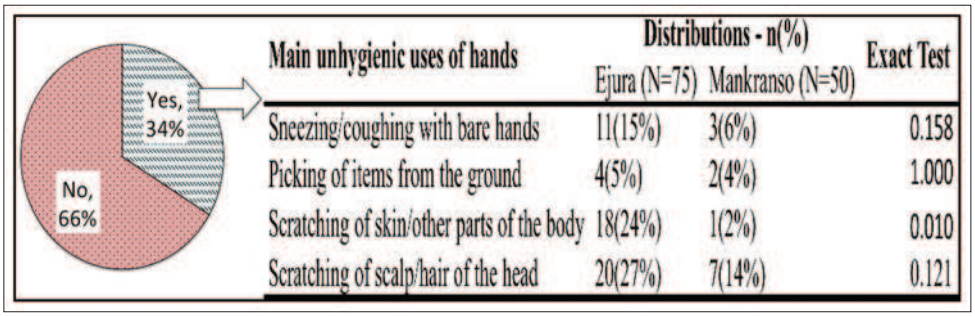

Figure 4: Unhygienic use of hands while serving food

Table 6: Instances of field visits and vendors' food hygiene practice level

Towns	Perceived instances of authorities' field visits	Food hygiene practice levels *n* (%)				*Fisher's test **Pearson's *R* (*P*-value)
		Above average	Average	Below average	Total	
Ejura	Frequent visits	4 (5)	2 (3)	7 (9)	13 (17)	0.504*, 0.166** (>0.05)
(*N*=75)	Infrequent visits	10 (13)	4 (5)	41 (55)	55 (73)	
	No visits	1 (1)	0 (0)	6 (8)	7 (9)	
Mankranso	Frequent visits	8 (16)	9 (18)	22 (44)	39 (78)	0.473*, −0.018** (>0.05)
(*N*=50)	Infrequent visits	1 (2)	4 (8)	5 (10)	10 (20)	
	No visits	0 (0)	1 (2)	0 (0)	1 (2)	

Table 7: Instances of field visits and vendors' environmental hygiene practice level

Towns	Perceived instances of authorities' field visits	Environmental hygiene practice levels *n* (%)				*Fisher's test **Pearson's *R* (*P*-value)
		Above average	Average	Below average	Total	
Ejura	Frequent visits	4 (5)	3 (4)	6 (8)	13 (17)	0.108*, 0.102** (>0.05)
(*N*=75)	Infrequent visits	3 (4)	20 (27)	32 (43)	55 (73)	
	No visits	1 (1)	3 (4)	3 (4)	7 (9)	
Mankranso	Frequent visits	3 (6)	17 (34)	19 (38)	39 (78)	0.258*, −0.051** (>0.05)
(*N*=50)	Infrequent visits	2 (4)	2 (4)	6 (12)	10 (20)	
	No visits	0 (0)	1 (2)	0 (0)	1 (2)	

Table 8: Instances of field visits and composite hygiene practice levels

Towns	Perceived instances of authorities' field visits	Composite hygiene practice levels *n* (%)				*Fisher's test **Pearson's *R* (*P*-value)
		Above average	Average	Below average	Total	
Ejura	Frequent visits	3 (4)	6 (8)	4 (5)	13 (17)	0.025*, 0.272** (0.025)
(*N*=75)	Infrequent visits	3 (4)	19 (25)	33 (44)	55 (73)	
	No visits	1 (1)	0 (0)	6 (8)	7 (9)	
Mankranso	Frequent visits	9 (18)	14 (28)	16 (32)	39 (78)	0.466*, –0.022** (>0.05)
(*N*=50)	Infrequent visits	1 (2)	4 (8)	5 (10)	10 (20)	
	No visits	1 (2)	0 (0)	0 (0)	1 (2)	

Table 9: Item - total statistics

Items/indicators descriptions	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
A. Vendors' perceived experiential instances of authorities field monitoring visits	66.168	110.576	0.377	0.770
B1.1 Awareness of existing food vending regulations	67.584	113.551	0.396	0.775
B1.2 Scope of knowledge of regulatory requirements	66.432	108.296	0.131	0.788
B1. Summated score for Consciousness of existing regulatory requirements	65.496	106.429	0.168	0.786
C1.1 Personal hygiene practices- fingernails upkeep	65.840	110.361	0.356	0.770
C1.2 Personal hygiene practices -Unhygienic use of hands while serving foods	63.096	106.507	0.363	0.767
C1.3 Personal hygiene practices- vendor observing standard dress code	67.648	108.778	0.363	0.768
C1. Summated score for level of personal hygiene practices	59.544	94.605	0.591	0.745
D1.1 Food hygiene practices - handling money and serving food at the same time	66.376	110.043	0.236	0.774
D1.2 Food hygiene practices - Control of houseflies	66.520	104.542	0.487	0.760
D1.3 Food hygiene practices - Invasion by houseflies at the food distribution joint/stall	67.200	109.565	0.390	0.768
D1.4 Food hygiene practices - Nearness of food to open drain or unhygienic spots	66.424	106.117	0.445	0.763
D1. Summated score for food hygiene practices	60.960	84.361	0.691	0.730
E1.1 Environmental hygiene - Onsite wastewater handling practices	67.360	113.603	0.248	0.776
E1.2 Environmental hygiene - Onsite solid waste handling practices	66.176	110.727	0.348	0.771
E1. Summated score environmental hygiene	65.016	108.726	0.391	0.767
F1. Summated total scores of all hygiene practices for the composite variable	48.480	59.639	0.880	0.707

