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Determinants of intravaginal practices among HIV-infected women in Zambia using conjoint analysis

Maria L Alcaide¹, Ryan Cook², Maureen Chisembele³, Emeria Malupande³, and Deborah L Jones²

¹Division of Infectious Diseases, University of Miami Miller School of Medicine, FL, USA

²Department of Psychiatry and Behavioral Sciences, University of Miami Miller School of Medicine, FL, USA

³University of Zambia, University Teaching Hospital, Lusaka, Zambia

Abstract

Intravaginal practices (IVPs) are associated with an increased risk of bacterial vaginosis and may play a role in HIV transmission. The objective of this study was to identify the importance of factors underlying the decision to engage in IVP using conjoint analysis; a novel statistical technique used to quantify health-related decisions. This study was a cross-sectional study. HIV-infected women in Zambia completed audio computer-administered self-interview questionnaires assessing demographic, risk factors and IVPs. Reasons for engaging in IVPs were explored using conjoint questionnaires. Conjoint analysis was used to identify the relative importance of factors for engaging in IVPs. Results of the conjoint analysis demonstrated that hygiene was the most important reason for engaging in IVPs (mean importance score = 61, SD = 24.3) followed by partner's preference (mean importance score = 20, SD = 14.4) and health (mean importance score = 17, SD = 13.5). When making the decision to engage in IVPs, women rank the importance of hygiene, partner preference and health differently, according to their personal characteristics. The use of conjoint analysis to define the characteristics of women more likely to engage in specific practices should be used to develop tailored rather than standardised IVP interventions, and such interventions should be incorporated into clinical practice and women's health programmes.

Keywords

Women; HIV; intravaginal practices; bacterial vaginosis; Africa; conjoint analysis

Introduction

Intravaginal practices (IVPs) are the introduction of products inside the vagina for hygienic, health or sexual reasons.¹ Although women may perceive IVPs as a beneficial practice, IVPs

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Corresponding author: Maria L Alcaide, Division of Infectious Diseases, University of Miami Miller School of Medicine, 1120 NW 14th St. Suite 864 (D-90A), Miami, FL 33136, USA. malcaide@med.miami.edu.

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are associated with numerous negative health outcomes, including the development of bacterial vaginosis (BV) and obstetric and gynecological complications. BV increases the risk of acquisition and transmission of sexually transmitted infections (STIs) and HIV, and therefore interventions to decrease IVPs may be important components of HIV prevention plans.^{2–5}

Zambia is a sub-Saharan country severely impacted by the HIV epidemic and the prevalence of HIV among urban women is as high as 35%.⁶ IVPs are common and may play a role in exacerbating the HIV epidemic.⁷ IVPs among Zambians are strongly influenced by social and cultural beliefs, endorsed by men, and traditionally introduced to women during early adolescence by ‘Alengizis’ – marriage counsellors who guide young girls in preparation for becoming a woman.^{8–10} The primary reasons why women engage in IVPs are hygiene, perceived health benefits and men’s preferences. We have previously described that hygiene reasons appear to be the primary determinant for most IVP in Zambia.^{8,9} Due to their detrimental association with health, there is a need to develop culturally-tailored interventions to decrease or ameliorate IVPs in Zambia and in other sub-Saharan countries in which IVPs are prevalent.^{8,9,11,12} It is equally necessary to clarify the role of each of these reasons in making the decision to engage in IVPs.

Conjoint analysis (CA) has been used in market research to clarify and quantify preferences for different products. CA analysis is a technique that can be used to quantify the relative importance of different aspects of a decision by asking participants to rate or choose a product or service based on a set of characteristics of the product or service. In CA multiple characteristics are presented together (conjointly), and trade-offs must be made during the evaluation process. CA presents scenarios that are hypothesised to be closer to ‘real life’ than those assessed by asking each characteristic independently.^{13–15} Conjoint designs are increasingly being applied in HIV and other health research studies,^{16–22} and can be utilised to identify the relative importance of factors influencing health-related decisions, such as the decision to engage in IVPs. Using conjoint questionnaires, participants identify preferences between different combinations of attributes of a health decision, and CA then enables the quantification of the importance of each attribute in comparison with the others.^{13,14}

This study sought to identify the relative importance of factors underlying the decision to engage in IVPs using CA, in order to develop culturally appropriate IVPs interventions for Zambian women. It was hypothesised that when comparing hygiene, male preferences and health, women would be most likely to engage in IVPs for hygienic reasons.^{8,9}

Material and methods

Ethics statement

Institutional Review Board (University of Miami Miller School of Medicine) and Research Ethics Committee (University of Zambia) approvals were obtained prior to recruitment, assessment and any study-related interventions. Participants were provided with information about the study and assured of confidentiality of information and study records. Voluntary signed informed consent was obtained from every participant prior to participating in the study.

