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*Full Length Research Paper*

## Breast self examination among secondary school teachers in South-South, Nigeria: A survey of perception and practice

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Breast cancer continues to claim the lives of hundreds of women all over the world inspite of the existence of simple to perform procedures that could ensure the early detection of breast changes. The study aimed to assess the practice and perceptions towards breast self examination (BSE) among secondary school teachers in Benin City. A cross-sectional study was conducted in July, 2010 among 300 female secondary school teachers in a selected local government area in Benin. An interviewer administered structured English language questionnaire was used for data collection. Data analysis was done using statistical package for social sciences (SPSS) with level of significance set as  $p < 0.05$ . All (100.0%) had heard of BSE, 79.3% had ever practised (BSE), of which 19% performed BSE monthly and 6% knew all steps in the procedure of BSE. Main source of information was the broadcast media. Ignorance of the usefulness of BSE was the most common reason given for not doing BSE. Nonetheless, attitude towards BSE was good for 80% of respondents. There is need for aggressive awareness campaigns among secondary school teachers that will focus on filling knowledge gaps and providing opportunities for guided practice.

**Key words:** Breast cancer, breast self- examination, practice, screening, teachers.

### INTRODUCTION

In Nigeria, cancer of the breast has overtaken carcinoma of the cervix in hospital incidence, with the prevalence described as 116 cases per 100,000 women per year (Bray et al., 2004; Chan et al., 2009; Gwarzo et al., 2009). Early detection plays an important role in reducing morbidity and mortality and theoretically, a 95% survival rate could be achieved if diagnosis was made at an early stage of the disease (Tavatiari et al., 2009). Studies have shown that over 90% of breast lumps are detected by women themselves, stressing the importance of breast

self examination (Onyije et al., 2010). Mammography has limited application in Nigeria, where facilities and expertise are largely unavailable, therefore, breast self examination if properly carried out remains the most cost effective method for the early detection of breast cancer (Chioma and Asuzu, 2007; Onyije et al., 2010; Saludeen et al., 2009).

Despite the growing campaign on breast cancer awareness in Nigeria, the practice of breast self examination (BSE) continues to vary widely among women. Female

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**Table 1.** Demographic characteristics of respondents (n = 300)

Variable	Frequency (%)
<b>Age (years)</b>	
20 – 29	51(17.0)
30 -39	79 (26.3)
40 -49	91 ( 30.3)
50 -59	76 (25.3)
60 - 69	3 (1.1)
<b>Religion</b>	
Islam	7 (2.3)
Christianity	293 (97.7)
<b>Educational level</b>	
National certificate of education	90 (30.0)
1st degree	193 (64.3)
2nd degree	17 (5.7)
<b>Marital status</b>	
Single	61 (20.3)
Married	127 (72.3)
Divorced	8 (2.7)
Widowed	24 (4.7)

women. Female school teachers form a group that are often neglected in breast cancer research. Available literature reveal that teachers have a poor practice of BSE, both in technique and timing, often in the light of a fair knowledge of breast cancer (Jarvandi et al; 2002; Nur, 2010; Odunsanya, 2001). In a cross sectional study to determine the knowledge, attitudes and behaviours of female teachers related to breast cancer and breast examination in Southern Turkey, more than half of them did not practise BSE and only 12.5% of them practised BSE regularly (Nur, 2010). Another study carried out among female secondary school teachers in Ilorin West Local Government Area of Kwara State, Nigeria revealed that 187 (54.8%) of the respondents had done BSE before, 49.0% were still practising it as at the time of the study, about 70% practised BSE once monthly, 12.5% thrice monthly, 3.1% twice yearly and 12.5% once a year. About 40% of the teachers knew the correct BSE procedure, while 36.5% did not know about the procedure at all (Kayode et al., 2005). The objective of the study was to assess the perceptions and practice of BSE among secondary school teachers in Benin City, Edo state.

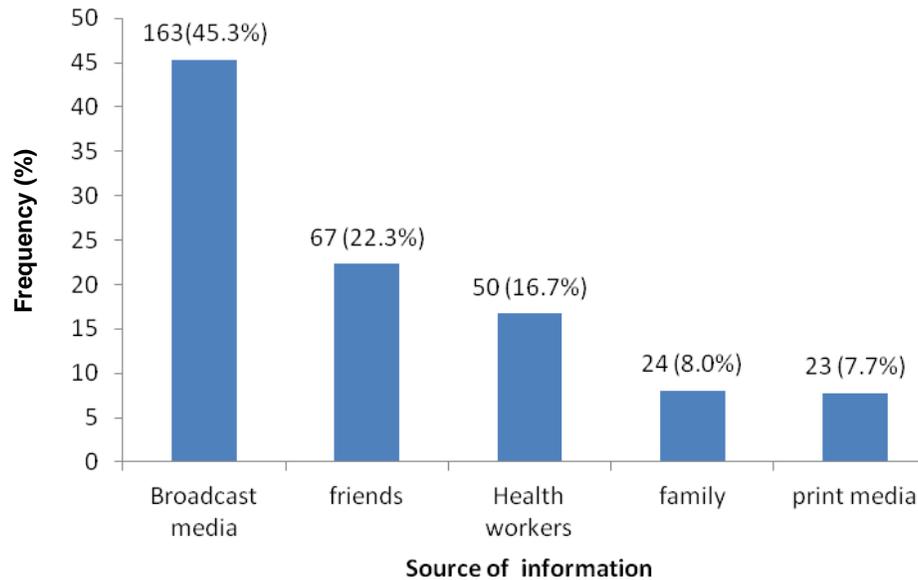
## MATERIALS AND METHODS

The study was carried out in Oredo, an urban Local government area of Edo state, Nigeria. The study population comprised all female teachers in government owned secondary schools in the study area. Sample size was computed using the formula for

prevalence study in a population of less than 10,000 (Araoye, 2004). The value for p was set as 39%, being the proportion of women who practiced BSE in Port-Harcourt, from an earlier study (Jebbin and Adotey, 2004), level of accuracy d was taken as 5% and margin of error z as 1.96 with a non-response rate of 10%. A minimum sample size of 254 was calculated and increased to 300 to enhance validity. Stratified random sampling with proportional allocation was used to select participants from a list of all female teachers in government owned secondary schools within the LGA. In the selected schools, the required quota of teachers was obtained by simple random sampling. Ethical approval was obtained from the University of Benin Teaching Hospital Ethic committee. Written institutional and individual informed consent were obtained and data collected using an interviewer administered structured pre-tested questionnaire that focused on socio-demographic variables of the teachers, perception and practice of BSE. There were 4 variables to determine knowledge of BSE including purpose, frequency, timing in relation to the menstrual cycle and knowledge of the steps of BSE. A score of two (2) was awarded for each correct answer and zero (0) for each wrong answer, with possible maximum score of 8. A score of 2 was graded poor knowledge, 4 as fair knowledge, 6 and 8 as good knowledge. There were 4 questions for practice of BSE. Each response on practice was scored as two (2) if correct and zero (0) if wrong. Total possible score for each respondent was 8. A score of 6 and 8 were designated as good practice and less than the score of 6 as poor practice. There were 4 questions to assess attitude to BSE, with a maximum possible score of 8. A total score of 2 was poor attitude and 4 to 8 as good attitude. Data analysis was done using SPSS version 16. Descriptive data were presented as frequency tables and cross-tabulations performed using chi-square test, with level of significance set as  $p < 0.05$  to examine for associations between variables.

## RESULTS

Three hundred teachers participated in the survey. Mean age of respondents was  $41.0 \pm 9.9$  years. The major ethnic groups of the respondents were Bini 109 (36.3%), 293 (97.7%) were Christians and 127 (72.3%) married. The majority 193 (64.3%) were university first degree holders (Table 1). All respondents (100.0%) had heard of breast self examination, with main source as being the broadcast media (45.3%) (Figure 1). Two hundred and fifty four (84.7%) knew the purpose of BSE, 248 (82.7%) knew that BSE should be started as early in life, 25 (8.3%) were sure BSE should be performed monthly. Only 6 (2.5%) could correctly mention all steps in the procedure of BSE. Overall knowledge of BSE was poor for 140 (46.6%), fair for 122 (40.7%) and good for 38 (12.7%) of respondents. Educational level was positively associated with knowledge ( $p = 0.025$ ). Sixty two (21.7%) respondents had never performed BSE, for the remainder, mean age of commencement of BSE was  $30.2 \pm 9.8$  years. Only 24 (10.1%) of the remaining 238 examined their breast regularly monthly. Forty-nine (32.6%) out of 150 pre-menopausal respondents examined their breasts anytime in the menstrual cycle, 45 (30.0%), 34 (22.7%) and 22 (14.7%) after, before and during menstruation, respectively. Of the 88 respondents that were post menopausal, majority 81 (92.0%) examined their breast anytime during the month, while only 7 (8.0%) did their



**Figure 1.** Primary source of information on BSE.

**Table 2.** Respondents' perception of BSE (n = 300).

Perception of BSE	Frequency (%)
<b>BSE improves early breast cancer detection</b>	
Yes	283 ( 94.3)
No	17 (5.7)
<b>BSE difficult to perform</b>	
Yes	70 (23.3)
No	230 ( 76.7)
<b>Willingness to discuss results of BSE with health professional</b>	
Yes	271 ( 90.0)
No	29 (10.0)
<b>Willingness to teach BSE</b>	
Willing	288 (96.0)
Not willing	12 (4.0)

examinations on the same date of any month. Practice was graded as poor for 213 (89.3%) and good for 25 (10.7%). Practice of BSE was positively associated with level of education ( $p = 0.029$ ) and not with any other demographic variable. Eighteen (7.6%) of those who had ever practised BSE discovered a lump for which 14 (77.8%) sought medical care from a doctor, 1 (5.6%) sought the services of a traditional medical practitioner and 3 (16.6%) preferred to wait and observe the lump. Forty nine (16.3%) of 300 respondents felt susceptible to breast cancer, 70 (23.3%) thought it a difficult procedure to perform by one's self, 270 (90.0%) felt willing to discuss the findings from breast self examination with a

health care provider, 288 (96%) expressed willingness to teach others about BSE (Table 2). Overall, attitude to BSE was good for 240 (80.0%) of the respondents and poor for 60 (20.0%). Attitude was significantly ( $p = 0.019$ ) associated with practice such that those who had a good attitude had good practice (Odds ratio 2.12, 95% CI = 1.05; 4.17) (Table 3).

