

ORIGINAL RESEARCH ARTICLE

Determinants of Elongation of the Labia Minora in Tete Province, Central Mozambique: Findings of a Household Survey

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Abstract

A WHO-supported provincial-level population-based survey was conducted in 2007 to understand the determinants and implications for health of vaginal practices. A total of 919 women aged 18-60 were selected randomly for enrolment. This is the first population-based study of females in Tete Province, Mozambique. At some time over their lives, 98.8% of women had practiced elongation of their labia minora and a quarter (24.0%) had done so in the past month. Currently practicing women were more likely to have engaged in sex recently, and used contraceptives and condoms at last sex than women who had stopped labial elongation. Younger age, residence in rural areas and having two or more male partners were also determinants of current practice. Women commonly reported they practiced for no specific reason (62.8%). Discomforting itchiness and lower abdominal pain were more frequent in women who had stopped labial elongation than in women who were currently practicing. Although women may not report current vaginal ill health, it is possible that prospective cohort studies could uncover alterations in genital vaginal flora or other indicators of impact on women's health. The findings of this study do not suggest that labial elongation is linked with high-risk behaviors for HIV transmission. (*Afr J Reprod Health* 2016; 20[2]: 111-121).

Keywords: Labia minora elongation; vaginal practices; Mozambique; survey; cross-sectional studies.

Résumé

Une enquête basée sur la population au niveau provincial soutenues par l'OMS a été menée en 2007 pour comprendre les déterminants et les conséquences pour la santé des pratiques vaginales. Un total de 919 femmes âgées de 18-60 ont été choisies au hasard pour participer. Cette étude est la première étude sur les femmes dans la province de Tete, Mozambique qui a été basée sur la population. À un certain moment de leur vie, 98,8% des femmes ont pratiqué l'allongement de leur petites lèvres et un quart (24,0%) l'avaient fait au cours du mois précédant. Actuellement les femmes qui le pratiquent étaient plus susceptibles d'avoir eu des rapports sexuels récemment, et d'avoir utilisé des contraceptifs et des préservatifs lors du dernier rapport sexuel que les femmes qui avaient arrêté l'allongement de petites lèvres. Le jeune âge, la résidence dans les milieux ruraux et ayant deux ou plusieurs partenaires mâles constituaient également des déterminants de la pratique actuelle. Les femmes ont souvent signalé qu'elles le pratiquaient pour aucune raison spécifique (62,8%). Démangeaison gênante et des douleurs abdominales basses étaient plus fréquentes chez les femmes qui avaient arrêté l'allongement de petites lèvres que chez les femmes qui le pratiquaient actuellement. Bien que les femmes ne puissent pas signaler des problèmes de santé vaginale courants, il est possible que les études de cohorte prospectives découvrent des altérations de la flore vaginale génitale ou d'autres indicateurs de l'impact sur la santé des femmes. Les résultats de cette étude ne suggèrent pas que l'allongement de petites lèvres est lié à des comportements à haut risque pour la transmission du VIH. (*Afr J Reprod Health* 2016; 20[2]: 111-121).

Mots-clés: allongement de petites lèvres, pratiques vaginales, Mozambique, enquête; études transversales.

Introduction

Labia minora elongation (LME) is the expansive modification of the inner lips of the female external genitalia, or labia minora, by a process of elongating with the help of a variety of herbs, oils, crèmes, and other instruments¹. The

anthropological literature documented this practice as common amongst the Venda and Lovedu of South Africa^{2,3} in the central and northern part of Mozambique⁴ in the south of Tanzania amongst the Makonde speaking people⁵ in the central region of Uganda among the Baganda linguistic group⁶ in Zambia among the Bemba⁷ and in

Zimbabwe amongst the Shona^{8,9}. A joint statement by WHO, UNICEF and UNFPA tagged LME as Female Genital Mutilation (FGM) Type IV in 1996¹⁰. Although that categorization raised many concerns, the WHO revised the statement in 2008 and maintained that LME is FGM^{11,12,13}. However, there is paucity of biomedical literature on the physical and psychosocial health implications of LME.

