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HAND HYGIENE PRACTICES AMONG STREET FOOD VENDORS

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Abstract: *The purpose of this paper is to assess the nature and extent of hand hygiene practices in the street food business in selected districts in Southern Ghana. Though street-vended foods have many health and socio-economic benefits, they often pose significant public health risk to consumers. Codex Alimentarius standards identify the hand of the vendor (or the consumer) as a 'high-risk' factor or conduit in street food contamination. The study applied cross-sectional descriptive survey with observation of street food vendor practices using a structured questionnaire in a face to face interview of 413 vendors randomly selected. While almost half of vendors (47.9%) were observed to handle food with their bare hands in the selling process, nearly one-fifth of vendors (18.4%) did not wash their hands with water and soap after visiting the toilet. Vendor fingernail hygiene was however not a major risk factor. It is also revealed that there is a significant positive relationship between food vendor's educational status and proper hand washing practices. It is recommended that respective local authorities in collaboration with other stakeholders be more proactive in the enforcement of food safety regulations regarding hand hygiene and food handling.*

Keywords*: Street-vended food, Codex Alimentarius, Hand, Contamination, Food-borne Diseases.*

1. Introduction

Street-vended food (SVF) refers to a wide range of ready-to-eat-food, prepared and sold along streets and several other public places such as lorry stations, parks, schools, construction sites and all locations where there is a high number of potential customers. About 2.5 billion people worldwide patronize SVF on daily basis [1]. In most developing countries including Ghana, SVFs are commonly and widely patronized by public/civil servants, school children, travelers/tourists, market women, petty traders, artisans, and the general public [2,3]. The street-vended food trade thus contributes significantly to food security and nutrition by providing comparatively inexpensive, and easily accessible tasty foods to millions of consumers. Additionally, it provides vast employment opportunities in the private sector, thus guaranteeing a decent livelihood for millions of street-food vendors (SFVs).However, SVF often pose significant public health risk to consumers. Concerns about SVF safety stem from the risk of faecal contamination of street food with the human hand as a conduit, potentially culminating in infection and outbreak of food borne diseases (FBDs) and outcomes of death or personal injury to the consumer. As an endogenous risk factor, contaminated hand thus plays a major role in faeco-oral transmission through food [4,5]. The purpose of this study was to assess the nature and extent of hand hygiene practices in the street food business with the aim of adding on to existing knowledge in food hygiene and safety. Benchmarks of the WHO *Codex*

Alimentarius for street-vended foods constitute the international standards for assessing food safety. WHO Five Keys to Safer Food relate to specific practices including washing the hands before handling food and during food preparation. Others include washing the hands thoroughly with water and soap after visiting the toilet to prevent food contamination from faecal matter; washing the hands after handling raw food such as meat, changing baby's diaper, blowing the nose and after handling rubbish, maintaining trimmed and clean fingernails and washing the hands thoroughly with water and soap before eating [6].

The individual street-food vendor, the consumer, and respective local authorities are all stakeholders in striving to achieve street-vended food safety [7]. Surveys in Africa, Asia, and Latin America suggest that in developing countries, ready-to-eat food sold along the streets and other public places, pose a significant public health burden to consumers. Poor personal hygiene of street food vendors, especially with respect to hand washing and food handling practices is considered a major preventable 'high-risk' factor [8, 9, 10, 11, 12]. Even in advanced countries, street-food vendors contact-serve foods with bare hands [13]. In Ghana, foods mainly prone to contamination are foods "handled excessively after cooking" and that the risk of "contamination was reduced where vendors sold food from the cooking pots" [14]. In Ghana between 70% and 95% of food vendors wash their hands regularly in the process of vending [15,16,17]. This assertion is however contradicted by some recent studies in Northern Ghana [18] hence the justification for this study.

A principal contamination risk factor of public health concern linked to food handling is the concurrent handling of food and money because of the presence of certain pathogens such as *E. coli, S. aureus* and *Salmonella spp.* on banknotes or currencies [19-21].Similarly, food handler nasal carriage of *Staphylococcus aureus* is a potential food contaminant through nose picking[22]. On the other hand, fingernail hygiene practices differ from one geographical area to the other [23-25]. The tendency of food vendors to properly wash their hands also depends on access to improved water sources [26-28]. Ultimately deficiencies in food safety and hygiene practices may be attributable to inadequate food regulation enforcement by the local authorities [29].