## DISCUSSION

The incidence of breast cancer is increasing worldwide and even more rapidly in societies that hitherto enjoyed a low incidence of the disease, such as developing African

**Table 3.** Association between educational level of respondent and perception with practice of BSE (n = 300).

Item	Practice of BSE		Total	p value
	Yes. n (%)	No. n (%)		
<b>Educational status</b>				
NCE	63 (70.0)	27 (30.0)	90 (100.0)	0.029
1st degree	160 (82.9)	33 (17.1)	193 (100.0)	
2nd degree	15 (88.2)	2 (11.8)	17 (100.0)	
<b>Perception</b>				
Good	197(82.8)	43 (17.2)	240 (100.0)	0.019
Poor	41 (69.4)	19(30.6)	60 (100.0)	
Total	238 (79.3)	62 (20.7)	300 (100.0)	

countries (Jarvandi et al., 2002; Kayode et al., 2005). Regular BSE in a resource poor country like Nigeria has more potential to detect early breast cancer than any other technique so far (Adesunkanmi et al., 2006). The study focused on the knowledge and practice of BSE among teachers in Benin city. The mean age of respondents in this study (41 years) is comparable to the mean age of breast cancer patients in studies conducted in Ibadan (43 years) (Adebamowo and Adekunle, 1999) and Newi (44 years) (Anyanwu, 2009) both in Nigeria. Thus, they represent a vulnerable population in need of BSE. Encouragingly, all respondents had heard of BSE, with the television as the most popular source, a finding also noted in other studies (Dandash and Al-Mohammed, 2007; Drakshyami and Venkata, 1994). The less common involvement of health care workers in the dissemination of information regarding BSE has also been noted in previous studies (Gwarzo et al., 2009; Saludeen et al., 2009) and requires urgent intervention, as understandingly, they are custodians of knowledge in this respect. The incompleteness of information received from the media is reflected in the poor knowledge of BSE found in this study.

Although a large number had ever performed BSE, only 19% examined their breast once a month and 30% did so just after menstruation, as recommended. This finding of poor technique of performance has been reported in previous studies (Demirkiram et al., 2007; Nur, 2010; Parsa et al., 2008). The tendency to miss out on breast changes is therefore higher, because regular BSE enables familiarity with the breast and easy recognition of changes. The fact that less than 30% of those who found lumps did not seek medical attention highlights the need for aggressive campaigns to highlight the dangers of late presentation and further research into the barriers of assessing medical care, as over 90% expressed their willingness to discuss their findings with a health professional. The good attitude towards BSE is encouraging and shows that if adequate attention was given to teaching these teachers about BSE, they would indeed be willing to make it a regular practice.

## Conclusion

From the study, most of the respondents were found to be aware of BSE, with the television as the source of information for the majority, though few had good knowledge of BSE. The attitude of teachers to BSE was good and although a large number practiced BSE, they did so incorrectly. It is needful for secondary school teachers to be re-educated both in theory and practical demonstrations on BSE, to clear gray areas in knowledge and improve practice. Health care workers should be more involved in the dissemination of BSE information and information passed on through the mass media should be screened for completeness.

## Conflict of interest

None declared.

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## REFERENCES

- Adebamowo CA, Adekunle OO (1999). Case-controlled Study of the Epidemiological Risk factors for breast cancer in Nigeria. *Br. J. Surg.* 6(5):665-8.
- Adesunkanmi AR, LawalOO, Adelusola KA, Durosimi MA (2006). The severity, outcome and challenges of breast cancer in Nigeria. *Breast* 15(3):399-409.
- Anyanwu SN (2000). Breast cancer in Eastern Nigeria: A ten year review. *WAJM* 19(2):120-5.
- Araoye OM (2004). *Research methodology with statistics for health and social sciences*, 2nd ed. Nathadex publishers, Ilorin.
- Bray F, McCarron P, Parkin DM (2004). The changing patterns of female breast cancer incidence and mortality. *Breast Cancer Res.* 6:229-39
- Chan X, Zheng Y, Zheng W, Gu K, Chen Z, Lu W, ShuXO (2009). The effect of regular exercise on quality of life among breast cancer

- survivors. *Am. J. Epidemiol.* 170:854-62
- Chioma C, Asuzu SRN (2007). Knowledge, attitude and practice of self breast examination among the female students of the University of Ibadan, Nigeria. *Pakistan J. Soc. Sci.* 4(3):400-2.
- Dandash KF, Al-Mohaimeed A (2007). Knowledge, attitudes and practices surrounding breast cancer and screening in female teachers of Buraidah, Saudi Arabia. *Int. J. Health Sci.* 1(1):76-86.
- Demirkiran F, Balkaya NA, Memis S, Turk G, Ozvurmaz S, Tuncyurek P (2007). How do nurses and teachers perform breast self-examination: are they reliable sources of information? *BMC Public Health* 7:96.
- Drakshyani DK, Venkata RP (1994). Teachers' knowledge and practice of breast self examination. *Indian J. Med. Sci.* 48(12):284-7.
- Gwarzo U, Sabitu H, Idris SH (2009). Knowledge and practice of breast self examination among female undergraduate students of Ahmadu Bello University, Zaria, North-Western Nigeria. *Ann. Afr. Med.* 8:55-8.
- Jarvandi S, Montazeri A, Harirchi I, Kazemnejad A (2002). Beliefs and behaviours of Iranian teachers towards early detection of breast cancer and breast self-examination. *Public Health* 116(4):245-49.
- Jebbin NJ, Adotey M (2004). Attitude to knowledge and practice of Breast self examination (BSE) in Port Harcourt. *Niger. Med.* 13(2):166-70.
- Kayode FO, Akande TM, Osagbemi GK (2005). Knowledge, attitude and practice of breast self examination among female secondary school teachers in Ilorin, Nigeria. *Eur. J. Sci. Res.* 10(3):42-7.
- Nur N (2010). Breast cancer knowledge and screening behaviour of the female teachers. *Women Health* 50(1):37-52.
- Odusanya OO (2001). Breast cancer: knowledge, attitudes and practice of female school teachers in Lagos, Nigeria. *Breast J.* 7(3):171-5.
- Onyije FM, Zenebo VC, Oboma YI (2010). Knowledge and practice of breast cancer self examination among female students in tertiary institutions in Nigeria. *Continental J. Biomed. Sci.* 4:75-82.
- Parsa P, Kandiah M, Mohd ZNA, Rahman HA (2008). Knowledge and behaviour regarding breast cancer screening among female teachers in Selangor Malaysia. *Asian Pac. J. Cancer Prev.* 9(2):221-7.
- Salaudeen AG, Akande TM, Musa OI (2009). Knowledge and attitudes to breast cancer and breast self examination among female undergraduates in a state in Nigeria. *Eur. J. Soc. Sci.* 7(3):157-165.
- Tavafiar SS, Hasani L, Aghamolaei T., Zare S, Gregory D (2009). Prediction of breast self examination in a sample of Iranian women: an application of the health belief model. *BMC Women's Health* 9:37.

*Full Length Research Paper*

# A survey of hygiene and sanitary practices of street food vendors in the Central State of Northern Nigeria

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This study examined the general hygiene and sanitary practices of street food vendors in Nigeria. 110 random samples of street food vendors were selected to represent 18% of street food vendors in the study area. Data was collected using pre-test structured questionnaire and observation checklists. The relationships in the factors studied were determined. Food vendors lacked basic training on hygiene and only 2.7% had formal training on food preparation. 63.6% acquired skills from parents while 33.7% acquired skills by self practice. 44.5% of vendors used their mouths to blow air into polythene bags to open, before using it to package foods for customers. 60.0% of the vendors prepared foods in unkempt environment with flies around the foods. The study indicated absence of evidence of relationship between vendors' education and vending location as well as between gender and personal hygiene. This study largely suggested non-compliance with the Codex Alimentarius Commission guidelines for street food control in Africa. The non regulation of street food vending business in Africa especially Nigeria portends danger of outbreak of food poisoning.

**Key words:** Street foods, hygiene, sanitation, vendors, food safety, Kaduna-North Central Nigeria.

## INTRODUCTION

Street foods are ready-to-eat foods prepared and/or sold by vendors and hawkers, especially in streets and other similar public places (Codex, 1999). The other public places include schools, markets and motor parks (Muleta and Ashenafi, 2001). A street food vendor is broadly defined as a person who offers foods for sale to the public without a permanent built up structure but with a temporary static structure or mobile stall-head load/wheel-barrow/truck (Janie and Marie, 2010). Street-

vended foods provide a source of inexpensive, convenient and often nutritious food for urban and rural poor; a source of attractive and varied food for tourists and the economically advantaged; a major source of income for a vast number of persons, particularly women; and a chance for self-employment and the opportunity to develop business skills with low capital investment (Codex, 1999).

In June 1997, the Codex Alimentarius Commission

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adopted revised basic texts on food hygiene and recommended their wide use and understanding by governments, regulatory authorities, food industries, all food handlers and consumers to ensure that food is safe and suitable for human consumption. The general hygienic requirements and practices to be followed by the vendors was also recommended for translation by the relevant authorities into Codes of practice and this was recognized as cost effective tools for the control of street foods, by fully taking into account local conditions including specific risk factors that are relevant to each operation (Codex, 1999).