Anthropological literature indicates that LME is still practiced by some linguistic groups in Southern and East Africa^{1,4,6}. This practice has been studied mainly from an anthropological lens, highlighting the motivation of the practice for beauty, hygiene and femininity, in preparation for sex, or as a symbol of cultural identity. The population-level prevalence of LME in sub-Saharan Africa is largely unknown¹. An understanding of the determinants of the practice, the products used and its possible health implications have not previously been assessed in a population-based study. The present research thus represents the first account of this type.

This paper draws on quantitative data collected in a World Health Organization (WHO)-led Gender, Sexuality and Vaginal Practices (GSVP) multi-country prevalence study conducted in 2007 in Tete Province (central Mozambique)^{14,15,16,17,18,19,20}. Although the data were collected nearly ten years ago, we believe that they can still provide useful insights to improve the understanding of the health implications of this widespread genital modification practice.

Data from the GSVP survey reporting the prevalence, motivations and timing of LME has previously been published^{14,15}. Those findings showed that LME was universal in the area^{14,15}. The practice starts during initiation rituals for about half the women (47.0%) and the same proportion reported practicing LME in preparation for sexual intercourse (4.0%)¹⁵. The median age at first practice was 11 years¹⁵. The motivations mentioned were that it was a symbol of female identity (72%), it contributed to keeping one's partner committed (38%) or enhanced male sexual pleasure (35%)^{14,15}. To have elongated labia was

the intended direct outcome of the practice (96%), However, some women mentioned vaginal tightening (11%) and heating (5%) as expected effects^{14,15}.

More detailed statistical analysis investigating associations between practice of LME in the past 30 days and the participants' health-related variables is presented here. The objective of this paper is to analyze the determinants and possible health implication of LME amongst a randomly selected population of women aged between 18 and 60 living in the Province of Tete.

Methods

Study design

The GSVP consisted of a cross-sectional population-based household survey, which was conducted in 2007. A preliminary ethnographic component informed the development of the survey questionnaire^{11,20}. The questionnaire had 54 items about socio-demographics and reproductive health and 22 questions on each of the 8 vaginal practices that were described by the female participants in the ethnographic stage. Here we present only the findings pertaining to the practice of LME.

Study setting

Mozambique is a poor country –three-quarters of the population live on less than a dollar (USD) per day²¹. The Tete province lies in the central part of Mozambique, and it borders Zambia to the north, Malawi and Zambezi province to the east, Zimbabwe to the west, and the provinces of Manica and Sofata to the south. Tete is inhabited by 1,807,485 people²². The population is predominately rural (85%)²². Poor access to primary education has a great impact on women: 71% of women are illiterate, compared to 39% of men²². The predominant languages are Cinyanja (46.5%), Cinyungwe (27.5%) and Cisena (11.6%) and the official national language is Portuguese²². The estimated HIV prevalence in Tete is 7% among people 15 to 49 years (8% among women)²³.

Sampling and recruitment

The survey aimed to enroll a representative sample of women of Tete province using a stratified multi-cluster sample design. The 2003 Demographic Health Survey was used to identify residential households grouped in clusters. From a list of 52 enumeration units in the province, 34 clusters were selected and, in each cluster, 30 households randomly selected.

Female interviewers, trained to conduct the questionnaire, identified the eligible women. For women to be considered eligible, they had to be 18-60 years old; to be resident in the identified household; and to be willing to provide consent to participate in the survey. At each randomly selected household, a woman aged 18-60 was selected using a Kish table and was invited to participate in the study. If the woman selected was not at the household at present, the interviewers made two further house calls. Sampling was done without replacement of either household or individual refusals. Overall, 1,025 households were approached in 34 clusters; 82 households had no eligible women, 24 women did not participate, and 919 women were interviewed (89.7% response rate; 919/1025).

Written informed consent was sought from all participants. To minimize non-response, interviewers were trained to ask questions in a sensitive and non-judgmental manner in a private location. The interviewers read questions to the consenting women and captured their responses onto paper-based forms that were double-entered electronically by separate data clerks using Epidata (™Odense, Denmark). Women who required medical assistance were given a referral card to local health services.

Data analysis

The survey questionnaire –which was informed by the preliminary ethnographic component, developed collaboratively in a series of workshops, and was translated into local languages and pretested locally– specifically asked the participants if they were currently practicing LME (having had practiced LME in the past 30 days). Current practice of LME is the primary outcome in the analysis presented in this paper.