Study procedures

Study activities took place at a Community Health Center in urban Lusaka, Zambia. Data presented are part of a larger study to develop and test a culturally-tailored intervention to decrease IVPs and BV among HIV-infected women in urban Zambia. In order to develop questionnaires addressing IVPs, focus groups, key informant interviews and introductory meetings with the clinic staff and local Community Advisory Boards were conducted at two Community Health Centers. Participants were primarily referred by enrolled peers or clinic staff, and presented documentation of HIV infection at the time of enrollment.

Documentation of HIV infection included clinic referral confirming the HIV status of a participant and was confirmed using antiretroviral registers and clinic files. Participants were women, 18 years of age or older, sexually active, engaging in receptive vaginal intercourse with men, engaging in IVPs in the prior month, HIV infected, receiving ART, not pregnant, not on contraceptive medications or with an intrauterine device, and living in the Lusaka Metropolitan Area.

Participants completed audio computer-administered self-interview (ACASI) questionnaires assessing demographic, sexual risk factors and IVPs. All audio and consent materials were provided in participants' preferred local languages (English, Bemba, Nyanja).

Outcome measures

Demographics, sexual risk factors and medical history—This questionnaire included age, marital status, number of children, yearly income, educational level, current partner's HIV status, mode of infection with HIV, number of partners in the prior month, sexual modalities (oral, anal sex), history of exchanging sex for money in lifetime and use of condoms in the prior month. Medical history was self-reported and included date of HIV infection and CD4 cells per microlitre.

Vaginal practices—This questionnaire assessed participants' use of IVPs and was adapted from a previous study.⁹ The study coordinator described IVPs to the participants prior to completing the questionnaire as 'the insertion of products inside the vagina for hygiene, health or sexual pleasure', and clarified that IVPs did not refer to external vaginal cleansing. A picture of the female genital anatomy was shown to the participants to illustrate. The questionnaire addressed products used for IVPs as well as recency and frequency of IVPs. Questions to assess product used were on a dichotomous scale, 'yes' = 1, 'no' = 0, and each product was assessed individually. Products identified in the focus groups and key informant interviews as used for IVPs included water alone, soap, cloth or a sponge or a rag, herbs or flowers taken directly from the land, traditional medicines given by traditional healers, vinegar, salt, beer and yogurt. Questions assessing recency and frequency of use were scored using a Likert scale. The recency scale was scored, 'within the last two days' = 1, 'within two days to one week' = two, 'within 1–2 weeks' = 3, 'within two weeks to one month' = 4, 'more than one month' = 5. The frequency scale was scored, 'daily' = 1, 'weekly' = 2 and 'monthly' = 3.

Conjoint questionnaire—Reasons for engaging in IVPs were explored using a conjoint questionnaire developed from information collected from focus group discussions (FGD)

with men and women and key informant interviews (KI) with marriage counsellors (Alengizis). Details of the FGD and KI have previously been described.⁸ Three common elements for engaging in IVPs were noted in both the FGD and KI: hygiene, partner preference and health. These elements were included as 'attributes' in the conjoint questionnaire. The study team then assigned different plausible 'levels' to each attribute based on previous research with this population. Levels assigned were positive (e.g., 'IVPs are good for your hygiene'), neutral (e.g., 'IVPs have no effect on your health') and negative (e.g., 'Your partner does not like that you engage in IVPs'). A set of nine profiles, including different combinations of attributes and levels, was generated using SPSS Statistics.²³ Women were asked to rate how likely they would be to engage in IVPs for each profile presented, from 1, 'very unlikely' to 9, 'very likely.' In order to enhance comprehension, a pictorial depiction of each profile was presented to the participant in conjunction with the question, presented in both audio and text. The pictures represented a woman (suggesting hygiene preference), a health care provider (suggesting health preference) and a man (suggesting partner preference) with facial and body expressions indicating the different levels of response (positive, neutral or negative). Conjoint questions were grouped in sets of three and distributed between sets of IVP questions to reduce participant burden. Table 1 presents the conjoint questionnaire.