In contrast to the potential benefits, it is also recognized that street-food vendors are often poor and uneducated and lack appreciation for safe food handling. Consequently, street foods are perceived to be a major public health risk. If a community is to have the full benefits of street-vended foods with minimal risk of food borne disease, government intervention is required to ensure that the standard of safety for such foods is the best attainable in the context of the prevailing local situation. Therefore, it is recommended that authorities undertake Hazard Analysis and Critical Control Point (HACCP) studies to identify and integrate critical control measures into strategies for improving the safety of street foods (WHO, 1996).

A total of 2.5 billion people all over the world eat street foods everyday (Food and Agriculture Organization (FAO), 2007). The world is becoming rapidly more urban and the population of the developing countries is projected to double from 1.7 to 3.4 billion in 2020. Deprivation in urban areas including poverty, food insecurity and malnutrition is increasing faster and urban growth now presents a serious challenge in developing countries (Maxwell et al., 2000). Sale and consumption of street food are on the increase and this will continue to grow (WHO, 2006). In developing countries especially Nigeria, there is a noticeable increase in the number of street food vendors as a result of dwindling economy and unemployment. According to WHO (1984), Bryan et al. (1992) and Ashenafi (1995), food exposed for sale on the streets may become contaminated either by spoilage or pathogenic micro-organisms. Furthermore, it is also reported that street-vended foods have epidemiological links with illness (El-Sherbeeney et al., 1985; Abdulsalam and Kaferstein, 1993; Muinde and Kuria, 2005).

FAO (1997) asserts that street foods raise concern with respect to their potential for serious food poisoning outbreaks and associated health problems like cholera, diarrhea and stomach upset as a result of unhygienic handling of foods and improper sanitary practices. Numerous studies carried out on street foods revealed their tremendous unlimited and unregulated growth which has placed a severe strain on municipal facilities, such as water, sewage system and interference with the city

plans through congestion and littering which adversely affect daily life (Canet and N'diaye, 1996; Chaulliac and Gerbouin-Renolle, 1996).

In the face of the rising population of street food vendors in Africa, the present study presents a survey of hygiene and sanitary practices of street food vendors in the central state of northern Nigeria as determinant of compliance with the Codex Alimentarius Commission guidelines for street food control in Africa.

## MATERIALS AND METHODS

### Study area

This study was carried out in Kaduna, the central state of northern Nigeria (Figure 1). Kaduna is stratified into Kaduna north located to the north of the state and Kaduna south located to the south of the state.

### Study population

According to the 2006 Nigeria population census, the total population of people in Kaduna North was 357,694 while the population in the Kaduna south was 402,390. The total population of the street food vendors in the study area was 611, with 315 (51.6%) of them in Kaduna north and 296 (48.4%) in Kaduna south. Agricultural practice is the main stay occupation of the people in these study areas. The sample size ( $n$ ) for the study was determined as follows:

$$n = \frac{D * Z_{1-\alpha/2}^2 * P(1 - P) * N}{d^2 * (N - 1) + Z_{1-\alpha/2}^2 P(1 - P)}$$

Where  $D$  = design effect = 2.0;  $Z$  = standard normal score corresponding to 95% confidence level = 1.96;  $d$  = degree of precision = 0.007;  $P$  = proportion of people selling street foods in the study area =  $[(760,084)^{-1}]611 = 0.0008$ ;  $N$  = total population of street foods vendor in the study area = 611;  $n$  = sample size. Substitution of the values in the equation for sample size produced  $n = 113$ . There were 3 invalid respondents and hence a sample size of 110 was used for the study.

### Administration of survey instruments

Prior to commencement of the survey, advocacy visits were made to the selected street vendors to solicit for their support and cooperation. This study was conducted through in-depth interview, administration of questionnaires and observational checklists. Two investigators consisting of one interviewer and an assistant in each location administered a pre-test structured questionnaire to each street food vendor to elicit basic socio-demographic details, food handling practices, personal hygiene practices, types of vending sites, storage of food before selling and serving of food, handling and storage of leftovers, water supply and sanitary practices. Eleven street foods that are commonly sold in the study area were selected purposively for the study. Fifty-five street food vendors were selected from each location, representing 17.5 and 18.6% of the total subjects from Kaduna North and Kaduna South, respectively.



**Table 1.** Socio-demographic characteristics, Food handling practices, Care of equipment, Vendor type, Water supply and Skill acquisition of street food vendors.

Parameter	Frequency	Percent
<b>Age (years)</b>		
<30	12	10.9
30-39	62	56.4
40-49	27	24.5
≥50	9	8.2
<b>Sex</b>		
Male	21	19.1
Female	91	80.9
<b>Level of Education</b>		
Primary	45	40.9
Secondary	19	17.3
Tertiary	3	2.7
Qur'an	15	13.6
No Education	28	25.5
<b>Serving of food</b>		
Food served with fork/spoon	35	31.8
Food served with bare hands	75	68.2
Total	110	100
<b>Handling of leftovers (n=47)</b>		
Consumed	9	19.1
Stored for use next day	38	80.9
Total	47	100
<b>Storage of leftovers (n=38)</b>		
Cupboard	13	34.2
Plastic container	23	60.5
Refrigerator	2	4.7
Total	38	100
<b>Cleaning of crockery</b>		
Water with oily appearance	9	8.6
Water with dirty appearance	21	19.5
Water with soapy appearance	9	8.6
No soap used	47	42.7
Clean water used with soap	24	21.8
Total	110	100
<b>Type of vendor</b>		
Stationary	91	82.7
Non-stationary	19	17.3
Total	110	100

<b>Type of vending site</b>		
Head load	8	7.3
Concrete	16	14.5
Mud	2	2.8
Wooden	7	6.4
Canopy	28	25.5
Container	16	14.5
Zinc sheet	22	20.0
Wheel barrow	11	10.0
Total	110	100
<b>Water supply</b>		
Tap	12	13.2
Borehole	3	3.3
Water vendor	52	57.6
Protected well	4	4.4
Unprotected well	20	21.9
Total	110	100
<b>Skill acquisition</b>		
Formal training	3	2.7
Self-practice	37	33.7
Parents	43	39.1
Other vendor	27	24.5
Total	110	100

respectively. The administration of questionnaires to about 18% of the study population selected purposively was carried out by trained interviewer and an assistant interviewer recorded the observation checklist on each vendor. Information was obtained on hygiene and sanitary practices of vendors. No incentives were offered to food vendors for participation in the survey.

#### Statistical analysis

Data collected during field work were entered and analyzed using statistical package for social science (SPSS) for windows version 15.0 (SPSS inc. Chicago, IL, USA) and STATA for windows version 9.0 (STATA 4905 Lakeway, Drive, Texas, 77845, USA) for descriptive statistics (mean, frequency and percentages) of the data. To test the relationship between different sub-groups with respect to hygiene and sanitary practices,  $\chi^2$  test was used for categorical variables.

## RESULTS

Table 1 shows the socio-demographic characteristics, food handling practices, care of equipment, vendor type, water supply and skill acquisition of street food vendors in the Central State of Northern Nigeria. 56.4% of the street food vendors were within 30 to 39 years. 10.9% were

**Table 2.** The level of personal hygiene, food handling and sanitary practices among street food vendors.

Parameter	Kaduna North n=55 (%)	Kaduna South n=55 (%)	Total N=110 (%)	P-value
<b>Hygiene Practices</b>				
Apron used	10 (18.2)	23 (41.8)	33 (30.0)	0.867
Hair covered	35 (63.6)	16 (29.1)	51 (46.4)	
Neat/clean finger nails	29 (52.7)	35 (63.6)	64 (58.2)	
Chewing/talking while serving	37 (67.3)	42 (76.4)	79 (71.8)	
Presence of undressed skin lesion	6 (10.9)	2 (3.6)	8 (7.3)	
Food exposed to flies	33 (60.0)	24 (43.6)	57 (51.8)	
<b>Food Handling Practices</b>				
Foodstuff washed once before cooking	34 (61.8)	47 (85.5)	18 (73.6)	0.054
Foodstuff washed properly before cooking	17(30.9)	26(47.3)	43 (39.1)	
Food prepared on same point several times	49 (89.1)	44 (80.0)	93 (84.5)	
Oil re-use for frying several times	15 (27.3)	19 (34.5)	34 (30.9)	
<b>Surrounding of vending site</b>				
Not clean	29 (52.7)	37 (67.3)	66 (60.0)	0.412
Clean	11 (0.2)	14 (0.25)	25 (22.7)	
<b>Waste disposal method</b>				
On the street/road	11 (20.0)	15 (27.3)	26 (23.6)	0.151
Drainage/Gutter	16 (29.1)	15 (27.3)	31 (28.2)	
Bush	3 (5.5)	8 (14.5)	11 (10.0)	
Waste bin	17 (30.9)	25 (45.5)	42 (38.2)	

P-value of <0.05 was considered statistically significant.

less than 30 years and 8.2% of the vendors were above 50 years. Majority of the vendors (80.9%) were women. 66.4% of the street food vendors had either primary or no education. Only 2.7% of them had tertiary education. 19.1% of vendors said leftover foods are consumed by households and only 4.7% of vendors who stored leftover foods for sale kept them in refrigerators. 18.9% kept left over foods in containers and cupboard. 45.5% of the vending sites were canopies with zinc sheet. Only 4% of the vending sites were concrete structures. 14.5 and 8.2% were made of mud and wooden structures, respectively. 57.6% of vendors obtained water from water vendors and only 49.9% of the vendors had access to clean water. 21.8% of them used soap with clean water to wash cooking utensils and plates. 19.5% cleaned their crockery with dirty water and 8.6% of them recycled wash water. 63.6% of vendors acquired skills from parents and other vendors while 33.7% acquired skills by self-practice.

Table 2 shows the level of personal hygiene, food handling and sanitary practices among the street food vendors in the central state of northern Nigeria. The data

indicate 53.6% of the vendors did not cover their hair, 7.3% had undressed wounds and many of the vendors exposed foods to flies. Vendors used mouth to blow air into polythene to open before using it to package food for their customers and 93.1% of the vendors held money while serving food. More than 50% of the vendors did not use apron. Many of the vendors engaged in chewing and talking while serving food. More than half of the vendors kept their finger nails clean and 60% of the vendors prepared food in an unclean environment with flies all over the place. Some of the vendors' stalls were located close to their dump site. 73.6% of vendors did not wash their foods properly before cooking and less than 40% of the vendors used waste bin to keep their waste while the rest dumped wastes on streets, major roads and drainage channels.