Descriptive univariate and bivariate inferential analysis was carried out. Cross tabulations and Pearson Chi-squared test (X^2) or Fisher's exact test are used to explore whether demographics and sexual and reproductive health characteristics of women were associated with currently practicing LME. The non-parametric Kruskal-Wallis test is used where appropriate.

Multiple logistic regression was used to estimate the presence and size of associations between current practice and demographic, and sexual and reproductive health characteristics, adjusting for potential confounders. Variables associated with the primary outcome (current practice of LME in the past 30 days) in bivariate analysis ($p < 0.05$) were included into the initial model and retained if their removal markedly altered model fit. A correlation coefficient matrix was run to measure how strongly included independent variables were related to each other: it was found that variables did not correlate at $>0.80^{24}$. Included interval (age) and nominal (partnership status) variables were dichotomized by a process of creating multiple categorical variables. The final model adjusted for age, partnership status, participants having more than one sexual partner, engagement in sex in the past month, condom use at last sex and contraception use. Statistical analysis was conducted using STATA v.12.0. (™College Station, Texas).

Ethics

The Ethics Committee of the Mozambique Ministry of Health approved the protocol of the GSVP study. Ethical approval was also obtained from the UNDP/UNFPA/WHO/World Bank Special Programme on Research, Development, and Research Training in Human Reproduction's Scientific and Ethical Review Group (SERG) and the WHO Ethical Review Committee.

Results

Of the 919 women who participated, 907 (98.7%) had ever practiced LME. The 907 women who had ever elongated comprise the population on which the analysis reported in this article is done. Almost a quarter of the 907 women reported having practiced LME in the past 30 days ($n=218$, 24.0%;

Table 1: Summary of Participants' Demographic Characteristics and Practice of LME

Variable	Women ever did LME Number (n=907)	Did not practice in past 30 days Percentage (n=689)	Practice in past 30 days Percentage (n=218)	Pearson χ^2 P
Current Practice of LME:	n=907			
Yes (95%CI)	907	75.9 (73.0-78.9)	24.0 (21.2-22.6)	
Median frequency in past month (IQR)		-	3 (2-7)	<0.001 ^B
Median age first practiced (IQR)		10 (10-12)	10 (10-12)	0.890 ^B
Timing of practice of LME: ^C	n=907			
Part of hygiene	18	2.0	1.8	0.856
Before or during menstruation	123	14.1	11.9	0.419
In preparation for sex	248	27.0	28.4	0.677
After sex	5	0.4	0.9	0.402
No pattern	357	31.9	62.8	<0.001
Age group:	n=907			
18-24	244	22.9	39.4	
25-34	299	31.3	38.1	
35-44	198	22.8	18.1	
45-60	166	22.9	3.7	<0.001
Median years (IQR)		33 (25-43)	27 (21-33)	<0.001 ^B
Area of residence:	n=907			
Urban	273	27.9	37.1	
Rural	634	72.1	62.8	0.009
Highest education level:	n=907			
None	356	41.0	34.7	
Primary incomplete	400	45.8	38.8	
Primary complete	88	7.6	16.7	
Secondary or tertiary	58	5.7	8.4	<0.001
Religion:	n=907			
Islam	9	0.7	1.8	
Catholic	276	30.8	29.5	
Protestant	159	17.8	18.9	
Zionist	7	6.2	6.4	
Ancestor worship/African traditional	219	23.5	26.2	
None	62	6.8	6.9	0.503
Ethno-linguistic affiliation:	n=907			
Portuguese	7	0.7	0.9	
Nyungwe	424	44.5	54.4	
Nyanja	261	33.1	15.3	
Other language in Tete	173	17.8	23.2	<0.001

^B Krustal-Wallis non-parametric test done to assess p value.

^C Multi-response variable.

IQR: interquartile range

95%CI=21.2-26.9). The remaining 689 women (75.9%, 95%CI=73.0-78.9) had previously practiced LME, but not in the past calendar month. In the past 30 days, 218 women (24.0%, 95%CI=21.2-22.6) had practiced LME a median 3 times (IQR 2-7; Table 1). With regards to timing of LME, most participants (28.4%) reported that this was done in preparation for sex.

