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Health system factors influencing traditional herbal medicine use during pregnancy amongst women in Mpigi District, Central Uganda

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Abstract

An estimated 80% of the population in developing countries is dependent on traditional medicine for their health needs, including use during pregnancy despite limited knowledge of potential side effects including teratogenicity. Controlling use of traditional medicines during pregnancy requires understanding the driving factors. This study aimed at determining the health system factors that influence traditional herbal medicine use during pregnancy in a Ugandan setting. A cross-sectional study was conducted among 315 post-partum women obtained by random sampling from post-natal clinics of health facilities in Mpigi District after informed consent. We carried out concurrent triangulation by conducting two focused group discussions of 10 post-natal mothers each, and four Key informant interviews. Quantitative Data analysis involved descriptive statistics and logistic regression analysis. Qualitative data was analyzed by thematic content analysis and presented as narratives. Prevalence of herbal medicine use during pregnancy was 79% (95% Confidence Interval (CI) 68.1% – 86.9%), mainly consumed through oral route (96%). Costly health care adjusted Prevalence Ratio (aPR) 1.61 (95% CI 1.02-2.53), p-value 0.042, and presence and influence of Traditional Birth Attendants aPR 1.21(95% CI 1.05-1.41), p-value 0.011 were significantly associated with use of traditional herbal medicines during pregnancy. Use of traditional herbal medicines is driven by the high costs of quality health care and influence from Traditional Birth Attendants. Innovations in health financing should be promoted and Traditional Birth Attendants should be sensitized and incorporated in the mainstream health care system as community referral agents. *(Afr J Reprod Health 2021; 25[6]: 88-98).*

Keywords: Traditional herbal medicines, Mpigi District, traditional birth attendants, pregnancy. costly healthcare

Résumé

On estime que 80 % de la population des pays en développement dépend de la médecine traditionnelle pour ses besoins de santé, y compris son utilisation pendant la grossesse, malgré une connaissance limitée des effets secondaires potentiels, y compris la tératogénicité. Le contrôle de l'utilisation des médecines traditionnelles pendant la grossesse nécessite de comprendre les facteurs déterminants. Cette étude visait à déterminer les facteurs du système de santé qui influencent l'utilisation de la phytothérapie traditionnelle pendant la grossesse dans un cadre ougandais. Une étude transversale a été menée auprès de 315 femmes en post-partum obtenues par échantillonnage aléatoire dans les cliniques postnatales des établissements de santé du district de Mpigi après consentement éclairé. Nous avons effectué une triangulation simultanée en menant deux discussions de groupe ciblées de 10 mères postnatales chacune, et quatre entretiens avec des informateurs clés. L'analyse des données quantitatives impliquait des statistiques descriptives et une analyse de régression logistique. Les données qualitatives ont été analysées par analyse de contenu thématique et présentées sous forme de récits. La prévalence de l'utilisation de plantes médicinales pendant la grossesse était de 79 % (intervalle de confiance (IC) à 95 % 68,1 % – 86,9 %), principalement consommée par voie orale (96 %). Le rapport de prévalence (aPR) ajusté pour les soins de santé coûteux 1,61 (IC à 95 % 1,02-2,53), la valeur p 0,042, et la présence et l'influence des accoucheuses traditionnelles aPR 1,21 (IC à 95 % 1,05-1,41), la valeur p 0,011 étaient significativement associés avec l'utilisation de plantes médicinales traditionnelles pendant la grossesse. L'utilisation de plantes médicinales traditionnelles est motivée par les coûts élevés des soins de santé de qualité et l'influence des accoucheuses traditionnelles. Les innovations dans le financement de la santé devraient être encouragées et les accoucheuses traditionnelles devraient être sensibilisées et intégrées dans le système de soins de santé ordinaire en tant qu'agents de référence communautaires. *(Afr J Reprod Health 2021; 25[6]: 88-98).*

Mots-clés: Phytothérapies traditionnelles, district de Mpigi, accoucheuses traditionnelles, grossesse. Soins de santé coûteux

Introduction

Herbal medicines are the most commonly used form of traditional medicine worldwide[1]. An estimated 80% of the population living in rural areas in developing countries depends on traditional medicine for their health needs, including use during pregnancy[2]. Herbal medicines are plant

extracts, usually administered in raw form without pharmaceutical processing, to prevent, treat or alter the course of illnesses or conditions[3]. Herbal medicines are often taken concurrently with conventional medicines and not strictly as an alternative[4]. In developing countries, the use of herbal medicines is believed to be increasing, despite little knowledge about their use and safety especially during pregnancy[5,22].