## DISCUSSION

During the survey, it was discovered that out of all the 611 total number of street food vendors in the study area,

about 71% of them have been in the food vending trade for about 5 years while in the recent time (less than a year), over 29% of the vendors joined the vending trade. These findings are consistent with the reported noticeable increase in street food vending in developing nations (WHO, 2006). 56.4% of the street food vendors sampled were within the age group of 30 to 39 years while 10.9 and 8.2% of the vendors were less than 30 years and 50<sup>+</sup> years, respectively. However, this study observed very low involvement of people under the age of 30 years and 50+ years, in the food vending trade. Majority of the vendors were women with mean age of 38.21 years and frequency of 91 (Table 1). This indicates that food vending business is predominantly practiced by women while 19.1% of the street food vendors were men with mean age of 37.43 years and frequency of 21. This is corroborated by the findings of Comfort (2010) and Odonkor et al. (2011).

Educationally, 66.4% of the street food vendors had either primary or no education. Only 2.7% of them had tertiary education qualification, with a frequency of 3 (Table 1). The low level of education is likely to promote lack of appreciation for food handling practices and presents potential risk to food safety.

### **Type of vendor**

Of all the street food vendors interviewed, only 17.3% were mobile with a frequency of 19, while the others maintained temporary static structures or stationary posts as also reported by Janie and Marie (2010).

### **Vending site type**

Almost half (45.5%) of the vending sites were made of either canopy or zinc sheets. Only 4% of the vending sites were made of block structure while 2.8 and 6.4% were made of mud and wooden structure, respectively.

### **Food handling practices**

Hygiene practices of vendors during handling, cooking and serving of foods were monitored. It was observed that 73.6% of vendors did not wash the raw foods properly before cooking (Table 2). Vendors selling grilled fish, roasted meat/chicken and chips washed their raw foods once and no rinsing before cooking, due to shortage of water. Similarly, fruits vendors did not wash their fruits properly and the portability of the purity water they use cannot be guaranteed. It was also observed that 84.5% of food vendors prepared foods on same surface several times without cleaning the surface (Table 2).

Remnants of processed food items were seen on the surfaces even when not in use. Vendors who sold fried yam, fried plantain, bean cakes, maize cake, grilled fish and chips prepared these foods on same surface without regard for hygiene. 30.9% of the vendors embarked on oil re-use practice for several frying incidents (Table 2). This practice may reduce oil nutritional value and also made the oil dark in colour because of the carbon deposit in the cause of frying food stuff and consequently affects the odour and taste of the food. Only 31.8% of the vendors served foods with fork/spoon and 68.2% served their foods with bare hands (Table 1). Some vendors were observed chewing and talking while cooking or serving foods. This act is capable of introducing saliva into foods being cooked or served. Majority (86.5%) of the subjects interviewed were handling money while serving food and this increases the possibility of currencies being rubbed on foods. 60.9% of the vendors did not have provision for heating their foods to keep it warm before serving. Some vendors selling fried yam, plantain and chips served their foods into plates that were not properly washed.

### **Personal hygiene practices of the vendors**

It was found from the data gathered that 53.6% of the vendors did not cover their hair and 7.3% of them had undressed skin lesion (Table 2). 51.8% of the vendors exposed foods to flies. 44.5% of vendors used mouth to blow air into polythene bags to open before using it to package foods for customers. Most of the vendors selling fried yam, plantain and bean cakes packaged the foods in mouth-blown polythene bags that may be contaminated. More than two-third of the vendors interviewed did not use apron. Slightly above half (58.2%) of the respondents kept their finger nails clean (Table 2).

### **Handling, storage of leftovers**

Majority of the vendors displayed foods in trays without cover (Table 2). 42.7% of the street food vendors surveyed revealed that they usually have leftovers. 19.1% of them said the leftover foods are consumed by their households. Only 4.7% of vendors who stored left-over foods for sale next day kept them in refrigerator. 18.9% kept them either in a container or cupboard (Table 1). These poor storage facilities may enhance contamination by pathogenic micro-organisms.

### **Water supply**

The results of the survey indicate supply of municipal water to the study area was not regular and sometimes

not available for days. Hence, accessibility to water source around the vending sites was very poor. 57.6% of the food vendors surveyed obtained water from water vendors who usually carried water from unknown sources in plastic containers of 15 to 20 liters capacity for sale. In attempts to cut cost, food vendors buy limited quantities of water and hence have insufficient water for washing their crockery and food stuff.

### Cleaning of crockery

It was observed that due to epileptic water supply in the study area, only 49.9% of the vendors had access to clean water and only 21.8% of them used soap with clean water to wash their cooking utensils and plates. 19.5% of the food vendors cleaned their crockery with dirty water while 8.6% of them reused water (with oily appearance) to wash crockery (Table 1). We also observed the absence of evidence of relationship ( $p > 0.05$ ) between gender and personal hygiene of vendors and this indicates that gender may not determine the level of personal hygiene practices amongst the food vendors surveyed.

### Surrounding of vending site

Sixty percent of the interviewed vendors prepared their food in an unclean environment with the presence of flies all over the place and some of the stalls were located very close to dump sites in attempt to avoid obstruction within the vending area (Table 2). The results of this study also indicate absence of evidence of relationship ( $p > 0.05$ ) between the level of education of vendors and sanitation of vending sites. This suggests that the education of the vendors may not impact the sanitary practices of the vendors when compared to their counterpart with lower educational achievement. On knowledge acquisition of food vending practices, the results indicate majority of the food vendors lacked basic training on hygiene and only three (2.7%) had formal training on food preparation. Seventy vendors (63.6%) acquired skills from parents and other vendors while thirty seven vendors (33.7%) acquired skills by self-practice (Table 1).

### Waste disposal method

The method of waste disposal used by the food vendors is deplorable because less than one-quarter of the vendors used waste bin to keep their waste while the rest used streets, major roads and gutters as their waste disposal points. On the relationships between personal hygiene practices, food handling practices, surrounding

of vending sites, waste disposal methods and locations of vendors, we obtained the P-value of 0.867, 0.054, 0.412 and 0.151 respectively, which indicates absence of evidence of relationship ( $p > 0.05$ ) between personal hygiene practices, food handling practices, surrounding of vending sites, waste disposal methods and locations of vendors (Table 2).

This study has shown that the street foods in the central state of Northern Nigeria have become popular amongst the urban dwellers because of easy access and their affordability when compared to hotels and restaurants. The many ethnic groups in the study area present varieties of vended foods and thus represent a mixed cuisine. The study revealed that the food vendors served more than 83 different types of foods that cut across the major ethnic groups in Nigeria. The customers of street foods in the study area include high class businessmen, office workers, apprentices, low income earners, school children and homeless beggars, popularly known as *almagaris*. This indicates that a substantial population of the study area depends on street vended foods.

The vendors that were observed to be serving food with bare hands could promote contamination and introduction of pathogenic microbes on foods if their hands were not properly washed. Vendors that were chewing and talking while serving foods stand the risk of introducing harmful micro-organisms that can trigger food-borne infections especially if the vendor is already a carrier of such organisms like tuberculosis bacteria. Money exchanges a lot of hands and as such may be carriers of harmful organisms. The vendors observed handling money while serving food and this may introduce contaminants through hand contact with the food. The presence of undressed skin lesion possessed by some food vendors especially those with discharges are important risk factor in food contamination and occurrence of food poisoning. This is because discharge from this lesion can easily come in contact with the food or utensils that are used to serve foods. The surrounding flies can transfer pathogens from the infected lesion unto food or utensils.

WHO (1984) recommended that no food handlers with skin lesion should be allowed to handle food unless the lesion is aseptically kept or such vendor has had proper medical treatment. Foods were exposed to flies and this could result to epidemiological disease outbreak like cholera (Ashenafi, 2009). Foods that were stored in container/cupboard other than refrigerator are likely to be contamination by pathogenic micro-organisms and associated with reduced quality (WHO, 1984; Bryan et al., 1992; Mensah et al., 2002). The oily appearance of water used for washing the crockery confirms the wash water reuse practice amongst the vendors surveyed. WHO (1996) reported that one of the most critical challenges in street food vending is the supply of water of

acceptable quality and sufficient quantity for drinking, washing of raw food materials, cleaning of crockery and surrounding of the sites. Studies carried out on street food vending in various parts of the world particularly in developing countries, where epileptic water supply is usually observed also reported wash water reuse (Abdul-Salam and Kafarstein, 1993).

All the fruit vendors did not keep their fruits in the refrigerator after preparation and fruits were displayed openly on tray for sale. According to WHO (1996), eating of fruits that are not properly washed or kept in refrigerators often result in food poisoning because fruits stored at ambient temperatures favour the growth of microbes and quickly proliferate to disease producing level.

## Conclusion

This study generally observed that food vendors in the central state of northern Nigeria were only concerned with profit making at the expense of standard food hygiene and sanitary practices. The findings of the study largely suggest non-compliance with the Codex Alimentarius Commission guidelines for street food control in Africa. The danger in the event of any outbreak of food related epidemic disease in the central state of northern Nigeria is the ease of spread to other African countries because of proximity. In order to maintain the benefits of street-vended food while assuring the safety of the food sold, authorities must implement policies aimed at assisting, controlling and maintaining the street food sector. The policy should be implemented in relation to an integrated consultation with vendors and consumers in order to meet the needs of government, consumers and vendors. Documentation and licensing of food vendors would enable authorities to identify persons employed in such enterprises and the types of food sold. This effort is likely to enable an opportunity to give food handlers advice and training in food safety.

## Conflict of Interests

The author(s) have not declared any conflict of interests.