These figures were similar for those currently practicing, or who had not practiced in the past 30 days. There was a two-fold increase in the percentage of women who currently practiced and reported to do so for no specific reason (62.8%) when compared with women who did not currently practice LME (31.9%, $p<0.001$).

Table 2: Associations Between Sexual Health and Elongation of the Labia Minora

Variable	Women ever did LME Number (n=907)	Did not practice in the past 30 days Percentage (n=689)	Practice past 30 days Percentage (n=218)	Pearson χ^2 P
Marital status:	n=907			
Married	416	46.6	43.6	
Unmarried, stable relationship	359	37.2	47.2	
Single, never had partnership	14	0.9	3.7	
Divorced	48	5.8	3.7	
Widowed	70	9.6	1.8	<0.001
Live with partner:	n=773 ^E			
Yes	716	93.1	91.4	
No	57	6.9	8.6	0.435
Median age primary partner (IQR)		38 (30-49)	33 (27-40)	<0.001 ^B
Male partner has other partner:	n=773 ^E			
Yes	264	35.1	31.1	
No	509	64.1	67.0	0.602
Woman has other partner:	n=905 ^D			
Yes	85	2.9	6.9	
No	870	97.1	93.1	0.008
Sex in the past four weeks:	n=905 ^D			
Yes	508	52.5	67.6	
No	397	47.5	32.4	<0.001
Often use of condoms:	n=905 ^D			
Always	19	1.8	3.3	
Sometimes	77	7.9	10.7	
Rarely	7	0.4	1.8	
Never	792	89.9	84.2	0.047
Condom use at last sex:	n=905 ^D			
Yes	42	3.7	7.9	
No	852	96.3	92.1	0.011

^B Krustal-Wallis non-parametric test done to assess p value.

^D Excluding 2 women who had never had sex (n=905)

^E The denominator is married and unmarried in a stable relationship (n=773)

Socio-demographics of women currently practicing LME (in past 30 days)

Most women (62.8%, $p=0.009$) lived in rural areas and belonged to the Nyungwe linguistic group (54.4%). Only 8.4% had completed secondary level education ($p<0.001$; Table 1). Being young, a resident in rural areas, a Nyungwe woman, and not having had completed primary studies were associated with current practice of LME (Table 1). The women who currently practiced were a median 27 years (IQR 21-33), six years younger than those who did not practice in the past 30 days. After adjusting for potential confounding variables, women had twice the odds of currently practicing LME if they were younger than 25 years (OR 2.05, 95%CI=1.47-2.87) compared with women older than 25 years (Table 5).

Sexual and reproductive health characteristics

Among the women who had a male partner (n=773), 91.4% were cohabiting with him, and 31.1% reported that their partner had concurrent relationships with other women (Table 2). Current LME practice was particularly common among unmarried women in a stable sexual relationship. On average, the primary partners of the women who had practiced LME in the past 30 days were younger (median 33, IQR 27-40) than the partners of the women who had stopped the practice (median 38, IQR 30-49). Eighty-five women currently practicing LME (6.9%) had more than one sexual partner, more than double that of women who had discontinued the practice (2.9%, $p=0.008$). Having had sex in the past four weeks

Table 3. Associations Between Reproductive Health and Elongation of the Labia Minora

Variable	Women ever did LME Number (n=907)	Did not practice in the last 30 days Percentage (n=689)	Practice past 30 days Percentage (n=218)	Pearson χ^2 P
Ever pregnant:	n=905 ^D			
Yes	874	96.4	96.9	0.723
Currently pregnant	102	12.3	9.5	0.248
Median parity (IQR)		5 (3-8)	3 (2-6)	<0.001 ^B
Uses contraception:	n=905 ^D			
Yes	169	15.1	30.1	<0.001
Ever menstrual problems:	n=907			0.048
None	537	57.3	66.0	
Spotting	71	8.0	7.3	
Lower abdominal pain	36	4.9	1.4	
Both spotting and pain	64	7.3	6.2	
Ever vaginal discharge?:	n=907			
Yes	307	34.2	32.6	0.647
If Yes: What Type?: ^C	n=307			
Excessive fluids	32	11.0	8.5	0.557
White discharge	268	88.9	83.1	0.191
Green discharge	4	1.3	1.4	0.922
Yellow discharge	52	16.6	18.6	0.700
Sticky consistency	30	10.6	7.1	0.389
Foul odour	67	22.1	21.4	0.901
Other genital problems: ^C	907			
Genital pain	87	10.0	8.3	0.442
Genital ulcers and warts	23	3.0	0.9	0.081
Discomforting itchiness	251	30.1	20.2	0.004
Genital/vaginal burning sensation	38	4.5	3.2	0.406
Pain during sexual intercourse	89	10.0	9.2	0.707

^B Krustal-Wallis non-parametric test done to assess p value.