Although there is limited knowledge of potential side effects of many herbal medicines in pregnancy[6], and possibility of teratogenic effects[7,8], exposure to herbal products is frequent in pregnancy[9], often on a self-treatment basis[10]. Like modern pharmaceutical drugs, herbal medicines have the potential to cause adverse effects[11]. The causes of such adverse reactions are diverse, including the use of inherently toxic herbal medicines or an overdose of herbs, conventional drug-herbal medicine interactions, and idiosyncratic reactions such as allergies[12]. Therefore, relying on herbal medicines during pregnancy instead of scientifically proven treatment can have serious consequences, suggested to include fetal distress and premature deliveries, intrauterine growth restriction and decreased fetal survival[13], and congenital malformations[14], among others.

Several herbs have the ability to contract the uterus thereby posing risks of abortion[15] and pre-term labour resulting in premature babies, who have reduced chances of survival compared to term babies. While pregnant women recognize the potential risks of drug usage during pregnancy, they do not realize that herbal products could also be toxic, premised on the implicit belief that herbal products, being natural, are necessarily safe[16].

In Uganda, use of herbal medicine is believed to contribute to poor maternal health seeking behaviour and consequently high maternal mortality, currently at 336 deaths per 100,000 live births[17]. Whereas over 97 % of pregnant women attend at least one ANC visit, only about 60% attend the recommended four or more ANC visits, and only 73 % give birth in a health facility[17], suggesting possibility of resorting to alternative methods of health care, including use of herbal medicines. In a study at Mulago hospital, 6% of the patients with abortion related admissions had used *mumbwa* [local herbal preparation] in the preceding 4 weeks period[18]. Abortion is illegal in Uganda, as in several other African countries, unless the physical or mental health of the mother is severely at risk[19]. Women who seek an abortion may therefore have recourse to the frequently unsafe traditional methods to induce foetal loss. Due to their inherent properties that lead to uterine contractions[15], herbal medicines may cause strong uterine contractions, which may result into abortions, preterm labour and/or uterine atony with resultant post-partum haemorrhage[15]. Post-partum haemorrhage is the leading cause of maternal mortality in Uganda[17].

Use of herbal and pharmaceutical products concomitantly leads to drug interactions with resultant undesirable effects of increased toxicity and/or decreased efficacy. One study found 40% of those using herbal medicine combined herbs with pharmaceutical drugs during pregnancy[20], however, the outcomes of such use of both herbs and pharmaceutical drugs were not reported. For a comprehensive health delivery system, while handling curative services, the system needs to address the health prevention and promotion activities and provide adequate health information dissemination about the herbal medicine use[19]. It is assumed that the service delivery system is able to provide appropriate information to the pregnant women seeking care from health facilities, making it paramount for health systems to study use of herbal medicines during pregnancy.

Despite knowledge of the potential of adverse outcomes associated with herbal medicine use during pregnancy, they have continued to be used[21,22]. Therefore, there must be a number of factors that drive mothers to use these herbal medicines, even in light of their toxicity profile. This study therefore sought to determine these factors, to help in implementation of programmes to address traditional herbal medicine use during pregnancy and improve maternal and new born health.

Methods

Study design

This was a mixed methods health facility-based study conducted from May to September 2019. An

Table 1: Demographic characteristics of the respondents

Category	Item	Frequency (n=315)	Percentage (%)
Age			
	15-24	76	24
	25-34	190	60
	35-44	46	15
	45-54	3	1
Tribe			
	Baganda	205	65
	Banyankole	44	14
	Basoga	22	7
	Bagisu	14	4
	Banyoro/Batooro	12	4
	Banyarwanda	11	4
	Others	07	2
Education Level			
	No formal schooling	42	13
	Primary	95	30
	Secondary	91	29
	Tertiary	87	28
Marital status			
	Single	49	16
	Married	249	79
	Separated	17	5
Employment status			
	Unemployed	102	32
	Self-employment	111	36
	Formal employment	90	32
Religion			
	Christian	250	79
	Moslem	64	20
	Others*	1	1
ANC Attendance			
	Never attended	22	7
	Once	15	5
	Twice	79	25
	Thrice	135	43
	Four or more	64	20

*Bhudist

interviewer administered semi structured questionnaire was used to collect quantitative data, while qualitative data was obtained through Focus group discussions and key informant interviews.