## REFERENCES

- Abdulsalam M, Kafarstein FK (1993). Safety of street foods. *World Health Forum* 14:191-194.
- Ashenafi M (1995). Bacteriological profile and temperature of ready-to-serve food items in an open market in Awassa, Ethiopia. *Trop. Goegr. Med.* 47:1-4.
- Bryan FL, Teufel P, Riaz S, Roohi S, Qadar F, Malik Z (1992). Hazards and critical control points of vending operations at a railway station and a bus station in Pakistan. *J. Food Prot.* 55:334-541.
- Canet C, N'diaye C (1996). Street foods in Africa. *Foods, Nut. and Agric.* 17/18, Rome 18.
- Chaulliac M Gerbouin-Renolle (1996). Children and street foods. *Foods Nutrition and Agriculture* 17/18. FAO, Rome.
- Codex International Food Guidelines (1999). Revised Regional Guidelines for the Design of Control Measures for Street-Vended Foods in Africa. CAC/GL-22R. WHO/FAO, Rome. 22p.
- Chukwuezi CO (2010). Food Safety and Hygienic Practices of Street Food Vendors in Owerri, Nigeria. *Studies Soc. Sci.* 1(1):50-57.
- El-Sherbeeney MR, Saddik MF, Bryan FL (1985). Microbiological profile of foods served by street vendors in Egypt. *Int. J. Food Microbiol.* 2:355-362.
- FAO (1997). Street foods. Food and Agriculture Organization Report, Rome. pp. 1-4.
- FAO (2007). Promises and challenges of the informal food sector in developing countries. Food and Agriculture Organization, Rome. Retrieved on 20<sup>th</sup> May, 2013.
- Janie P, Marie T (2010). Street food in Kolkata- A hygienic perspective Project in practice 400040, Blok 3.
- Maxwell DG, Levin CE, Armar-Klimesu M, Ruel MT, Morris SS, Ahiadeke C (2000). Urban livelihood and food and nutrition security in greater Accra, Ghana. *International Food Policy Research Institute, report* 112.
- Muinde OK, Kuria E (2005). Hygienic and Sanitary practices of vendors of street foods in Nairobi, Kenya. *Afr. J. Food Agric. Nutr. Dev.* 5(1).
- Muleta D, Ashenafi M (2001). Salmonella, Shigella and Growth potential of other food-borne pathogens in Ethiopian street vended foods. *East Afr. Med. J.* 78(11):576-580.
- Mensah P, Yeboah-Manu D, Owusu-Darko K, Ablordey A (2002). Street foods in Accra, Ghana: how safe are they? *Bull. World Health Organ.* 80(7): 546-553.
- Odonkor ST, Adom T, Boatın R, Bansa D, Odonkor CJ (2011). Evaluation of hygiene practices among street food vendors in Accra metropolis, Ghana. *Elixir Food Sci.* 41:5807-5811.
- WHO (1984). The role of Food and Safety in Health and Development: Report of a joint FAO/WHO Expert Committee on Food Safety. *Technical Report Series.* 705:30-35.
- WHO (1996). Food Safety Issues: Essential Safety requirements for street foods. *World Document WHO/FNU/FOS/96.7.* WHO, Geneva.
- WHO (2008). Street food vending in the Region: Food Safety Challenges. *AFRO Regional Food Safety Newsletter.* pp. 5-8.

*Full Length Research Paper*

# Vaginal douching behavior among young adult women and the perceived adverse health effects

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Several health belief models suggest that health risk perception could enhance behavioral modification to reduce lifestyle-related risks. Perceived health risks associated with vaginal douching (VD), propensity to douche and effects on douching behaviors were assessed in a cross-sectional survey of 1,463 female undergraduates, aged 18 to 35 years, randomly selected in a tertiary institution between 2011 and 2012. A 3-section semi-structured socio-demographic questionnaire on female genital tract hygiene practice was used for data collection. We conducted logistic regression analysis to test for association between douching and perceived health risk. The overall prevalence of VD was 79.2%. Most douchers (79.8%) lacked knowledge of risks associated with VD, 78.3% had misbeliefs about VD, 76.0% accepted the practice, 50.6% would have stopped if they had known the associated risks and 56.4% expressed fear of genital tract infections if they stopped douching. False beliefs and lack of knowledge about the health risks associated with VD increased the odds of douching among douchers ( $p < 0.05$ ). Low health risk perception and misconceptions about VD are the primary reasons for douching. Therefore, providing health education on the associated health risks of VD to female adolescents and young adult women may help to discourage VD among women in our societies.

**Key words:** Vaginal douching, perceived health effects, young women.

## INTRODUCTION

Although vaginal douching (VD) can be dated back 3,000 years (Farage and Lennon, 2006), it was not until 1902 that the practice gained widespread acceptance and popularity, when Joseph Greer opined that "every part of the body should be as clean as the face" in his book on female hygiene (Blumberg, 1997; Merchant et al., 1999). This statement propelled various commercial media to encourage douching as the solution for young women who were not feeling clean, fresh and confident during

their menstrual periods.

Today, the practice has gained overwhelming worldwide acceptance, with over 25% of women douching regularly and nearly 73% douching at some point in their lives (Aral et al., 1992; Zhang et al., 1997; Funkhouser et al., 2002). This practice has gained popularity despite numerous adverse health effects and public health efforts have been insufficient to educate women, especially adolescent and young adults who are among the most

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vulnerable and susceptible groups about the risks for adverse health. Previous research findings have shown that the intra-vaginal liquid irrigation process is more prevalent among blacks than whites, that it is often initiated at a young age and that it commences earlier when compared to older generations of women (Aral et al., 1992; Zhang et al., 1997; Merchant et al., 1999; Funkhouser et al., 2002). Research literature has also shown that early onset of douching is associated with acquaintance with someone who douches regularly, the belief that douching prevents sexually transmitted diseases and sexual debut at a young age (Oh et al., 2003). Anecdotal evidence suggests that those who begin douching at an earlier age are more likely to become frequent douchers and those who douche more than once a month are more likely to remain frequent douche product users than those who begin later (Oh et al., 2003).

Similarly, several lines of evidence suggest that adolescents and young adults who douche are more likely to contract sexually transmitted infections (STIs) and suffer from pelvic inflammatory disease (PID) and sequelae, including chronic pelvic pain, pelvic adhesions, pyosalpinx, tubo-ovarian abscesses, ectopic pregnancies and infertility, than older adults (Oh et al., 2003; Martino et al., 2004). The exocervix epithelium of adolescents is more susceptible to sexually transmitted infective agents (bacteria, viral and fungal) than adults. This increased sensitivity is largely due to the exocervix's larger transformation zone and changes in reproductive hormone levels during adolescence and young adulthood that induce considerable physical and tissue changes and may increase vulnerability to STIs (Aral et al., 1992; Zhang et al., 1997; Merchant et al., 1999; Funkhouser et al., 2002; Oh et al., 2003; Martino et al., 2004; Krashin et al., 2012). Existing research suggests that women may douche for various reasons, including treatment of vaginal symptoms (for example, vaginal odor, vulvar itching, vaginal discharge and inter-menstrual bleeding), for general hygiene, cleaning after menstruation, before and after sexual intercourse and as a contraceptive measure (Sweet, 2000; Ness et al., 2002; Martino and Vermund, 2002). However, worldwide, the primary reason for douching is its use as a hygienic measure, even though it is also potentially harmful (Rosenberg et al., 1991; Simpson et al., 2004). Cultural beliefs may also form a compelling reason for douching. Douching behavior is more common among blacks of African descent, most likely because some cultural beliefs and practices in Africa accept and encourage it (Lichtenstein and Nansel, 2001; Vermund et al., 2001). Several authors have suggested that VD is most likely to be practiced by women who are unmarried, less educated, with lower incomes, or with higher numbers of lifetime partners, as they may douche to please their male partners (Aral et al., 1992; Ness et al., 2003).

Epidemiological evidence suggests widespread heterogeneity in douching practice among countries, races, tribes and ethnic groups with regards to the frequency, technique and fluid used (Misra et al., 2006). For instance, while in some countries women douche once a month, in others, sporadic douching has been reported; however, a frequency of once per week is more common (Ness et al., 2003). This may also explain the varying prevalence of VD recorded by different studies.

Previous research findings suggest that frequent douching might be associated with an increase in gynecologic disorders such as PID, reduced fertility, cervical cancer and sexually transmitted diseases, including HIV (Peters et al., 1986; Gerdner et al., 1991; Baird et al., 1996; Holzman et al., 2001; Fonck et al., 2001; Foch et al., 2001; Harry, 2005). Adverse reproductive outcomes associated with VD include preterm delivery, low birth weight, ectopic pregnancy and infertility (Kenkel, 1991; Martino and Vermund, 2002). These negative health effects have been shown to be exacerbated by an increased frequency of douching (Hseih et al., 1996; Jones and Kirigia, 1999). Despite the numerous adverse health effects of VD in women, there are generally no public health programs to educate the populace, especially those at a higher risk of practicing douching (that is, the less educated, women with low socio-economic status, young, black, unmarried and urban dwellers). Some women may not perceive it as a harmful behavior, while others may see it as a protective hygienic practice, as consistently documented in the literature (Lichtenstein and Nansel, 2001; Foch et al., 2001; Martino et al., 2004). These women may be unaware of the adverse health consequences of VD and therefore continue in the act. In this study, we assessed the relationship between perceived health risks associated with VD and the propensity to douche and the effect of education on douching behaviors of young adult school women.

## METHODOLOGY

### Participants

We used a simple random sampling technique to conduct a cross-sectional study of 1,572 female undergraduates aged 18 to 35 years recruited between September, 2011 and February, 2012. The choice of this sample size was based on the total number of female students in the University (5,648) and the prevalence of VD (65%) obtained during a previous pilot survey at a sister institution within the same geographical area. Sample size was calculated using Epi Info™ version 6 (Centers for Disease Control, Atlanta GA, USA) at 95% confidence interval. From the initial number, 109 respondents were excluded due to age outside of the study range and inadequate questionnaire responses. Others declined to participate in the study because they were not students of the institution. The Institutional Research Ethics Committee approved the study protocol and informed consent was obtained from each respondent before participation in the study.