2. Materials and Methods

2.1 Study Area

The study was carried out in two selected districts of the Central Region of Ghana, namely Komenda Edina Eguafo Abrem (KEEA) municipal district (Figure 1) and the Ajumako Enyan Essiam (AEE) (Figure 2) district between January and May 2015.

The KEEA municipality is located along the coast of Southern Ghana. The KEEA, whose capital Elmina, houses the St George Castle, a UNESCO designated world heritage site, is a major tourist destination. Notable socio-economic activities in the municipality are petty trading including food vending.

On the other hand, the AEE District with Ajumako as its capital is located inland away from the coast. This district, predominantly rural, covers an area of about 521.3sq.km. Dominating the district economy is agriculture and the sales sectors consisting of a large number of street-food vendors operating at various market centers and public places.

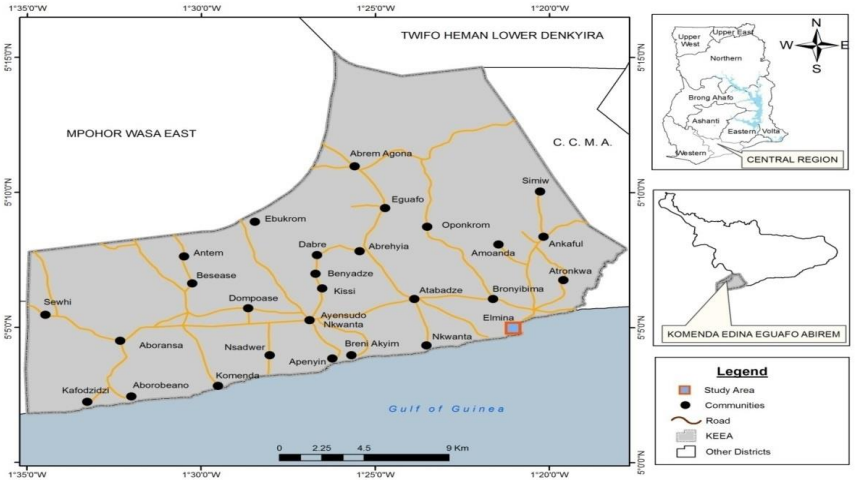

Figure 1: Map of the KEEA Municipal District.

Methods & Sample Size

The main objective of this survey was to study the role of the hand of food vendor as a risk factor to food safety. A cross-sectional survey of food vendors selling along streets and other public places was used. A study sample size of 413 food vendors was performed. In all a number of 266 food vendors were interviewed in the KEEA, and 147 in the AEE District using a structured questionnaire. The selected food vendors were obtained from one-third of localities in each district randomly sampled from a sampling frame of localities for each district. The sampling frame for the KEEA municipality had 36 localities while that of the AEE District had 45 localities. Food vendors were mainly interviewed at low peak hours (in-between breakfast, lunch and dinner hours) to minimize interruptions of interviews by customers. Alongside the interview process was the observation of vendor food safety practices and behaviors.

Data Analysis

Data entry and analysis were conducted using SPSS Version 21 software. The validity and reliability of the data were enhanced by pre-testing the instruments and the constructs revised appropriately before data collection. Averagely seven minutes were used in keying each questionnaire data into the SPSS data editor.

3. Results and Discussion

3.1 Vendor Socio-Demographic Profile

Overwhelming majority (97.3%) of street-food vendors in the study area were females (Table 1). The study thus confirms street-food vending as a major source of income and livelihood for middle-aged women in the private sector. Additionally, Table 2 reveals that majority of food vendors were illiterates. Overall, 84.5 per cent of vendors had education below the senior high school level. Whereas only 1.2 percent had tertiary education, 15.3 percent of vendors had had no formal schooling. Majority (39.2%) of vendors also fell within the age bracket of 30 to 39 years with an arithmetic mean age of 34.98 years (Table 2). It was also found that majority of food vendors (83.3%) plied their trade at a stationary public place whiles 16.7 per cent were mobile vendors usually called hawkers. This finding has a major implication for town and urban planning. In the main it was found that designated food vending areas lacked adequate sanitary facilities.