Study site

The study was conducted in Mpigi District, Central Uganda. In Uganda, the health system is organized in levels of care depending on the package of services offered. The lowest ranking health unit is a Health Centre II, which services a parish; and refers to health centre III, at subcounty level. Health Centre IIIs have inpatient treatment capacity and also offer basic emergency obstetric care and maternity services. Health centre IIIs refer to Health Centre IVs, that serve a constituency and have capacity to offer comprehensive emergency obstetric care. The largest health unit in a district is a general hospital, which refers to a regional referral hospital at regional level and finally to the national referral hospital at national level. Mpigi District has a total of 26 health facilities. These include one hospital, two health centre IVs, 18 Health centre IIIs and 5 health centre IIs. Of these, there are 8 private not for profit hospitals (One hospital, one health centre IV and 5 health centre IIIs), and 18 public facilities.

A total of four health facilities were selected to participate in the study. These included one PNFP hospital, one public Health Centre IV and two public Health Centre IIIs. The four facilities were purposively selected given that they are all high-volume facilities for maternity services. All these facilities provide antenatal, maternity and post natal services. Mpigi District is located in central region of Uganda with a population of 250, 540 with 83% of this population living in rural areas. Skilled birth attendances are at 56%, Antenatal care 4st visit at 36% while first post-natal care visits are at 24.8%[24] In Uganda Demographic Health Survey of 2016, the majority of the women of reproductive age sought maternal health care from health facilities. Nationally, the antenatal attendance was 95.8%; deliveries in health facilities was 81.1%; and post natal attendance was 56.3%[16].

Sample size estimation

Using the Leslie Kish 1965 formula [Kish, 1965]; $n = (Z\alpha)^2(PQ)/\delta^2)$

With standard normal deviation at 95% confidence interval (Z=1.96), P-expected proportion of women who attend post-natal service 24.8%[24] and sampling error (δ) of 5%, and accounting for a non-response bias of 10% a total of 315 post-partum women (15-49 years) was considered for the study.

Study population, sampling and recruitment

A sample size of 315 was obtained using the Keish Leisle formula, and these were systematically

Table 2: Prevalence of traditional herbal medicine use during pregnancy in Mpigi District

Category		Frequency	Percentage (%)
Did you use herbal medicine during pregnancy (n = 315)			
	Yes	249	79
	No	66	21
At what stage of gestation (n= 249)			
	0-12	169	68
	13-27	160	64
	28-40	160	64
	In labour	55	22
For how long (n=249)			
	1 day	5	02
	1 week	4	02
	1 month	37	15
	Several months	203	82
Source of herbal medicines (n = 249)			
	TBA*	109	44
	Mother	96	39
	Garden	19	08
	Peers	17	07
	Others	8	03
Commonly used herbs (n=249)			
	Emumbwa	147	59
	Ebombo	57	23
	Olweza	43	17
	Namirembe	30	12
	Others	139	55
Routes of administration (n=249)			
	Oral	240	96
	Topical	200	80
	Vaginal	85	34
	Parenteral	10	04

sampled, by skipping every other three mothers from those attending the post-natal clinics. A pre-coded and pre-tested semi-structured questionnaire was used to collect quantitative data. Two focused group discussions were held, lasting 45 and 74 minutes respectively comprising of ten mothers each, selected at the immunization clinic. These were mothers who had not been part of the quantitative study. Four key informants including one traditional birth attendant (TBA), one Village Health Team member (VHT), and two midwives were interviewed. A number of health system factors were studied, to determine their influence on herbal medicine use during pregnancy. These included distance from the nearest health facilities, attitude of health care workers, availability of medicines and supplies at the health facilities among others.

Data was coded and entered into a computerized database using epi-data version 3.1. Data was then cleaned and analyzed at three levels using STATA version 12. Generalized Linear models with Poisson regression were used to identify health system factors that independently influence herbal medicine use during pregnancy. Qualitative data was analyzed using content analysis; data was transcribed, interpreted and some responses were used as quotations in the presentation and discussion of findings. After transcription, the recorded data was anonymized and stored together with the questionnaires.