## Measures

For this survey, respondents completed a 3-section semi-structured socio-demographic questionnaire on female genital tract hygiene practice prepared by the authors as described previously (Foch et al., 2001). The questionnaire gathered information on the experiences and opinions of the respondents relating to VD, focusing on perception, practice and knowledge about its adverse health effects. This study defined VD as any intravaginal irrigation with water or any other fluid mixture. The first section of the questionnaire contained 8 questions structured to obtain information regarding participants' age (years), marital status, area of residence, toilet facility, ethnicity, smoking habit, alcohol use and parents' socioeconomic status.

The second section contained 5 items to gather information regarding respondents' douching status. All women were asked if they had ever douched; if the answer was "yes," they were asked to state the last time they had douched. Based on this information, respondents were divided into 3 groups: (1) current douchers, that is those who reported douching at least once in 2 months prior to the survey; (2) former douchers, that is those who reported douching at some point in the past but had not douched in the past 2 months; and (3) never douchers, that is those who reported that they had never douched. Current and former douchers were merged and grouped as douchers to stratify the douching status as douchers and non-douchers.

The third section of the questionnaire contained 17 questions to obtain information regarding respondents' perception, practice and knowledge of the adverse health risks related to VD. This section contained open-ended questions to assess respondent perceptions on the practice of douching and included questions such as: How would you grade your agreement with the practice of douching (completely agree, partly agree, or disagree)? How did you learn about douching? Why do women douche in your opinion? Do you think there could be adverse health consequences following douching? Will you stop if you learn that douching has adverse health effects? Questions about douching practice focused on the age at first douche, frequency, duration, reasons and fluid used for douching. Questions on the duration of fluid flow exposure during douching, duration from first douche and technique with respect to placement of the nozzle of tube in the vagina during douching were also asked. Additionally, open-ended questions assessed respondents' knowledge on the adverse health effects of douching such as PID, STI, cervical cancer, ectopic pregnancy, infertility, and menstrual irregularities. Respondents who provided correct answers to the questions were regarded as having good knowledge.

## Analyses

Data obtained were analyzed descriptively using simple percentages and the relationships between categorical variables were tested using the Chi-square test. Multiple logistic regression analysis was used to test for any association between douching and risk factors. Based on these models, odds ratio and 95% confidence interval (CI) for odds ratio (OR) were computed. Statistical computations were performed using statistical package for social sciences (SPSS 17.0). All  $p < 0.05$  were considered statistically significant.

## RESULTS

The socio-demographic variables of the 1,463 women

included in the analyses showed that 19.8% were between 18 and 24 years of age, 78.5% were between 25 and 30 years of age and 1.7% of respondents were between 31 and 35 years of age. In addition, 87.8% were single while 12.2% were married. Off-campus residence was reported by 41.4% of respondents, while 58.6% resided in a hostel. Additionally, 78.3% were of Ibibio ethnicity, 65.5% had parents with secondary levels of education, 52.3% had parents who were unemployed and 63.5% used public toilet facilities. The study also showed that the overall prevalence of VD was 79.2%. There were statistically significant matched-pair differences between douchers and non-douchers, with higher prevalence of douching found among those who were single (85.2%), aged between 25 and 30 years (80.9%), non-smokers (95.7%), hostel residents (55.5%), of Ibibio ethnicity (80.6%), users of public toilet facilities (60.7%) and those with unemployed parents (55.0%) ( $p = 0.001$  for all). However, non-significant matched-pair differences were found among respondents who consumed alcohol (50.2%) and whose parents had secondary levels of education (64.7%) ( $p = 0.998$  and  $0.388$ , respectively) (Table 1).

Most of the respondents (78.3%) felt that douching was a normal female hygiene measure and therefore completely accepted (76.0%) the practice that was first recommended to them by their mothers (54.2%). The majority (56.4%) of the respondents felt that douching could prevent infections and would probably stop if they knew that douching is associated with adverse health consequences (50.6%) (Table 2). More than half (54.5%) of the douchers had been douching for more than 4 years and 37.9% of them started the practice between 12 and 17 years of age. The percentage of those who douched more than 4 times per week was 35.3% and those who usually douched with water and soap was 66.1%; further, 36.2% of our subjects reported that each douching usually lasted for more than 10 min (Table 3).

Results of multiple logistic regression showed that the chances of douching were about 2 times higher for single respondents than for married respondents (OR = 1.92, 95% CI: 1.903 to 4.092) and for students who lived in the hostel (OR = 1.96, 95% CI: 1.945, 4.053). Prevalence was approximately 3 times higher in those who used public toilet facilities (OR = 2.91, 95% CI: 1.747, 4.847). Similarly, higher odds for douching (OR = 3.38, CI: 1.62, 7.060) were noted among those with multiple sexual partners (Table 4). Table 5 shows the distribution of respondents based on their knowledge of the potential adverse health outcomes of VD. There were statistically significant differences in the number of douchers and non-douchers with poor knowledge of adverse health effects of douching ( $p < 0.001$ ). More douchers than non-douchers had poor knowledge of PID, sexually transmitted diseases, cervical cancer, ectopic pregnancies

**Table 1.** Socio-demographic characteristics of douchers and non-douchers.

Demographic characteristics of respondents	Total no. of respondents (1463)	No. of douchers (1159)	No. of non-douchers (304)	p value
<b>Age (Years)</b>				
18 - 24	290 (19.8)	203 (17.5)	87 (28.6)	< 0.001***
25- 30	1148 (78.5)	937 (80.9)	211 (69.4)	
31 - 35	25 (1.7)	19 (1.6)	6 (2.0)	
<b>Marital status</b>				
Single	1285 (87.8)	987 (85.2)	298 (98.0)	< 0.001***
Married	178 (12.2)	172 (14.8)	6 (2.0)	
<b>Area of residence</b>				
Off-campus	605 (41.4)	516 (44.5)	89 (29.3)	< 0.001***
Hostel	858 (58.6)	643 (55.5)	215 (70.7)	
<b>Toilet facility</b>				
Private	534 (36.5)	455 (39.3)	79 (26.0)	< 0.001***
Public	929 (63.5)	704 (60.7)	225 (74.0)	
<b>Tribe</b>				
Ibibio	1145 (78.3)	934 (80.6)	211 (69.4)	< 0.001***
Non-Ibibio	318 (21.7)	225 (19.4)	93 (30.6)	
<b>Respondents' smoking habit</b>				
Non-Smokers	1290 (88.2)	1109 (95.7)	181 (59.5)	< 0.001***
Smokers	173 (11.8)	50 (4.3)	123 (40.5)	
<b>Respondents' alcohol usage</b>				
Drinkers	734 (50.2)	582 (50.2)	152 (50.0)	0.998
Non- drinkers	729 (49.2)	577 (49.8)	152 (50.0)	
<b>Parents' level of education</b>				
Not educated	91 (6.2)	74 (6.4)	17 (5.6)	0.388
Primary	61 (4.2)	53 (4.6)	8 (2.6)	
Secondary	958 (65.5)	750 (64.7)	208 (68.4)	
Tertiary	353 (24.1)	282 (24.3)	71 (23.4)	
<b>Parents' employment status</b>				
Employed	698 (47.7)	521 (45.0)	177 (58.2)	< 0.001***
Unemployed	765 (52.3)	638 (55.0)	127 (41.8)	

\*\*\* $p < 0.01$  Significant at 0.1%.

and infertility as possible adverse health effects of douching.

## DISCUSSION

This study assessed the effect of knowledge on the

adverse health outcomes of VD on the douching behavior of young female adults in a tertiary institution. This was based on the hypothesis that having a good knowledge of the harmful health consequences of VD could help women decide not to douche. Several health belief models suggest that health risk perception could enhance behavioral

**Table 2.** Respondents' perception about vaginal douching.

<b>Douching perception variable</b>	<b>No. of respondents</b>	<b>Percentage (%)</b>
<b>Acceptance of douching practice</b>		
Complete	1112	76.0
Partial	47	3.2
Not accepted	304	20.8
<b>How did you learn about douching?</b>		
Mother	628	54.2
Other family relatives	396	34.2
Friends	76	6.6
Mass media	19	1.6
Self motivated	40	3.4
<b>Opinion about the practice of douching</b>		
Abnormal	318	21.7
Normal	1145	78.3
<b>Awareness of adverse health effects of douching</b>		
Yes	296	20.2
No	1167	79.8
<b>Perceived consequences of having to stop</b>		
Nothing	35	3.0
Feels less clean	307	26.5
Less sexually attractive	163	14.1
More likely to be infected	654	56.4
Less likely to be infected	0	0
<b>Possibility of stopping</b>		
Would never stop	260	22.4
Could stop anytime there is need	120	10.4
If advised to stop by a health professional	192	16.6

modification to reduce lifestyle-related risk (Kenkel, 1991; Hseih et al., 1996; Jones and Kirigia, 1999; Kan and Tsai, 2004). In Viscusi 1991, reported that smokers are less likely to smoke as their subjective risk for dying of lung cancer increases. Of particular interest was the fact that most smokers with good knowledge about the risk over-estimated it, a finding corroborated by Rovira et al. (2000) in Taiwan and Spain and Nyaruhucha et al. (2003) in an obese population in Tanzania.