Statistical analysis

Descriptive analyses were performed to describe demographic, medical and sexual risk factors. Since CA cannot be performed when all of the profiles are given the same rating by a participant, the variability of profile ratings within participants was examined and those participants who did not vary in their ratings of profiles were not included in analyses of the conjoint survey. The nine different profiles and rating scales are illustrated in Table 1.

For those participants who can be analysed, CA is completed on an individual level (i.e. one analysis for each person), and the results are then averaged across the entire sample or compared between subgroups. In this CA, the likelihood of engaging in vaginal practices was modelled as the sum of a constant plus parameter estimates associated with the levels of the three attributes (i.e. hygiene, partner and health) appearing in the questionnaire. The outcome variables in the conjoint model were the participant ratings for the scenarios, and the categorical predictors were the attributes, with categories corresponding to the levels of each attribute, i.e. 'positive, no effect, negative.' Categorical variables were coded such that the estimate for each level represents deviation from the constant, and parameter estimates were obtained using ordinary least squares multiple regression techniques. Using the parameter estimates, importance scores were computed. This was done by first calculating the absolute value of the difference between the largest parameter estimate and the smallest estimate associated with the levels of each attribute. The range is then expressed as a percentage of the sum total of all ranges of all factors, and represents the importance of that factor relative to the other factors.^{13,14} Mean importance scores were calculated for the entire sample and transformed into a 1–100 scale. Importance scores were then compared across groups of women using independent sample t-tests. IBM SPSS Statistics for Windows version 21 was used for analyses.²³ A *p* value <.05 was considered significant.

Results

Characteristics of study participants

One hundred and twenty-eight HIV-infected participants were enrolled. Two participants provided the same rating for all of the questions and were not included in the analysis. Demographic characteristics, medical history and risk factors are described in Table 2. Median age was 37.3 years. Most women had a very low income (three-quarters of women earned less than 150 US dollars per month) and about half of the participants had only primary education (46%). The majority of participants were married to a HIV-infected partner (68%). Ten percent had a history of exchanging sex for money or gifts. About half of the participants had been infected with HIV for more than one year but less than five years, and half self-reported CD4 counts over 500 cells/ μ l (47%).

IVPs

IVPs results are detailed in Table 2. By design, all women enrolled in our study engaged in IVPs and started these practices at a young age (median = 15 years, range 8–41). Most had engaged in IVPs in the prior two days (83%). Water, soap, a cloth, rag or sponge were most commonly used. Herbs collected outdoors were used by over half of the women and traditional medicines by over one-quarter. Other products such as vinegar, salt, beer had been used by 10% or less of the participants.

Determinants for engaging in IVPs

Importance scores for the different attributes (hygiene, partner preference and health) are illustrated in Table 3.

Two participants provided only one rating for all profiles and were not included in the analyses. Results of the CA ($n = 126$) demonstrated that hygiene was the most important reason for engaging in IVPs (mean importance score = 62, SD = 24.3) followed by partner's preference (mean importance score = 20, SD = 14.4) and health (mean importance score = 17, SD = 13.5).

Importance scores were compared among group of women with different demographic and medical characteristics, risk factors and IVPs. As seen in Table 3, women with higher income, those that had used IVPs in the prior two days and those using water or cloths for IVPs placed more importance on hygiene. Women with lower income, those not did engage in IVPs in the prior two days and those not using water for IVPs placed more importance on partner preference. Women who had not engaged in IVPs in the prior two days, had a history of exchanging sex for money or gifts and used cloth for IVPs placed more importance on health. Finally, women who had engaged in IVPs most recently were more likely to rate hygiene as most important and women who had engaged in IVPs less recently placed partner preference or health as most important (see Table 3).

Discussion

This study examined the determinants of engaging in IVPs among women with HIV infection in Lusaka, Zambia, using CA to identify the relative importance of factors

influencing the decision to engage in IVPs. In support of our previous studies in Zambia, we found hygiene to be the most important factor in the decision to engage in IVPs.⁹ In addition, women were found to rank the importance of hygiene, partner preference and health differently, according to their personal characteristics. Women who had engaged in IVPs more recently were more likely to rate hygiene as most important, in contrast with those who engaged in IVPs less recently, who were more likely to rate partner preference or health as most important. Women with a higher income rated hygiene as more important, in contrast with those with a lower income, who rated partner preference as most important.