Results

Socio-demographic characteristics of the respondents

The median age of the participants was 28 years and ages ranged from 18 to 49 years of age. Majority of the participants were below 30 years of age, with the 75th percentile at 31 years. Multiple tribes participated in the study but the majority (65%) were Baganda.

Prevalence of traditional herbal medicine use

The results showed that 79% (95% CI 68.1% - 86.9%) of the participants used traditional herbal medicines for their health needs during pregnancy**.** The period of time during which the herbal medicines are used varied amongst different women. Majority of these (82%) had used traditional herbal medicines for several months during pregnancy while only 2% (5 participants) had used herbal medicines for only one day, and that was during labour.

The reasons given for use of herbal medicines included providing energy to the mother, reducing vomiting during pregnancy, cleansing the baby of evil spirits, preventing neonatal conditions like jaundice, easing labour, faster and quick delivery, and bringing good luck to the mother and the new born baby. These were further stressed during FGDs where one participant stated that 'traditional herbal medicines like *Olweeza* cleanses the baby of all bad spirits and brings good luck throughout the baby's life.' Another participant in one of the focused group discussions remarked that:

Table 3: Bi-variable analysis for the health system factors influencing traditional herbal medicine use during pregnancy in Mpigi District

	Used HM in pregnancy (n=315)			CPR (95 % CI)	P-Value
	Yes	No	Total		
Distance from Health Unit					
>5km	166	64	230	1.0	
<5km	83	2	85	1.35 (1.24-1.47)	<0.001*
Rude and Careless Health Workers					
Disagreed	131	60	191	1.0	
Agreed	79	2	81	1.42 (1.28-1.58)	<0.001*
Neutral	39	4	43	1.32 (1.15 –1.51)	<0.001*
Presence of TBA					
Disagreed	46	54	100	1.0	
Agreed	170	6	176	2.10 (1.69-2.60)	<0.001*
Neutral	33	6	39	1.84 (1.43-2.37)	<0.001*
Side-effects from conventional medicines					
Disagreed	58	42	100	1.0	
Agreed	148	11	159	1.60 (1.35-1.91) <0.001*	<0.001*
Neutral	43	13	56	1.32 (1.06-1.65)	0.013
Costly Health Care					
Disagreed	11	25	36	1.0	
Agreed	225	30	255	2.89 (1.76-4.74)	<0.001*
Neutral	13	11	24	1.77 (0.96-3.28)	0.068
Inadequate Health Educations in ANC					
Disagreed	90	21	111	1.0	
Agreed	99	24	123	0.99 (0.88-1.12)	0.909
Neutral	60	21	81	0.91 (0.78-1.06)	0.260
Inadequate supplies at Health facilities					
Disagreed	106	41	147	1.0	
Agreed	78	4	82	1.26 (1.11-1.42)	<0.001*
Neutral	65	17	82	1.10 (0.95-1.28)	0.215
Adverts for herbal medicines					
Disagreed	16	20	36	1.0	
Agreed	192	36	228	1.89 (1.31-2.74)	0.001*
Neutral	41	10	51	1.81 (1.22-2.67)	0.003*

*P-value significant (<0.05), CPR [Crude Prevalence Ratio], TBA [Traditional Birth Attendant], ANC [Ante-Natal Care] HM [Herbal Medicine

> *"Early pregnancy is associated with severe vomiting and weakness. Traditional herbal medicines help to restore energy, and stop vomiting. Some of those conditions cannot be effectively controlled by medicines from hospitals, because they are natural conditions." FGD participant*

The commonest route of administration used was the oral (96%) and topical routes (80%), The vaginal route had been used by 34% of the respondents. According to the participants, the vaginal route is preferred because of its effectiveness in inducing and fastening labour. This was highlighted by one of the participants in the FGDs who stated that:

> *"There are special medicines prepared to insert in the vagina to induce labour and fasten the process of labour by augmenting the contractions. These also help to avoid caesarian section delivery even in mothers who have previous scars." FGD participant*

The parenteral route of administration was also used by the respondents, where a razor blade is used to make cuts on the mother's skin, so that herbs are smeared in the cuts and into the blood stream.