In a similar manner, the present study findings show that health risk perception and misconception about VD are the primary reasons for douching and are consistent with results from other studies (Oh et al., 2003). In previous studies, most douchers stated that they would have stopped douching if they knew about its adverse

health consequences (Braunstein and de Wiggert, 2003; Kukulu, 2006). Funkhouser et al. (2002) found that women who received advice from a health care advisor to discontinue douching often discontinued the practice. Similarly, Cottrell (2005) reported that women who had been informed by a healthcare professional were less likely to have douched within the past 6 months than women who were not given this information. Ness et al. (2002) further confirmed this observation. In their study, over 85% of women indicated that they would have stopped the practice if they had been told that VD might cause STIs, infertility or cancer. This study also showed that past attempts to stop or reduce VD through educational efforts of health care professionals were associated with both fewer perceived adverse health consequences

**Table 3.** Respondents' douching practice.

<b>Douching practice variable</b>	<b>No. of douchers (1159)</b>	<b>Percentage (%)</b>
<b>Age at 1st douche</b>		
<12 years	70	6.0
12-17	439	37.9
18-20	414	35.7
>21	236	20.4
<b>Frequency of douching/week</b>		
Once per week	167	14.4
2 times per week	268	23.1
3-4 times per week	315	27.2
>4 times per week	409	35.3
<b>Douching fluid used</b>		
Water only	155	13.4
Water and soap	766	66.1
Commercial vaginal deodorant	193	16.6
Others (vinegar shampoo)	45	3.9
<b>Duration from 1<sup>st</sup> douche (Year)</b>		
<1 year	175	15.1
1-3 years	352	30.4
4-6 years	428	36.9
≥6years	204	17.6
<b>Duration of fluid flow exposure during douching (min)</b>		
1-5	342	29.5
6-10	398	34.3
>10	419	36.2
<b>Placement of the nozzle of tube during douching</b>		
Right inside vagina	0	0
Half way inside vagina	98	8.5
At the vaginal opening (introitus)	349	30.1
Missing	712	61.4
<b>Reasons for douching</b>		
After menstruation	187	16.1
After sexual intercourse	80	6.9
After using toilet	105	9.0
When not feeling fresh	89	7.7
To relief vaginal symptoms	76	6.6
During bathing	578	49.9
General hygiene	44	3.8
Prevent pregnancy	0	0

from douching and geographical location. In addition, health education in the United States caused a reduction in the prevalence of VD from 37 to 27% between 1988 and

and 1995 (Braunstein and de Wjgert, 2003).

Consistent with results of previous studies, we found significant associations between age, marital status, area

**Table 4.** Multiple logistic regression showing association between vaginal douching and respondents' characteristics.

<b>Risk factor for douching</b>	<b>Odds ratio</b>	<b>95% Confidence interval</b>	<b>p value</b>
<b>Marital status</b>			
Married	1.00		
Single	1.92	1.903-4.092	0.040*
<b>Age</b>			
18-24	1.96	1.713-4.562	
25-30	1.80		0.038*, 0.046*
31-35	1.00	1.781-4.909	
<b>Area of residence</b>			
Off-campus	1.00		
Hostel	1.96	1.945-4.053	0.041*
<b>Toilet facility</b>			
Private	1.00		
Public	2.91	1.747-4.847	< 0.001***
<b>Number of Sexual partners</b>			
None	1.00		
1-2	3.16	1.292-7.7718	0.012**, 0.001**
Above 2	3.38	1.621-7.060	
<b>Alcohol usage</b>			
Non-drinkers	1.00		
Drinkers	0.932	0.516-1.674	0.814
<b>Smoking habit</b>			
Non-smokers	1.00		
Smokers	1.25	0.723-2.166	0.423

\* $P < 0.05$ , Significant at 5%, \*\* $P < 0.01$ , Significant at 1%, \*\*\* $P < 0.001$ , Significant at 0.1%.

of residence, toilet facilities, ethnicity, smoking habits, parents' employment status and the practice of douching (Misra et al., 2006; Kukul, 2006; Cotrell and Close, 2008). Single participants who smoked were between 25 and 30 years of age, lived in off-campus residences, used public toilets and had more than 2 sexual partners, had higher odds for VD. However, conflicting findings can be found in the literature and reflect the heterogeneity in the practice between countries, races, tribes or ethnic groups and are likely influenced by cultural beliefs about douching (Arbour et al., 2009). These beliefs could influence the age at onset of douching, duration and frequency of douching, reasons for douching and the douching fluid as well as the technique used. For example, in some studies, adolescent women were found

to douche more frequently than older women, whereas in others, older women were found to douche more frequently than younger women (Blumberg, 1991; Abma et al., 1997; Sakru et al., 2006; Arbour et al., 2009).

As previously documented, participants most commonly used water as a douching fluid, but most respondents preferred soapy water, likely because water and soap are readily available and most douche while bathing or performing ablutions (Abma et al., 1997; Sakru et al., 2006; Sen and Mete, 2009). In addition, most douchers in this survey commenced douching between the ages of 12 and 20 years and reported douching more than 4 times per week. Most had douched for 3 to 6 years since the first douche, with each douching lasting for more than 10 min. This age bracket corresponds with

**Table 5.** Distribution of douchers and non douchers based on knowledge of adverse health effects of douching.

<b>Awareness of adverse health risks</b>	<b>Total no of respondents (1463)</b>	<b>No. of douchers (1159)</b>	<b>No. of non- douchers (304)</b>	<b>P value</b>
<b>PID</b>				
Good	135 (9.2)	35 (3.0)	120 (39.5)	<0.001***
Poor	1328 (90.8)	1124 (97.0)	184 (60.5)	
<b>STI</b>				
Good	503 (34.4)	205 (17.7)	298 (98.0)	<0.001***
Poor	960 (65.6)	954 (82.3)	6 (2.0)	
<b>Cervical cancer</b>				
Good	96 (6.6)	27 (2.3)	69 (22.7)	< 0.001***
Poor	1367 (93.4)	1132 (97.7)	235 (77.3)	
<b>Ectopic pregnancy</b>				
Good	52 (3.6)	11 (0.9)	41 (13.5)	<0.001***
Poor	1411 (96.4)	1148 (99.1)	263 (86.5)	
<b>Infertility</b>				
Good	28 (1.9)	7 (0.60)	21 (6.9)	<0.001***
Poor	1435 (98.1)	1152 (99.4)	283 (93.1)	
<b>Menstrual irregularities</b>				
Good	189 (12.9)	75 (6.5)	114 (37.5)	<0.001***
Poor	1274 (87.1)	1084 (93.5)	190 (62.5)	

\*\*\*P< 0.001, Significant at 0.1%

puberty, as most of them would have had their menarche at about this time. It also corresponds with age at sexual debut (Cotrell and Close, 2008). Our findings corroborate previous findings. Another study found that the age at first douche correlated positively with the age at first sexual intercourse (Harry, 2005). Prior studies have shown that women douche more often immediately before and after sexual intercourse and during and after menstruation (Vermund et al., 2001). The high frequency of douching by most respondents in this survey supported the observations by Sen et al. (2009) that 62.8% of study participants accepted to have douched 1 to 9 times a week. This study was conducted among sexually active women aged ≥ 18 years, similar to the respondents in the present survey. However, varying douching frequencies have been reported in other studies and are a reflection of the heterogeneity of douching practices due to the effects of other factors.

The socio-demographic characteristics of most respondents in this survey, including being single, living off-campus, using public toilets, having specific ethnic backgrounds and having less-educated and unemployed

parents, depict a low socio-economic population (Cotrell, 2003; Arslantas et al., 2010). Earlier studies have observed a significant correlation between factors that depict individual socio-economic status and health awareness and practices. Socio-economic status may influence health by limiting access to preventative and treatment services and shaping health behaviors (Santelli et al., 2000; Simms and Stephenson, 2000; Diclemte et al., 2012). Hence, socio-economically disadvantaged populations are likely to be strongly affected by various health problems and adopt practices such as VD that may result in increased risks of gynecological problems. In addition, worse health indicators (such as high prevalence of VD) are common in such populations, suggesting that women in low socio-economic classes douche more often than those in high socioeconomic classes (Cotrell, 2005; Diclemte et al., 2012).

Another interesting finding of this study was a significant relationship between smoking and VD. Current smoking was associated with higher odds of douching in the respondents, a finding supported by other studies (Misra et al., 2006). An indirect association between

smoking and VD has been hypothesized. Smoking is a known risk factor of PID (Simms and Stephenson, 2000). For example, cigarette smoking has been identified as a risk factor for *Neisseria gonorrhoeae* and *Chlamydia trachomatis* infections, and women with PID douche more often than those without (Caliskan et al., 1996). Paradoxically, the relationship between douching and PID has become an unfortunate cycle: PID is a reason for douching in some women and douching is a precipitating factor for PID (Zhang et al., 1997; Caliskan et al., 1996; Cotrell, 2010).

The findings of this survey underscore the importance of health education to communicate a clear message and improve women's knowledge regarding the adverse health effects of VD and the benefits of discontinuing the practice. Fitzpatrick and Miletti (1994) stressed that people need information on high-risk situations in their work on risk communication. However, information will not necessarily change behaviors, unless 5 critical steps are taken. People must hear, understand, believe, personalize and choose to act on the information (Fitzpatrick and Miletti, 1994). The plausibility of this assertion is supported by the study by Ness et al. (2002) in Pittsburgh who observed that in regions where more participants heard, understood, believed and personalized the message to stop douching, women were less favorable about the usefulness of douching and were more likely to stop. Similarly, health education in the United States is attributed to the reduction in the prevalence of VD from 37 to 27% between 1988 and 1995 (Aral et al., 1988; Abma et al., 1997).

## LIMITATIONS AND STRENGTHS

Limitations worth noting in this study include the likelihood of oversampling the population of douchers with poor knowledge about the adverse health consequences of VD due to the study design. In addition, the generalization of the results is limited due to the homogenous nature of the participants studied (for example, similar educational attainment, age bracket, mostly single, from the Ibibio tribe and low parental socioeconomic status). Additionally, differences in self-reported knowledge of adverse health consequences of VD may be due to a recall bias. Despite these limitations, the study obtained its precision and strength from its large sample size, which gives a fair representation of the entire population of the area studied.