Table 1

Socio-Demographic Profile of Vendors

	KEEA		AEE		Total	
	Freq (266)	**%**	**Freq (147)**	**%**	**Freq (413)**	**%**
Types of Vendors						
Stationary	198	74.4	146	99.3	344	83.3
Mobile	68	25.6	1	0.7	69	16.7
Sex						
Male	9	3.4	2	1.4	11	2.7
Female	257	96.6	145	98.6	402	97.3
Education						
No Schooling	42	15.8	21	14.3	63	15.3
Primary	24	9	35	23.8	59	14.3
JHS Middle	128	48.1	75	51	203	49.2
Voc Tech	11	4.1	5	3.4	16	3.9
SHS	49	18.4	10	6.8	59	14.3
Tertiary	4	1.5	1	0.7	5	1.2
Arabic	8	3	0	0	8	1.9

Table 2

Age (Years) Distribution of Street-Food Vendors

	N	Range	Minimum	Maximum	Mean	Std Dev	Variance
Ages in years	413	50	15	65	34.98	8.958	80.138

As shown in Table 3, majority of vendors in the study area (61.3%) said they washed their hands with water and soap before preparing food and during vending (even though this could not be verified). Overall, over one-third of vendors (38.7 percent) conceded to not washing their hands with water and soap during the vending process while nearly half of vendors (47.9%) handled food with their bare hands in the vending process. Also 81.6 percent of vendors intimated that they washed their hands with water and soap after visiting the toilet. This implies that overall nearly one-fifth of vendors (18.4%) did not wash their hands with water and soap after visiting the toilet. Table 3 also reveals that over one-third of food vendors (35.1%) were caring for children at the time of the study. And of all food vendors studied, 16.7 percent who were carriers of children said they handled food with their bare hands. These findings suggest that nearly one-fifth of vendors who changed used children dippers, handled vended food with bare hands thus making 'child care' an indirect risk factor to food handling and food safety. This makes food handling a key risk factor in food vending in the study area and brings to question the effectiveness of regulation enforcement practices.

The length and cleanliness of vendor fingernails is also an important consideration in hand hygiene practices because safe hand washing practices includes keeping clean and trimmed fingernails.

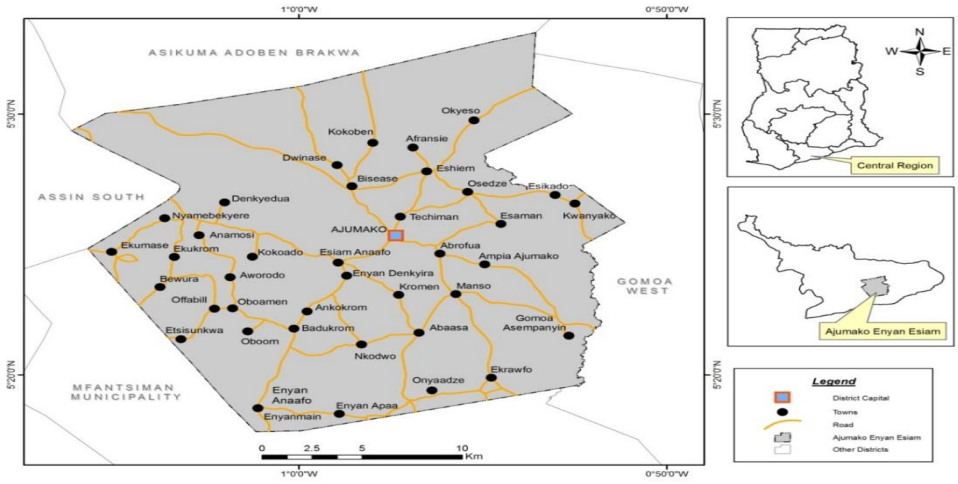

Figure 2*:* Map of Ajumako Enyan Essiam District

Table 3 suggests that vendor fingernail hygiene was not a major risk factor in the study area. Only 9 (2.2%) of food vendors were observed to wear long fingernails. The tendency for food vendors to properly wash their hands may depend on access to improved water sources.

Table 3

Food Vendor Hand Hygiene Practices

	KEEA		AEE		Total	
	Freq (266)	**%**	**Freq (147)**	**%**	**Freq (413)**	**%**
Fingernail hygiene						
Long nails	2	0.8	7	4.8	9	2.2
Short nails	264	99.2	140	95.2	404	97.8
Handling of food						
Bare hands	125	47.0	73	49.7	198	47.9
Protected hand	141	53.0	74	50.3	215	52.1
Vendor Handwashing						
No hand washing	40	15.0	4	2.7	44	10.7
Only water	35	13.2	79	53.7	114	27.6
Muddy water	0	0	1	0.7	1	0.2
Water and soap	191	71.8	62	42.2	253	61.3
Wiping with cloth/napkin	0	0	1	0.7	1	0.2
Handwashing after Toilet						
Don't wash hands	3	1.1	0	0	3	0.7
Wash hand with water	33	12.4	39	26.5	72	17.4
Wash hands/ water & soap	230	86.5	107	72.8	337	81.6
Bath before vending	0	0	1	0.7	1	0.2
Child care						
Yes	83	31.2	62	42.2	145	35.1
No	183	68.8	85	57.8	268	64.9

A Chi-Square hypothesis test (Table 4) conducted shows that there is a significant positive relationship between food vendor educational status and hand washing

practices in the study area. Chi-Square Pearson's Correlation Coefficient (*R= 69.349, df= 20, P-value= 0.000*. *P*-value of 0.000 < statistical significance of 0.05, i.e. 5%). This finding signals the importance of education and schooling to food safety. Significantly, access to potable water sources was not a major challenge.