Study findings have important implications for the development of interventions to reduce the prevalence of IVPs, and suggest the need for tailored rather than standardised interventions. In Zambia, IVP use begins at an early age and is typically practiced frequently using a variety of products.⁸ Although in general, hygiene appears to be the most important driver of IVPs; among subgroups, different factors emerged as potential predictors of the decision to engage in IVPs. Results indicate that women who believed that IVPs were associated with enhanced health had a history of exchanging sex for money and using a cloth for IVPs. This finding suggests an urgent need for interventions targeting sex workers regarding the health impact and limited benefits of IVPs. Similarly, among those women more recently engaging in IVPs, water or a cloth was most commonly used, and these women were more likely to believe it was associated with improved hygiene. The relationship with IVPs and BV has also been shown in other settings, in particular in the US where women engage in IVP with commercially available vaginal douches.²⁴ The manual introduction of water into the vagina may also represent a type of douching in a setting in which douching products may not be affordable or available. However, previous studies have also found frequent use of IVPs and the use of cloth to be associated with BV,^{5,25} and regardless of the way the product is inserted in the vagina, women appear to engage in such practices as part of their routine daily hygiene. Future studies should explore interventions to reduce the frequency of IVPs and propose healthy and acceptable hygiene alternatives for all women. Messages regarding the negative impact of IVPs are primarily given by health care providers and focus on IVP engaged in for hygiene purposes. To have the greatest impact, IVPs prevention campaigns should have a broader message that includes hygiene, partner preference and health rather than focusing solely on hygiene.

Generalisation of the results of this study is limited by its small sample size. Due to the high number of statistical tests required, comparing individual importance scores between groups using *t*-tests may not be the optimal strategy for analysis of conjoint data. More sophisticated strategies to uncover different ‘types’ of decision makers, such as cluster analysis or latent class analysis, are often utilised with data resulting from a CA; however, the sample size in this study was too small to utilise these strategies. In addition, it is not feasible to include all aspects of a decision in a conjoint questionnaire, and thus conjoint analyses may not represent the full complexity of a decision-making process. Because conjoint questionnaires use hypothetical real-life scenarios applying combinations of factors rather than factors presented in isolation, the conjoint analytic technique represents a powerful tool for the assessment of health decision making and has been applied to other health settings.¹⁸ However, the current study did not include ‘holdout scenarios’ (profiles that are rated by participants but are ‘held out’ of the analysis to assess validity) in the

questionnaire or other methods to test the overall validity of the survey.¹⁵ Future research should continue the use of the conjoint method with a larger sample and include an assessment of validity. In addition, due to the high prevalence of IVPs, using a recency/frequency scale with additional options (e.g. today or yesterday for recency and more than once a day or once a day for frequency) could be useful in future studies.

Both IVPs and BV have been shown to increase the risk of acquisition and transmission of STIs and HIV.^{2–5} As a culturally sanctioned behaviour, although IVPs are difficult to influence, public health initiatives to decrease the use of IVPs and its consequences may be an important addition to the HIV prevention toolkit.

The use of CA to define characteristics of women more likely to engage in specific practices should be used to develop tailored IVP interventions to be incorporated into clinical practice and women's health programmes. CA can be a powerful tool to incorporate into HIV research studies addressing decision-making processes.

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Table 1

Questions used to assess the determinants for engaging in intravaginal practices (IVPs) using conjoint analysis (CA).

Vaginal practices may have an effect on your HEALTH, your HYGIENE and the relationship with your PARTNER. Please rate from 1 to 9 (very unlikely to very likely) how likely would you be to engage in vaginal practices if they were:									
	1	2	3	4	5	6	7	8	9
Are BAD for your HYGIENE									
Your PARTNER does NOT LIKE them		Very unlikely				Somewhat likely			Very likely
Have NO EFFECT on your HEALTH									
Are GOOD for your HYGIENE	1	2	3	4	5	6	7	8	9
Your PARTNER LIKES them		Very unlikely				Somewhat likely			Very likely
Have NO EFFECT on your HEALTH									
Have NO EFFECT on your HYGIENE	1	2	3	4	5	6	7	8	9
Your PARTNER DOES NOT CARE		Very unlikely				Somewhat likely			Very likely
Have NO EFFECT on your HEALTH									
Are GOOD for your HYGIENE	1	2	3	4	5	6	7	8	9
Your PARTNER DOES NOT CARE		Very unlikely				Somewhat likely			Very likely
Are BAD for your HEALTH									
Have NO EFFECT on your HYGIENE	1	2	3	4	5	6	7	8	9
Your PARTNER LIKES		Very unlikely				Somewhat likely			Very likely
Are GOOD for your HEALTH									
Are BAD for your HYGIENE	1	2	3	4	5	6	7	8	9
Your PARTNER DOES NOT CARE		Very unlikely				Somewhat likely			Very likely
Are GOOD for your HEALTH									
Are BAD for your HYGIENE	1	2	3	4	5	6	7	8	9
Your PARTNER LIKES		Very unlikely				Somewhat likely			Very likely
Are BAD for your HEALTH									
Are GOOD for your HYGIENE	1	2	3	4	5	6	7	8	9
Your PARTNER DOES not like		Very unlikely				Somewhat likely			Very likely
Are GOOD for your HEALTH									
Have NO EFFECT on your HYGIENE	1	2	3	4	5	6	7	8	9
Your PARTNER DOES NOT like		Very unlikely				Somewhat likely			Very likely
Are BAD for your HEALTH									