## Conclusion

The results of the present study suggest that low health risk perception and misconception about VD are the

primary reasons for douching. Therefore, health education should form a major cornerstone of any intervention program to discourage VD among our youths and reproductive health counselors and peer counselors should provide advice on the adverse health effects of VD to young female adolescents and women at schools, social clubs, hospitals and immunization grounds along with the use of mass media. Such health education should be designed to ensure that the listed 6 steps are followed. Participants should be made to see, hear, understand, believe, personalize and act to stop VD. Health risks associated with the act should be the focus of interventions. The use of a VD risk avoidance and reduction model should be paramount in intervention programs. This model is consistent with other public health models that respond to health risks by emphasizing optimal health promotion and disease prevention. Health professionals should address misconceptions about douching, as positive responses have been recorded in previous interactions between health care professionals and douchers.

## Competing interests

The authors declare that they have no competing interest in this study.

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## REFERENCES

- Abma JC, Chandra A, Mosher WD, Peterson LS, Piccinino LJ (1997). Fertility, family planning and women health: New data from 1995 National Survey of Family Growth. *Vital Health Stat.* 1-114.
- Aral SO, Mosher WD, Cates W Jr (1992). Vaginal douching among women of reproductive age in the United State. *Am. J. Pub. Health* 82:210-214.
- Arbour M, Corwin J, Salsberry P (2009). Douching patterns in women related to socio-economic and racial/ethnic characteristics. *J. Obstet. Gynecol. Neonatal Nursing* 38(5):577-585.
- Arslantas D, Karabagli H, Koc F (2010). Vaginal douching practice in Eskisehir in Turkey. *J. Public Health Epidemiol.* 2:245-250.
- Baird DD, Weinberg CR, Voigt LF, Daling JR (1996). Vaginal douching and reduced fertility. *Am. J. Public Health* 86:844-850.
- Blumberg J (1997). *The Body Project: An Intimate History of American Girls.* New York: Vintage Books.
- Braunstein S, De Wijger J (2003). Cultural norms and behavior regarding vaginal lubrication during sex. Implications for the acceptability of vaginal microbicides for the prevention of HIV/STIs. New York: The Population Council. pp. 1-44.
- Caliskan D, Col M, Akdur R, Yavuzdemir S, Yavuz Y (1996). Vaginal douching in the area of park health centre. (In Turkish) *Ankara Universitesi Tip Fakultesi Mecmuasi* 49:73- 80.

- Cottrell BH (2003). Vaginal douching. *J. Obstet Gynecol. Neonatal Nurs.* 32:12-18.
- Cottrell BH (2005). Vaginal douching practices of women in Eight Florida Panhandle counties. *J. Obstet. Gynecol. Neonatal Nursing* 35(1):12-18.
- Cottrell BH (2010). An updated review of evidence to discourage douching. *Am. J. Matern. Child Nurs.* 35(2):102-107.
- Cottrell BH, Close FT (2008) Vaginal douching among university women in the Southeastern United States. *J. Am. Coll. Health* 56:415-421.
- Diclemente RJ, Young AM, Painter JL, Wingood GM, Rose E, Sales JM (2012). Prevalence and correlates of recent vaginal douching among African American adolescent females. *J. Pediatr. Adolesc. Gynecol.* 25(1):48-53.
- Farage M, Lennon L (2006). Products for vulva hygiene. In: Farage M, Maibach H (eds.), *The Vulva: Anatomy, Physiology and Pathology.* pp. 217-233.
- Fitzpatrick C, Mileti DS (1994). Public risk communication. In: Dynes RR, Tierney KJ (eds.), *Disasters, Collective Behavior, and Social Organization.* Newark, NJ: University of Delaware Press. pp. 71-84.
- Foch BJ, McDaniel ND, Chacko MR (2001). Racial differences in vaginal douching knowledge, attitude and practices among sexually active adolescents. *J. Pediatr. Adolesc. Gynecol.* 14:29-33.
- Fonck K, Kaul R, Keli F, Bwayo JJ, Ngugi EN, Moses S, Temmerman M (2001). Sexually transmitted infections and vaginal douching in a population of female sex workers in Nairobi, Kenya. *Sex. Transm. Infect.* 77:271-275.
- Funkhouser E, Hayes TD, Vermond SH (2002). Vaginal douching practices among women attending a university in the southern United States. *J. Am. Coll. Health* 50:177-182.
- Gardner JW, Schuman KL, Slattery ML, Sanborn JS, Abbott TM, Overall JC Jr (1991). Is vaginal douching related to cervical carcinoma? *Am. J. Epidemiol.* 33:368-375.
- Harry WH (2005) Multifactorial etiology of cervical cancer: A hypothesis. *Medscape Gen. Med.* 7(4):56.
- Holzman C, Leventhal J M, Qiu H, Jones NM, Wang J, the BV Study Group (2001). Factors linked to bacterial vaginosis in nonpregnant women. *Am. J. Pub. Health*, 91:1664-1670.
- Hsieh CR, Yen LL, Liu JT, Lin CJ (1996). Smoking, health knowledge, and anti-smoking campaigns: an empirical study in Taiwan. *J. Health Econ.* 15(1):87-104.
- Jones AM, Kirigia JM (1999). Health knowledge and smoking among African women. *Health Econ.* 8:165-169.
- Kan K, Tsai W (2004). Obesity and risk knowledge. *J. Health Econ.* 23(5):907-934.
- Kenkel DS (1991). Health behavior, health knowledge, and schooling. *J. Polit. Econ.* 99(2):287-305.
- Krashin JW, Koumans EH, Bradshaw-Sydnor AC, Braxton JR, Evan Secor W, Sawyer MK, Markowitz LE (2012). *Trichomonas vaginalis*, prevalence, incidence, risk factor and antibiotic resistance in an adolescent population. *Sex. Transm. Dis.* 37:400-410.
- Kukulu K (2006). Vaginal douching practices and beliefs in Turkey. *Cult. Health Sex.* 8(4):371-378.
- Lichtenstein B, Nansel T (2001). Women's douching practices and related attitudes: findings from four focus groups. *Women Health* 31(2-3):117-131.
- Martino JL, Vermund S (2002). Vaginal douching: Evidence for risks and benefits to women's health. *Epidemiol. Rev.* 24:109-124.
- Martino JL, Young Pairo JS, Vermund S (2004). Vaginal douching, personal practices and public policies. *J. Women's Health* 13(9):1048-1065.
- Merchant JS, Oh MK, Klerman LV (1999). Douching: a problem for adolescent girls and young women. *Arch. Pediatr. Adolesc. Med.* 153:834-837.
- Misra DP, Trabert B and Atherly-Trim S (2006). Variation and predictors of vaginal douching behavior. *Women Health Issues* 16(5):275-282.
- Ness RB, Hillier SL, Richter HE, Soper DE, Stamm C, McGregor J, Bass DC, Sweet RL, Rice P (2002). Douching in relation to bacterial vaginosis, lactobacilli and facultative bacteria in the vagina. *Obstet. Gynecol.* 100:765-772.
- Ness RB, Hillier SL, Richter HE, Soper DE, Stamm C, Bass DC, Sweet RL, Rice P, Downs J, Aral S (2003). Why women douche and why they may not stop. *Sex. Transm. Dis.* 30:71-74.
- Nyaruhucha CN, Achen JH, Msuya JM, Shayo NB, Kulwa KB (2003). Prevalence and awareness of obesity among people of different age groups in educational institutes in Morogoro, Tanzania. *East Afr. Med. J.* 80(2):68-72.
- Oh MK, Funkhouser E, Simpson T, Brown P, Merchant J (2003). Early onset of vaginal douching is associated with false beliefs and high-risk behavior. *Sex. Transm. Dis.* 30:689-693.
- Peters RK, Thomas D, Hagan DG, Mack TM, Henderson BE (1986). Risk factors for invasive cervical cancer among Latinas and non-latinas in Los Angeles County. *J. Nat. Cancer Inst.* 77(5):1063-1077.
- Rosenberg MJ, Phillips RS, Holmes MD (1991). Vaginal douching. Who and why? *J. Reprod. Med.* 36:753-758.
- Rovira J, Viscusi W, Antofianzas F, Costa J, Hart W, Carvalho I (2000). Smoking risks in Spain: Part II--Perception of environmental tobacco smoke externalities. *J. Risk Uncertain.* 21(2-3):187-212.
- Sakru N, Inceboz T, Inceboz U, Zeren I, Karakus M, Kirca U (2006). Does vaginal douching affect the risk of vaginal infections in pregnant women? *Saudi Med. J.* 27(2):215-218.
- Santelli J S , Lowry R , Brener ND, Robin L (2000). The association of sexual behaviors with socio-economic status, family structure and race/ethnicity among US adolescents. *Am. J. Public Health* 90(10):1582-1588.
- Simms I, Stephenson JM (2000). Pelvic inflammatory diseases epidemiology: what do we know and what do we need to know? *Sex. Transm. Infect.* 76:80-87.
- Simpson T, Merchant J, Grimley DM, Oh MK (2004). Vaginal douching among adolescent and young women: more challenges than progress. *Arch. Pediatr. Adolesc. Gynecol.* 17:249-255.
- Sen E, Mete S (2009). Vaginal douching practices of women in Turkey. *DEUHYOED* 2(1):3-15.
- Sweet R (2000). Gynecologic conditions and bacterial vaginosis: implications for the non-pregnant patient. *Infect. Dis. Obstetr. Gynecol.* 8:184-190.
- Vermund SH, Sarr M, Murphy DA, Levin L, Abdalian SE, Ma Y, Crowley-Nowick PA, Wilson CM (2001). Adolescent Medicine HIV/AIDS Research Network. Douching practices among HIV infected and uninfected adolescents in the United States. *J. Adolescent Health* 29:81-86.
- Viscusi WK (1991). Age variation in risk perceptions and smoking decisions. *Rev. Econ. Stat.* 73(4):577-588.
- Zhang J, Thomas AG, Leybovich E (1997). Vaginal douching and adverse health effects: a meta-analysis. *Am. J. Public Health* 87:1207-1211.



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