Table 4

Chi-Square Hypothesis Tests- Education status and Hand Washing Practices

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	69.349[a]	20	.000
Likelihood Ratio	52.210	20	.000
Linear-by-Linear Association	12.972	1	.000
N of Valid Cases	413		

4. Conclusion

Hand hygiene is one of the most important strategies for infection control. Proper hand washing is necessary because hands frequently transport microorganisms and could be a major source of food contamination. Scrupulous hand-washing by food handlers results in the prevention of the spread of pathogenic microorganisms. The study reveals an unsatisfactory handwashing practices among food vendors. The findings therefore bring to question the effectiveness of food regulation enforcement practices. Strengthening food safety programmes help to ensure protection of consumer health, reduce food-borne disease and mortality burden, and thereby increase human wellness and decrease poverty.

5. Acknowledgements

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6. References

[1]. FOOD AND AGRICULTURAL ORGANIZATION OF THE UNITED NATIONS, West African Cities in Street Food Vending. Potential and Challenges. FAO Regional Office for Africa, Brazzaville (2012). [Online Accessed on 10 June 2014 from http://www.fao.org/africa]
[2]. HALEEGOAH, J., RUIVENKAMP, G., ESSEGBEY, G., FREMPONG, G., & JONGERDEN, J., Street-Vended Local Food Systems Actors Perceptions on Safety in Urban Ghana: The Case of Hausa Koko, Waakye and Ga Kenkey. *Advances in Applied Sociology*, 5: 134-145, (2015). [3]. TORTOE, C., JOHNSON, P.N.T., OTTAH-ATIKPO, M. & TOMLINS, K. I. Systematic Approach for the Management and Control of Food Safety for the Street/Informal Food Sector in Ghana. *Food and Public Health*, 3(1):59-67, (2012).
[4]. WHO REGIONAL OFFICE FOR AFRICA, Initiative to estimate the Global Burden of Foodborne Diseases. WHO Africa Region Office, Brazzaville, (2014). [5]. NURUDEEN, A. A., LAWAL, A. O. AND AJAYI, S. A., A survey of hygiene and sanitary practices of street food vendors in the Central State of Northern Nigeria. *Journal of Public Health and Epidemiology*, 6(5):174-181, (2014).
[6]. WHO, Five Keys to Safer Foods Manual. World Health Organization, Department of Food Safety, Zoonoses and Foodborne Diseases, (2006).