^C Multi-response question

^D Excluding 2 women who had never had sex (n=905)

was associated with current practice of LME (67.6% of women, $p < 0.001$; Table 2). Condom uptake was very low among all women, with 84.2% of the women reporting that they never used them.

In multi-variate analysis (Table 5), women who were in a relationship (OR 1.81, 95% CI: 1.01-3.2) and women who had more than one partner (OR 2.44, 95% CI: 1.17-5.06) had greater odds of practicing LME in the past 30 days. However, after controlling for all other variables in the model, sex in the past 30 days (OR 1.38, 95% CI: 0.96-1.98) and condom use at last sex (OR 1.65, 95% CI: 0.90-3.40) were not associated with practice of LME in the past 30 days.

Almost all women (96.9%) had been pregnant at least once (Table 3). Of these, approximately one tenth were pregnant at the time of the survey. Women who currently practiced LME had fewer children (median=3, IQR 2-6) than women who had discontinued the practice (median=5, IQR 3-8).

Almost one third of the women who had practiced LME in the past 30 days (30.1%) were using contraception, whilst only 15.1% of the women who had stopped LME were doing so (Table 3) after adjusting for all variables, women who used contraception other than condoms, had almost twice the odds of practicing LME in the past 30 days (OR 1.65, 95%CI: 1.10-2.46) (Table 5).

Table 4: Self-Reported Effects of Labia Minora Elongation, Compared with other Vaginal Practices

Current Vaginal Practices (VP) (n=Women who have practiced this VP in past 30 days) ^F	Adverse health effects ^C Women who have used labial elongation in past 30 days (n=218)			
	Women who concurrently practice labial elongation and other VP N (%) (X^2 p.005)	Swelling Number Women (%) (Fisher's Exact test p 0.05)	Dyspareunia	Irritation / Pain
External washing: (n=895)	211 (96.7%) X^2 0.005	5 (2.4) 1.000	-	10 (4.7) 1.000
Douching/Cleansing: (n=800)	195 (89.4%) X^2 0.513	3 (1.5) 0.088	-	8 (4.1) 0.285
Intravaginal insertion: (n=276)	103 (47.2%) X^2 < 0.001	2 (1.9) 1.000	-	6 (5.8) 0.522
Oral ingestion: (n=148)	57 (26.1%) X^2 < 0.001	1 (1.7) 1.000	-	2 (3.5) 1.000
Cutting: (n=219)	55 (25.2%) X^2 0.668	2 (2.3) 0.602	-	3 (5.4) 0.715
Total (regardless of other practices):	From the 907 women 218 (100%)	8 (0.8) 5 (2.3)	1 (0.1)	6 (0.7) 10 (4.6)

^C Multi-response question.^F See François et al 2012 for definition of vaginal practices**Table 5:** Association Between Practice of Labial Elongation in the Past 30 days and Demographic/ Health Factors

Variable	Percent practiced in past 30 days (n=218)	Crude OR (95% CI)	P value for bivariate OR	Adjusted OR (95% CI)	P value for multivariate OR
Age					
Older than 25years	132 (60.5%)	Ref.		Ref.	
Younger than 25years	86 (39.4%)	2.18 (1.58- 3.02)	<0.001	2.05 (1.47-2.87)	<0.001
Partnership status					
Not in relationship	20 (9.2%)	Ref.		Ref.	0.045
In relationship	198 (90.1%)	1.92 (1.16-3.17)	0.010	1.81 (1.01-3.2)	
Woman has other Partners					
No	202 (93.1%)	Ref.		Ref.	
Yes	15 (6.9%)	2.48 (1.24-4.93)	0.008	2.44 (1.17-5.06)	0.016
Sex in past 30 days					
No	70 (32.4%)	Ref.		Ref.	
Yes	146 (67.6%)	1.88 (1.36-2.59)	<0.001	1.38 (0.96-1.98)	0.078
Condom at last sex					
No	199 (92.1%)	Ref.		Ref.	
Yes	17 (7.9%)	2.23 (1.18-4.21)	0.011	1.75 (0.90-3.40)	0.097
Contraception (excl. condoms)					
No	165 (75.7%)	Ref.		Ref.	
Yes	53 (24.3%)	2.00 (1.37-2.93)	<0.001	1.65 (1.10-2.46)	0.015