The non-existence of local byelaws has necessitated authorities to rely on existing national laws on food hygiene and safety as required [16]. The two authorities have well-established permit acquisition process where qualified vendors obtain permit, and the processes are not different from other district assemblies known in similar studies [18,26]. The whole process for permit acquisition, according to KIs, begins with registering with the Environmental Health and Sanitation Unit/Department (EHSU/D), the EHSU/D then organizes health education and training for vendors (full participation is required), followed by payment of the requisite fees toward laboratory examinations (medical screening by a health facility), then inspections of sites (for food preparation and distribution), and finally the issuance of permit after successfully going through all the stages. The permit processing usually starts at the beginning of every year, stretching over at least the first quarter, and this process is mandatory for all food vendors (old and new). By the end of first quarter of 2013 (at the time of this study) about 27-30 permits have been issued (both renewal and new registrations) and according to KIs, authorities were hopeful that more food vendors would avail themselves even in excess of the numbers 140-150 for previous year (2012). The registration and permit acquisition fee was GHS 15 (close to US$ 4.3) per vendor (i.e. at both towns) and the fee is generally considered affordable according to KIs. Furthermore, according to KIs, authorities have stationed field officers to monitor and supervise food vendors on routine basis. The indication from KIs was that the officials' field visits involve rigorous exercises involving inspection of permits, advising and educating vendors on several issues bothering on food hygiene and safety, summoning vendors to the office, processing offenders to court, forbidding food sales, closing down premises, and others as reported in a similar study [26].

However, food vendors perceived the officials' field visits to be more frequent in Mankranso than Ejura. This could be reflective of pertaining situation since assessment was based on the last 3 months (the first quarter) of the year, and new entrants could not have influenced this to any large extent because majority of the vendors have enough working experience in the towns. It could also be that efforts by authorities on permit acquisition and process campaigns were not much felt among street food vendors especially at Ejura. Consequently, more officers-vendors interactions could be expected at Mankranso than Ejura, which could also translate into comparatively better awareness of food vending regulations and observed hygiene practices if field visits were influential. Ironically, most of these vendors in both towns could not show any proof to support their permit-holding claims [Table 3] although almost all vendors claimed they were registered and knew it was mandatory to make permit document handy and ready for inspection at all times. The high numbers of claimants were doubtful because they were more than the officially registered vendors given by authorities at the time of the study. The paradox of the doubtful registration claims is likened to a related study where a similarly good number of permit claimants could not show any proof [26]. Already Ackah *et al*. [37] suggest that the majority of food vendors will not have permits mostly because they simply ignore the

permit acquisition processes. However, significant number of vendors showed awareness of laws that regulate their trade and there was even 100% consciousness from Mankranso. The findings from Mankranso could be as results of the largely reported frequent officials' field visits and also more likely due to lessons from historical legal prosecutions against offending vendors in that town [26]. However, it is also disappointing that most vendors could not list or recall at least four of the basic regulatory requirements and this eventually affected the overall regulatory consciousness levels, which are largely 74% and 81% below average [Figure 2 and Table 4]. Curiously, there is no significant association and correlation between instances of field visits, and ability of vendors to prove permit-holding status, and also awareness levels of food vending regulation. This strongly suggests that perceived instances of authorities' field visits would not necessarily influence street food vendors to avail themselves for registration and also improve regulation awareness, except probably the visits are effective and/or embedded with enforcement of standards [26].

There is a significant association and correlation of personal hygiene practice levels with description of authorities' field visits at Ejura but not at Mankranso [Table 5]. This is more likely because almost all vendors from Mankranso (98%, 49/50) scored average with only 2% (1/50) scoring above average unlike Ejura where 24% (18/75) of vendors ranked below average [Table 5]. Thus, at Ejura, it could be suggested that the largely reported "infrequent visits" (73%, 55/75) appear to influence personal hygiene practices. A less expected factor could be the scope of data set available in the study since the findings from the combined data sets of both towns showed more pronounced significant association and correlation. The overall personal hygiene levels were largely negatively affected by vendors' performance associated with compliance with the dress code and unhygienic use of hands. The unhygienic uses of hands require attention because the food sold under such conditions tends to have higher risk of exposure to pathogens [38]. It is therefore imperative that hand hygiene standards are enforced during field visits because Oklahoma State Department of Health (OSDH) [38] asserts that most foodborne disease outbreaks involve infected people who touch certain parts of their body including face, hair, mouth or private parts, and then handle food.