[7]. AHWOI, K. Local Government & Decentralisation in Ghana: Unimax Macmillan Ltd, Accra, Ghana, (2010).
[8]. WHO & UNICEF, Progress on Sanitation and Drinking-water: 2010 Update. Geneva & London, (2010).
[9]. MUHONJA, F. & KIMATHI, G. K., Assessment of Hygienic and Food Handling Practices among Street Food Vendors in Nakuru Town in Kenya. *Science Journal of Public Health*, 2(6): 554-559, (2014).
[10].FARUQUE, Q., HAQUE, Q.F., SHEKHAR, H.U., & BEGUM, S., Institutionalization of Healthy Street Food System in Bangladesh: A Pilot Study with Three Wards of Dhaka City Corporation as a Model, Final Report (2010).
[11] MUYANJA, C., NAYIGA, L., BRENDA, N. & NASINYAMA, G., Practices, knowledge and risk factors of street food vendors in Uganda. *Food Control Journal*, 22 (10):1551–1558, (2011).
[12]. GAWANDE H.A., MISHRA A.A., SHUKLA R.N. & JYOTI J., Socio-economic Profile of Street Food Vendors and Quality Evaluation of Samosa and Panipuri in Allahabad City, (UP) India. *International Journal of Agriculture and Food Science Technology*, 4(3): 275-280, (2013).
[13]. BURT, B. M., VOLEL, C., & FINKEL, M., Safety of vendor-prepared foods: evaluation of 10 processing mobile food vendors in Manhattan. *Public Health Reports* (2016).
[14]. Mensah,P., Yeboah-Manu, D, Owusu-Darko, K & Ablordey, A., Street foods in Accra, Ghana: how safe are they? Geneva: *Bulletin of the World Health Organization*, 80(7): 546-554, (2002).
[15]. FOOD AND AGRICULTURAL ORGANIZATION OF THE UNITED NATIONS, Street food in Urban Ghana. A desktop review and analysis of findings and recommendations from existing literature, (2016).
[16]. APANGA, S., ADDAH, J., & SEY, D.R., Food Safety Knowledge and Practice of Street Food Vendors in Rural Northern Ghana, *Food and Public Health*, 4(3):99-103, (2014).
[17]. MONNEY, I., AGYEI, D., & OWUSU, W., Hygienic Practices among Food Vendors in Educational Institutions in Ghana: The Case of Konongo. *Food and Public Health, Scientific and Academic Publishing*, 4(6):306-315, (2013).
[18]. DUN-DERY, E. J. & ADDO, H.O., Food Hygiene Awareness, Processing and Practice among Street Food Vendors in Ghana. *Food and Public Health Journal*, 6(3): 65-74, (2016).
[19]. ANGELAKIS, E., AZHAR, E. I., BIBI F., YASIR, M., AL-GHAMDI A. K., ASHSHI, A. M., ET. A.L., Paper money and coins as potential vectors of transmissible disease. *Future Microbiology*, 9(2): 249-261, (2014).
[20]. LUURE, P., ASARE, W., COBBINA, S. J., DUWIEJUAH, A. B., & NKOOM, M., Microbial Contamination of Ghanaian Cedi Notes from Traders of the Tamale Central Market, Ghana. *British Microbiology Research Journal*, 5(2): 139, (2015).
[21]. VRIESEKOOP, F., RUSSELL, C., ALVAREZ-MAYORGA, B., AIDOO, K., YUAN, Q., SCANNELL, A., ET AL., Dirty money: An investigation into the hygiene status of some of the world's currencies as obtained from food outlets. *Foodborne Pathogens and Disease, 7*(12): 1497-1502, (2010).
[22]. EL-SHENAWY, M.,EL-HOSSEINY, L., TAWFEEK, M., EL-SHENAWY, M., BAGHDADI, H., SALEH, O., et. al., Nasal carriage of enterotoxigenic *Staphylococcus aureus* and risk factors among food handlers-Egypt. *Food and Public Health*, 3(6): 284-288, (2013).
[23]. ODONKOR, S.T., ADOM T., BOATIN, R., BANSA D., & ODONKOR, C.J. Evaluation of Hygiene Practices among Street Food Vendors in Accra Metropolis, Ghana. *Elixir Food Science International Journal* 41: 5807-5811, (2011).
[24]. IWU, A.C., UWAKWE, K.A., DURU, C.B., DIWE, K.C., CHINEKE, H.N., MERENU, I.A., OLUOHA, U.R., MADUBUEZE, U.C., NDUKWU, E. & OHALE, I., Knowledge, Attitude and Practices of Food Hygiene among Food Vendors in Owerri, Imo State, Nigeria. *Occupational Diseases and Environmental Medicine*, 5:11-25, (2017).
[25]. ALUKO, O.O, OJEREMI, T.T., OLALEKE, D.A., AJIDAGBA, E.B., Evaluation of food safety and sanitary practices among food vendors at car parks in Ile Ife, Southwestern Nigeria. *Food Control*, (40): 165–171, (2014).
[26]. GHANA STATISTICAL SERVICE *2010 Population & Housing Census. National Analytical Report*, (2013).
[27]. GHANA STATISTICAL SERVICE *2010 Population & Housing Census. Summary Report of Final Result*s (2012), p. 96.
[28]. DONKOR, E.S., KAYANG, B.B., QUAYE, J. & AKYEH, M.L., Application of the WHO Keys of Safer Food to Improve Food Handling Practices of Food Vendors in a Poor Resource Community (Chorkor) in Ghana. *International Journal of Environmental Research and Public Health*, 6(11): 2833–2842, (2009).
[29]. ANNAN-PRAH A, AMEWOWOR DH, OSEI-KOFI J, AMOONO SE, AKORLI SY, SAKA E, NDADI HA. Street foods: handling, hygiene and client expectations in a World Heritage Site Town, Cape Coast, Ghana. *African Journal of Microbiology Research*, 5(13):1629-1634, (2011).