In this model, current practice of labial elongation (past 30 days) was adjusted for variables with a significant association in bivariate analysis (age, partnership status, women has other partners, sex in past 30 days, use of condom at last sex, and use of contraception, excluding condoms). OR = odds ratio.

Self reported ill health and adverse effects associated with LME

One third of women (32.6%) reported that they had ever had vaginal discharge, which was most commonly a white color (83.1%) (Table 3). Similarly, about one third of women had experienced menstrual problems. Menstrual symptoms of spotting and lower abdominal pain were less common in women who currently practice than in those who had stopped. Also, discomforting itchiness of the genitalia was less frequent among women who currently practice LME than among women who had stopped (Table 3).

The women mentioned few symptoms or adverse health effects that they associated with LME (Table 4). Notably, ten (4.7%) and five (2.4%) women respectively reported having suffered pain or irritation and swelling in the past 30 days. Only one woman, who had not practiced LME in the past month, mentioned dyspareunia. All the women who reported genital pain or irritation and swelling were also using other vaginal practices, at least concurrently using external washing with LME (Table 4). The self-reported adverse events of LME in the past 30 days were compared with contemporaneous practice of other vaginal practices. Compared with women not practicing LME, current users were more likely to also currently practice external washing ($p=0.005$) and oral ingestion and intravaginal insertion of substances ($p<0.001$) (Table 4).

Discussion

The study identified key determinants of current LME, both demographic characteristics and sexual behaviors. Recent use of LME was associated with being younger than 25 years, a resident in rural areas; not having completed primary level education; and a member of the Nyungwe ethnolinguistic group. Moreover, LME was more common among women in a relationship; having more than one male partner; and those reporting recent sexual activity. The analysis corroborated that, as LME is practiced in preparation for sexual intercourse, the women concurrently engaged in

other practices, such as external washing, that aim to alter the tightness, temperature and lubrication of the vagina²⁰. Some of these associations relate to the main motivators reported for LME in Mozambique in the literature^{1,4,20,30}. Namely: to feel feminine, to keep a partner committed and to enhance pleasure for both men and women^{1,4,20,30}.

This study demonstrates that pain, irritation and swelling were uncommon effects of LME. These were reported when other vaginal practices –external washing, intravaginal insertion and oral ingestion– were practiced contemporaneously. No woman who was currently practicing LME alone reported any adverse effect. The few short-term effects described by our participants are consistent with previous reports of pain, irritation, and swelling reported by women in qualitative research in Malawi²⁵, South Africa²⁶, Rwanda²⁷, or Uganda²⁵. Only one woman among the 907 women from Tete province (who was not currently using LME) reported symptoms consistent with a WHO report claiming that dyspareunia may be an adverse effect of LME²⁸.

Our study provides useful insights into arguments that LME may be linked with higher levels of risky sexual behavior or with genital ill health^{1,25}. Albeit the percentage of women with more than one partner was higher among the group of women who currently practiced LME; condom and contraception use were higher in these women. Additionally, there was no association between current practice and other genital symptoms such as menstrual complaints and vaginal discharge. Overall, there is little scientific evidence that LME increases risk of ill health beyond the potential adverse effects –pain, irritation and swelling– identified in our survey¹. There is paucity of documents measuring the role that LME plays in HIV/STI transmission or in altering vaginal pH or lactobacilli vaginal flora. A prospective cohort study that includes serial laboratory investigations of vaginal flora may assist in establishing an association between LME and sexual and reproductive ill health.