Table 4: Multivariate Poisson Regression Model for use of herbal medicines during pregnancy in Mpigi District

	CPR (95 % CI)	*p*-value	aPR (95% CI)	*p*-value
Distance from Health Unit				
>5km	1.0		1.0	
<5km	1.35 (1.24-1.47)	<0.001	1.06(1.01-1.17)	0.101
Rude and Careless Health Workers				
Disagreed	1.0		1.0	
Agreed	1.42 (1.28-1.58)	<0.001	1.06(1.10-1.13)	0.058
Neutral	1.32 (1.15 –1.51)	<0.001	1.17(1.03-1.32)	0.013
Presence of TBA				
Disagreed	1.0		1.0	
Agreed	2.10 (1.69-2.60)	<0.001	1.21(1.05-1.41)	0.011*
Neutral	1.84 (1.43-2.37)	<0.001	1.02(0.85-1.22)	0.841
Side-effects from convent				
Disagreed	1.0		1.0	
Agreed	1.60 (1.35-1.91)	<0.001	0.91(0.81-1.04)	0.157
Neutral	1.32 (1.06-1.65)	0.013	0.90(0.78-1.05)	0.187
Costly Health Care				
Disagreed	1.0		1.0	
Agreed	2.89 (1.76-4.74)	<0.001	1.61(1.02-2.53)	0.042*
Neutral	1.77 (0.96-3.28)	0.068	1.14(0.70-1.86)	0.596
Inadequate supplies at Health facilities				
Disagreed	1.0		1.0	
Agreed	1.26 (1.11-1.42)	<0.001	0.99(0.87-1.10)	0.823
Neutral	1.10 (0.95-1.28)	0.215	1.01(0.88-1.15)	0.938
Adverts for herbal medicines				
Disagreed	1.0		1.0	
Agreed	1.89 (1.31-2.74)	0.001	0.89(0.66-1.19)	0.439
Neutral	1.81 (1.22-2.67)	0.003	0.88(0.66-1.17)	0.370

*p-value significant [Less than 0.05], aPR [adjusted Prevalence Ratio], 95% CI [95% confidence interval] CPR[Crude Prevalence Ratio]

A total of 10 participants (4%) had used this method. This was further elaborated by one Key Informants, KI2, a TBA, who stated that:

> *"The parenteral route is highly effective for hereditary curses that are inherited through blood lineage. Some curses from the great grand-fathers can follow through to grand-daughters bringing misfortunes like recurrent miscarriages, and recurrent early neonatal deaths." KI 2.*

Health system factors that influence herbal medicine use during pregnancy

Most participants 98% (83, n=85) who lived more than 5 km from the nearest health facility used herbal medicines during pregnancy. Participants who lived over 5 kms from the nearest health facility were 1.35 times more likely to use herbal medicines than their counterparts who lived within 5kms from the health unit. Long distances from health facility was statistically significant (p-value <0.001) at influencing herbal medicinal use during pregnancy at bi-variable analysis.

Majority of the participants (61%) disagreed that health workers were rude and careless. However, of the 81 participants who agreed that health workers at health facilities were rude and careless, 79 (98%) of them had used herbal medicines during pregnancy. Participants who stated that health workers were rude and careless were more likely to use herbal medicines than those who never agreed and this was found to be statistically significant at bi-variable analysis (CPR 1.42, 95% CI 1.28-1.58). However, during FGDs, it was found out that mothers don't want to attend ante-natal and get conventional medicines not because of rude and careless health workers but because the health workers at facilities are young, and some are even naïve about child birth. An FGD participant narrated that:

> *"Sometimes you come to the hospital for ante-natal care and you find a very young health-worker, who has never given birth and sometimes you feel embarrassed undressing in front of her. …when they start talking ill about herbal medicines you may think it is because they are naïve about child birth." FGD Participant*

Presence of a Traditional Birth Attendants (TBAs) was found to influence mothers to use herbal medicines during pregnancy. Sixty eight percent (170, n=249) of the users of herbal medicines reported that they had been influenced by the ease of access and availability of TBAs, who often have herbal medicines. This was highlighted as a key factor in the FGD, where a participant stated that:

> *"The presence of a TBA in our village helps us to easily access herbal medicines from her, since she knows most of them, and has used them on a number of people with good results. She has a lot of experience and know many important herbs for pregnancy conditions." FGD Participant.*

Mothers with easy access to TBAs were twice more likely to be influenced to use traditional herbal medicines than those who reported no TBAs near their locality. This was found to be statistically significant (CPR 2.10, 95% CI: 1.69-2.60), *p*-value<0,001).