Each profile was identified by including different combinations of attributes and levels using SPSS statistics and questions were created based on the different attributes of individual profiles.

Conjoint questions were grouped in sets of three and distributed between sets of IVP questions to reduce participant burden.

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Table 2

Baseline socio-demographic characteristics, risk behaviours, medical history and intravaginal practices (IVPs) in the study population (n = 126), (number, %).

Demographics	
Age in years (range)	37.3 years (24–60)
Married or stable relationship	126, 100%
Monthly income (approximately – US dollars)	
Less than USD150	98, 77.8%
More than USD150	28, 22.2%
Education (n = 113)	
Primary education	58, 46%
Higher than primary education	68, 54%
Sexual risk factors	
HIV-infected male partner	86, 68.2%
Mode of HIV infection	
Sexual	106, 84.1%
Unknown	20, 15.9%
More than one partner in the prior month	44, 34.9%
Oral sex in the prior month (n = 94)	16, 17%
Anal sex in the prior month (n = 94)	4, 4.3%
Exchange sex for money or gifts (lifetime)	13, 10.3%
Condom use in every act in the prior month (n = 94)	4, 4.2%
Medical history	
Time since HIV diagnosis	
Less than one year	12, 9.4%
More than one year	75, 58.6%
CD4 T cells per microlitre (n = 106)	
More than 500	49, 47%
One hundred to 500	49, 46.2%
Less than 100	7, 6.6%
Intravaginal practices	
Use of IVPs in the month prior to enrollment	126 (100%)
Mean age of IVP initiation in years (range)	15.8 years (8–41 years)
Last use of IVPs?	
In the last two days	105, 83.4%
Two days to one week	5, 3.9%
One to two weeks	2, 1.6%
Two weeks to one month	14, 11.1%
Products used for IVPs in the prior month	
Water use	118, 93.6%
In the last two days (n = 117)	109, 93.2%
Daily	111, 94.1%

Demographics	
Weekly	2, 1.7%
Monthly	5, 4.2%
Soap	89, 70.6%
In the last two days (n = 89)	87, 97.8%
Daily	83, 94.3%
Weekly	2, 2.3%
Monthly	3, 3.4%
Cloth	68, 53.9%
In the last two days (n = 68)	60, 88.2%
Daily	48, 70.6%
Weekly	12, 17.6%
Monthly	8, 11.8%
Traditional medicines	37, 29.3%
In the last two days (n = 37)	25, 19.8%
Daily	13, 38.2%
Weekly	12, 35.3%
Monthly	9, 26.5%
Herbs or flowers collected outdoors	25, 19.8%
In the last two days (n = 25)	22, 17.5%
Daily	16, 66.7%
Weekly	5, 20.8%
Monthly	3, 12.5%

Products listed are those that were used by more than 10% of the participants. Other products assessed and used by less than 10% of participants were: beer (8 or 6.3% of participants), lemon (12 or 9.5% of participants), salt (11 or 8.7% of participants) and vinegar (4 or 3.2% of participants).

Table 3

Association between importance scores for the different attributes (hygiene, partner preference and health) and demographic, medical, risk factors and intravaginal practices (IVPs) (n = 126).