Participants in qualitative research in Mozambique²⁹, Rwanda³⁰, South Africa²⁶, or Uganda³¹ noted that men may feel discouraged to use a female condom as it impedes foreplay with their partner's elongated labia. A research group

from the University of Padova in Italy, The Padova Working Group in Female Genital Mutilation, described LME as a *'form of masturbation socially accepted... a pretext for encouraging sexual promiscuity'*³², and then considered that LME had an influential role on women's higher vulnerability to HIV²⁵. This statement was shared by one of the authors of this paper with Zambian women and men that participated in another research conducted in South Africa in 2014²⁶. The participants opposed such a statement and argued that the elderly instructors advise the young girls to keep their virginity until marriage and not to engage in early sex with other boys²⁶. It must be noted that practices such as intravaginal insertion or LME are not direct causes of the HIV infection, are not invariably associated with uptake of risky sexual attitudes, but are carried out in environments in which women are subjected to a myriad of gendered norms that may contribute to their vulnerability. Modern-day academia should ask the women what the motivations and health implications of traditional genital modification practices are. As reported by many participants in qualitative studies on LME, beyond the enhancement of sexual pleasure women want to be admired, considered, valued, integrated, and fit as members of their society and their culture^{1,20,26}. This is, ultimately, what most women want all around the world.

Future prospects

Understanding of the consequences of LME can help inform interventions that aim to improve women's health. These interventions might include discussion on traditional genital practices in groups of men and women, culturally-appropriate educational materials on LME, and assisting mothers to provide instructions on LME to their daughters, drawing on evidence-based recommendations³³. Furthermore, in the frame of continuing nursing education programs in Mozambique, nurses attending women who practice LME could be encouraged to explore their sexual and reproductive practices; assess their agency to use HIV/STI prevention technologies;

and provide appropriate health education to help them improve their sexual health. As LME is a sensitive practice that is not discussed in public, it will be important to carefully design and field test any health promotion activities related to LME.

A longitudinal prospective study may help to understand causality; as the women from Tete province also linked pain, irritation and swelling to other vaginal practices^{14,15,19}. Such a study could also untangle linkages between any adverse effects of LME and whether these are related to the concurrent use of other vaginal practices involving vaginal drying. We encourage scholars, prevention product developers and sexual health programmers to investigate how concurrent engagement in LME and other vaginal practices may hinder or foster opportunities for women and men to use HIV/STI prevention technologies. Mixed-methods research is also required to understand how the practice of LME impacts women's psychosocial and sexual health and how engaging in this practice at an early age may reinforce gendered norms that raise the vulnerability of girls and women to HIV/STI.

Limitations

Because of its large sample size, a strength of this study is that it is powered to detect potential harms of LME. However, as this is a cross-sectional study, it was not possible to ascertain causality. Most especially, we could not assess the temporal order of the vaginal practices and adverse effects.

A further limitation of our study is that almost all women had ever practiced LME and we thus could not compare those who had and those who had not used the practice. The GSVP study was conducted in 2007; should such a survey be conducted today in the same setting, the percentage of women who have never practiced LME might have increased and different groups of women (ever versus never having practiced it) could be compared. A recent study in Maputo, Nampula and Zambezi provinces of Mozambique suggests that the proportion of women adopting the practice may be reducing³⁴. Interestingly, in that study, around forty percent of women had stopped LME, often citing *'disliking a painful experience'* as a key motivator for this³⁴.

Conclusion

Socio-demographic determinants of current use of LME were: younger than 25 years; being a resident in rural areas; not having had completed primary level education; and belonging to the Nyungwe ethno-linguistic group. Other important variables associated with current practice of LME were: being in a relationship; having more than one partner; and recent sexual activity. Women practicing LME had higher levels of condom and contraception use than non-users. These factors together reflect the main motivators identified for LME in Mozambique: to feel feminine, to keep a partner committed and to enhance sexual pleasure. This study finds that according to the reports of most participants LME is not a major contributor to sexual and reproductive ill health among mature women. Pain, irritation and swelling were uncommon effects of LME, and may be due to other vaginal practices used concurrently. Importantly, overall, the study does not suggest that the practice of LME is linked with high-risk behaviors for HIV transmission.

Contribution of Authors

AMH conceived, designed and directed the study. BB, MH, EM, FM and TH contributed to study design, data collection and analysis. GMP contributed to data analysis and prepared this manuscript. All authors listed in this article approved the manuscript for publication.

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