The overall food hygiene practice levels show no significant association and correlation with a description of authorities' field visits, and the majority of vendors performed below average level [Table 6]. The worst culprit is invasion of most food distribution joints by houseflies, followed by selling of food close to open drains or unhygienic spots, then use of bare hands for both handling money and dishing food, and to some extent provisions for fly controls against houseflies. The high incidence of fly invasions at food joints demanded the caution to use completely the recommended fly controls like fly screens or nets which are known to be effective, instead of the large improvisation such as the use of cloth to cover food and mosquito repellants that were patronized among vendors. This is because houseflies are one of the known disease vectors [39] and their invasion of street food joints implies probable unhygienic environment or lack of adequate sanitation [40,41]. In addition, more vendors need to use spatulas, tongs, deli papers or single-use gloves when serving/handling food as recommended by OSDH [38] because of the assertion that consecutively handling money and serving food with bare hands increases the risk of street food contamination especially in fecal-oral infections [1,42-44].

The environmental hygiene practices were not generally impressive since at least half of vendors scored below the average rank although the findings showed no significant association and correlation with a description of authorities' visits [Table 7]. The predominant poor onsite wastewater and solid waste handling practices ranging from 54% to 86% could partly explain the cause of the corresponding high incidence of invasion by houseflies at the food distribution joints as discussed earlier. The findings are comparable to the national wastewater disposal practices where about 93% of all localities in Ghana use unimproved methods [45]. It is therefore logical to suggest that the field visits do not necessarily influence environmental hygiene practices among street vendors, and field visit would need improved strategies to make an impact. Since pests like flies and waste management are part of major indicators of vendors' hygiene status [20,46], the findings are indictment on vendors' hygienic practices and also question the effectiveness of authorities' field visits which are mainly intended to enforce standards. Yet, street food vendors should be encouraged to appropriately store waste onsite for proper disposal later after the close of the day instead of indiscriminate handling and disposal.

The composite hygiene practice levels reflect the various practices where the majority of vendors from Ejura are ranked below average and close to half of vendors from Mankranso are ranked same [Table 8). As expected, the hygiene levels are significantly associated and correlated with the instances of authorities' field visits at Ejura which strongly suggest that most vendors scored low hygiene practice levels because of the predominantly reported infrequent and no visits (83%, 62/75) [Table 8]. However, vendors from Mankranso could not show the expected high level of improved overall hygiene practice that should correspond to the high reports of frequent field visits. This also means that positive report on officials' field visits by vendors do not make a positive impact if visits are weak or devoid of enforcement. Furthermore, it was expected that the comparatively high proportion of vendors (majority) that ranked average and above could translate into significant association and correlation with the dominantly perceived frequent field visits but it was otherwise. This shows that perceived rates of authorities monitoring and supervision field visits did not necessarily influence the overall (composite) hygiene practices if in reality the visits are ineffective. The hygiene practices performance among the street food vendors in this study could be the reflection of the delivery of field enforcement personnel as asserted by Afele [18] that in Ghana this is often non-existing or weak.

CONCLUSION

Local authorities have established food vending permit acquisition processes and also routine field visits for monitoring

and supervision but their visits were largely perceived as frequent and infrequent among vendors from Mankranso and Ejura towns, respectively. Moreover, authorities have confidence in their food vending regulation. Most street food vendors knew that there were laws governing their trade, however, very few had permits to trade legally which is an indictment on enforcement. Some food vendors struggle with practicing hygienic standards such as putting up vending dress code, hygienic use of hands, avoiding invasion of food distribution joints by houseflies, use of recommended fly controls, and avoiding use of bare hands for both handling money and serving food. Perceived rate of officials' field visits among street food vendors do not necessarily influence the hygienic practices of the vendors because enforcement of standards are critical on such monitoring and supervision visits, which in the Ghanaian context could be non-existing or weak. It is recommended that further studies be conducted to interrogate in details activities that define officials' field visits. However, it is also timely to mount a crackdown on all unqualified or illegal street food vendors as required by law. Authorities must facilitate mass education on street food vending especially to raise consumer awareness to be able to demand standard hygienic practices and compliance with regulations from street food vendors.

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CONSENT AND APPROVAL

Informed consent was first sought from the EHSU/Ds of the district assemblies and also verbal consent was obtained from all vendors who participated voluntarily in the study. Verbal rather than written consent was preferred because written consent appeared intimidating and inconvenient to respondents especially as the majority could not read and/or write.

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