	Hygiene preference Mean (SD)	p Value	Partner preference Mean (SD)	p Value	Health preference Mean (SD)	p Value
Mean importance score	61.9 (24.3)		20.7 (15.1)		17.3 (13.9)	
Demographics						
Age more than 38 years		0.841		0.669		0.908
Yes	61.4 (26.1)		20.2 (13.3)		17.1 (14.6)	
No	62.3 (23.0)		20.2 (13.3)		17.4 (13.5)	
Married or in a stable relationship		0.795		0.611		0.919
Yes	62.3 (24.3)		20.3 (14.4)		17.1 (14.2)	
No	61.0 (24.3)		21.8 (17.2)		17.4 (13.5)	
Monthly income		0.005		0.004		0.083
Less than USD150	58.8 (25.0)		22.9 (15.7)		18.5 (14.5)	
More than USD150	72.3 (17.9)		13.7 (10.6)		13.4 (11.3)	
Education less than primary		0.169		0.273		0.231
Yes	58.7 (24.6)		22.3 (14.5)		15.9 (13.9)	
No	64.7 (23.8)		19.4 (15.7)		18.9 (13.8)	
Sexual risk factors						
HIV-infected male partner		0.186		0.098		0.620
Yes	62.8 (24.1)		25.8 (17.2)		18.7 (16.9)	
No	55.4 (25.6)		20.0 (14.5)		17.1 (13.5)	
Oral sex in the prior month		0.339		0.722		0.175
Yes	57.9 (25.3)		21.7 (12.4)		20.3 (15.8)	
No	64.6 (25.1)		20.2 (16.4)		15.2 (13.0)	
History of exchanging sex for money or gifts (lifetime)		0.445		0.587		0.043
Yes	57.0 (24.8)		18.5 (16.5)		24.3 (19.0)	
No	62.5 (24.2)		20.6 (15.0)		16.5 (13.1)	
Condom use in every vaginal encounter in the prior month		0.996		0.384		0.318
Yes	63.4 (28.1)		27.2 (31.1)		9.4 (7.6)	
No	63.3 (25.2)		20.1 (14.8)		16.4 (13.7)	

	Hygiene preference Mean (SD)	<i>p</i> Value	Partner preference Mean (SD)	<i>p</i> Value	Health preference Mean (SD)	<i>p</i> Value
Medical history						
Time since HIV diagnosis		0.394		0.941		0.160
More than one year	67.9 (24.3)		20.7 (18.8)		11.6 (10.4)	
Less than one year	61.4 (24.2)		20.4 (14.8)		17.8 (14.1)	
CD4 counts (cells/microlitre)		0.249		0.126		0.774
Greater than 500	63.5 (22.3)		19.0 (13.2)		17.5 (13.9)	
Less than 500	58.0 (25.3)		23.7 (17.1)		18.3 (13.9)	
Intravaginal practices						
Age of IVP initiation older than 16 years		0.301		0.125		0.895
Yes	59.3 (23.3)		23.1 (17.2)		17.5 (13.0)	
No	63.8 (24.9)		18.9 (13.3)		17.1 (14.6)	
Use of IVPs in the prior two days		0.004		0.013		0.025
Yes	0.64 (0.22)		0.19 (0.13)		0.16 (0.12)	
No	0.49 (0.26)		0.27 (0.19)		0.23 (0.16)	
Products used for IVPs in the prior month						
Water		0.008		0.015		0.052
Yes	63.6 (23.9)		19.7 (15.0)		16.6 (13.9)	
No	42.6 (20.1)		31.8 (12.8)		25.5 (12.8)	
Soap		0.237		0.179		0.552
Yes	63.6 (24.7)		19.5 (15.2)		16.8 (14.1)	
No	58.1 (23.1)		23.4 (14.9)		18.4 (13.6)	
Cloth or fabric		0.023		0.067		0.050
Yes	66.5 (22.4)		18.4 (13.7)		19.9 (15.3)	
No	56.7 (25.3)		23.3 (16.3)		15.0 (12.3)	
Traditional medicines						
Yes	58.7 (25.5)	0.343	23.5 (17.2)	0.198	17.8 (13.6)	0.803
No	63.2 (23.7))		16.6 (14.2)		17.1 (14.1)	
Herbs or flowers collected outdoors						
Yes	36.1 (25.6)	0.792	20.4 (17.4)	0.909	16.5 (14.3))	0.738
No	61.6 (24.0)		20.8 (14.6)		17.5 (13.9)	

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Products listed are those that were used by more than 10% of the participants. Other products assessed and used by less than 10% of participants were beer, lemon, salt, vinegar and yogurt. Importance scores were compared across groups of women using independent sample t -tests.

Values in bold show the p value is less than 0.05 and is significant.