Costly health care is another factor that greatly influences use of herbal medicines during pregnancy. Ninety percent (90%) of the users of herbal medicines during pregnancy reported that herbal medicines are very cheap compared to conventional medicines. Those who reported that herbal medicines are cheaper compared to conventional medicines were almost three times more likely to use herbs in pregnancy than those who did not. This was statistically significant with p-value <0.001. It was also found that the other costs associated with conventional health care would further influence women to resort to herbs. This was reported in FGDs that:

> *"When you go to the health facility, you have to pay for tests, consultation fees, registration fees, even before getting the drugs. Even in Government facilities, you have to pay for some items. Yet at the TBA, you just buy the local medicines and start using. It is cheaper." FGD participant*

The study revealed that inadequate health care supplies at health facilities influences herbal medicine use during pregnancy. One participant in the FGDs stated that:

> *"You walk for over five miles to reach a facility, and then you don't find anything like gloves, cotton, not even medicine. If u find them there, they ask you to pay for them, Yet, we have these herbs in our gardens near our homes." FGD Participant*

Key Informant 4 explained that most often than not, there is presence of limited health commodities at the health facility, because they serve a big population. She stated that 'we often run out of stock of medicines and sometimes we tell the mothers to buy from private pharmacies outside.' This frequent stock out of key commodities makes mothers resort to use of herbal medicines for their health needs during pregnancy.

Apart from the herbs' availability and accessibility from people's gardens and farmlands, it was revealed that a number of herbalists move around villages and small towns selling herbs. Key Informant 3, a VHT from one of the communities remarked that there were a number of traditional herbal medicine hawkers who move around with mega-phones selling herbs to people. These would sell herbs to pregnant women at the comfort of their homes. There were also multiple adverts on local radio stations and televisions which advertise herbal medicines. These induce demand and consequently influence use of herbal medicines. Adverts for traditional herbal medicines were found to be statistically significant at influencing use of herbal medicines during pregnancy, with a *p*-value less than 0.001.

Multivariate analysis of the factors that influence herbal medicine use during pregnancy in Mpigi District

Factors that were statistically significant on bi-variable analysis were further tested using multi-variable analysis to determine those that independently influence herbal medicine use during pregnancy.

Influence/presence of TBAs and costly health care were the only factors that were found out to be statistically significant at independently influencing herbal medicine use during pregnancy. The rest of the factors with p-values above 0.05 were not statistically significant. The multivariate analysis was conducted using the generalized linear models, using the Poisson Regression Model with robust variance.

Discussion

The prevalence of herbal medicine use during pregnancy was high. It was found out that 79% of women had used herbal medicines during their most recent pregnancy. This high prevalence compares well with WHO which estimated a prevalence of 80% in developing countries[2] and 68% reported in one Nigerian study[21]. However, in the recent Ugandan study, the prevalence had been reported as 21%[22], while a multi-national study reported a prevalence of 28%[23]. Other studies in Kenya reported a lower prevalence of 12%[25,26]. The reported lower rates in the other studies, compared to this studies' findings and WHO's estimation, could be attributed to non-disclosure due to the methodology used in the previous studies, where health-workers were used as data collectors. Previous studies found out that women were less likely to disclose use of herbal medicines to healthcare providers if they sought treatment from herbalists[22,27]. In this study, data collectors were selected from members of the community, and hence it is possible that non-disclosure was minimized.

The differences in prevalence could also be attributed to the differences in the populations studied including differences in socio-cultural contexts and health care systems (accessibility, costs, availability and trust of the health workers). Mpigi District is located in Central Uganda, which happens to be the home of several herbalists in addition to hosting the institute of traditional medicine in Buyijja forest[28]. Though Gharoro and Igbafe studied use of herbs among postnatal women, they only considered use of few specific herbs which is likely to explain the relatively lower prevalence of use[25]. While Titilayo *et al* looked broadly at use of herbal medicines in recent years among pregnant women[21], this study focused on use in the most recent pregnancy. This gives a plausible explanation to the likely differences in the reported prevalence of herbal medicinal use between their study and this study.

