

*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 Wijgert, 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  $\geq 18$  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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