The routes of administration of the herbal medicines included mainly the oral and topical route. The study findings were consistent with those of Mekuria *et al* in Ethiopia, who also found out that herbs were most commonly consumed by the oral route[29]. However, in this study, we found out that 4% of the respondents had used the parenteral route, which leaves questions on the safety of the procedure, in the era of infectious diseases like hepatitis, and HIV. There was no mention of sterilization of the equipment used to cut the skin, and there was a huge risk of introduction of infections during the process of administering parenteral drugs.

The most commonly used herb was *Mumbwa*, which had been used by 59% of the respondents. In prior studies, the commonest used herbal medicine during pregnancy was ginger[29] in Ethiopia and Garlic[30] in Sydney Autsralia. These contradictory findings are attributable to the differences in the study settings and to the fact that *mumbwa* is a combination of several herbals unlike Ginger and Garlic which can be used as single herbs. *Mumbwa* is also unique to Uganda, and may not easily be found in other countries. *Mumbwa* comprises of several different herbs molded together with clay into a rod. A number of routes are used to administer this traditional herbal medicine including Oral, topical and vaginal routes. Its popularity could be linked to its multiple routes of administration. It is also easy to handle, and store, since it is molded into a clay rod. This means that several women find it convenient to use. Other herbs used are commonly available shrubs nearby people's homesteads, like *olweeza, Namirembe, and ebombo.* These are also easily available and accessible.

Study results revealed the fact that the cost of healthcare strongly influences use of traditional herbal medicines during pregnancy. This was similar to a number of previous studies[22-26]. Herbal medicines are cheap, some are available in people's gardens and farm-lands and require no additional costs unlike conventional medicines, whereby apart

from the direct out of pocket expenditure for health care at the health facility, there are other indirect expenses like transport, consumables like gloves, cotton and guaze, and so on. With Uganda's largest population (60%) depending on subsistence farming[31], there will always be challenges with asking the population to pay for their health needs. Even in public facilities, some mothers will not afford to buy the medicines that are out of stock, or do laboratory investigations as requested. Some may not even afford transport to the health facility. Government has proposed the Universal Health Insurance Scheme, where by all workers will contribute 4% of their monthly earnings to ensure health for all[32]. This is likely to go a long way in reducing catastrophic expenditure for health care, and improve health seeking behavior. With affordable health care for all, there is likely to be a reduction in the users of herbal medicines during pregnancy.

The results of the study also showed that mothers who reported presence of traditional birth attendants in their localities were more likely to be users of herbal medicines during pregnancy. The results also showed that most mothers had obtained the traditional herbs from the traditional birth attendants. Results further showed that these are old, experienced and mature women that are trusted by many expectant mothers unlike the young mid-wives at the Health Centres. The ease of access, trust and affordability of traditional birth attendants gives them leverage as key health providers of choice in communities[33]. This puts traditional birth attendants in a key position regarding maternal and new born care.

These TBAs are not regulated by any law in Uganda. Although the indigenous and complementary medicine bill, 2015 has been tabled in parliament, Uganda's Ministry of Health doesn't recognize TBAs as health workers, hence they have continued their operations albeit illegally. Studies have also shown than Men utilize services of traditional birth attendants for health care of their wives[34]. Recent studies have further stressed the need for collaborative efforts between skilled birth attendants and traditional birth attendants in rural and deprived communities to provide quality and culturally acceptable health care in communities[35]. Similary, Miller reported that a multi-faceted approach to prepare and partner with TBAs improves access to skilled care at birth, and improves maternal and neonatal outcomes[36]. Turinawe *et al* also concluded that since men trust and have confidence in TBAs; closer collaboration with TBAs may provide a suitable platform through which communities can be sensitized and men actively brought on board in promoting maternal health services for women in rural communities[34]. Government of Uganda and partners need to recognize the custodial role of TBAs in maternal health, and offer some basic training and formalize them as community aid posts and referral agents to health facilities for proper care of the mothers and new-borns.

Limitations

This was a facility-based study, and could have missed out on mothers who rarely come to hospital, and who are expected to be users of traditional herbal medicines. This was however minimized by triangulation with qualitative data, which was obtained from community members. Use of first post-natal visit/Immunization visit as the sample population also reduced this effect, since first immunization coverage at 6 weeks is high. (97%). Indeed, even some mothers who never attended any ANC visit were captured from the immunization clinic.

The study was also likely to suffer from information bias (i.e. reporting bias). Since use of herbal medicines is often perceived negatively by health workers, some mothers may fear to admit use of the herbs during pregnancy. To reduce this bias, research assistants who were non-medical health workers (Community members and VHTs) were used to collect data, and they ensured they built enough rapport and explained the importance of the research so as to limit reporting bias.

Conclusion and recommendations

Cost of health care is a key influencer of herbal medicinal use during pregnancy. Quality health care is expensive to most members in the community, and they resort to the available trusted and experienced traditional birth attendants. This therefore calls for innovative health financing models to ensure quality health care is available and

affordable all the time, putting into account the individuals financial risk protection. Such innovations include the National Health Insurance Scheme, Community led health insurance schemes and saving and internal lending schemes for health. Traditional Birth Attendants are highly trusted members in the communities, and play a big role in maternal and child health service provision at the community level, using herbs. These should be mentored, monitored and incorporated into the mainstream health care delivery system as community referral agents. A similar model has worked very well with the Village Health Teams (VHTs) who help in identifying sick children and offering basic treatment and referral to nearby health units. A similar arrangement, if used for traditional birth attendants is likely to work perfectly well.

Ethics approval and consent to participate

This study was approved by the Uganda Martyrs University Institutional Review Board. Permission to conduct the study was also obtained from Mpigi District Health Office and informed consent was sought from all the participants prior to enrollment into the study.

Availability of data and materials

We did not obtain consent to share data obtained from the questionnaire, however the datasets used may be availed on request from the corresponding principle investigator.

Competing interests

The authors declare no conflict of interest in this work.

Authors' contributions

Criscent Tumuhaise developed the proposal, research tools, trained research assistants, supervised and participated in data collection, data analysis and writing the initial complete draft of this manuscript.

Richard Kabanda was responsible for the overall supervision and technical support in the development of the proposal, data analysis and manuscript writing.

Miisa Nanyingi and Arthur Kiconco participated in manuscript writing, reviewing and editing in preparation for the final manuscript for submission.

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References

1. World Health Organization (WHO), 2002. WHO traditional medicine strategy 2002–2005. Geneva.
2. World Health Organisation, 2016. Traditional Medicine; 12-01.
3. Complementary Medicines explained, 2021, NPS MedicineWise. Available at; https://www.nps.org.au/consumers/complementary-medicines-explained
4. Nordeng H, Bayne K, Havnen GC and Paulsen BS. Use of herbal drugs during pregnancy among 600 Norwegian women in relation to concurrent use of conventional drugs and pregnancy outcome. *Complement Therapy Clinical Practices*, 2011 issue 17, Vol 3 pg 147–151.
5. Nikolajsen T, Nielsen F, Rasch V, Sørensen PH, Ismail F, Kristiansen U and Jäger AK. Uterine contraction induced by Tanzanian plants used to induce abortion. *Journal of Ethnopharmacology*. 2011 Issue 137 vol 1: pg 921–5
6. Earnest E. Herbal medicinal products during pregnancy: are they safe? *British Journal of Obstetrics and Gynaecology*. Issue 109: 2002 pg 227–35.
7. Seely D, Dugoua JJ, Perri D, Mills E and Koren G. Safety and efficacy of panax ginseng during pregnancy and lactation. *Canadian Journal of Clinical Pharmacology*; 2008 15(1): pg 87–94.
8. Dugoua JJ, Perri D, Seely D, Mills E and Koren G. Safety and efficacy of cohosh (caulophyllum thalictroides) during pregnancy and lactation. Canadian Journal of Clinical Pharmacology; 2008 15(1):e66–73.
9. Cuzzolin L, Zaffani S, Murgia V, Gangemi M, Meneghelli G, Chiamenti G and Benoni G. Patterns and perceptions of complementary/alternative medicine among paediatricians and patients' mothers: a review of the literature. European Journal of Pediatrics. 2003;162(12):820–7. Epub 2003 sep 26.
10. Conover EA. Herbal agents and over the counter medications in pregnancy. Best Practices Research in Clinical Endocrinology and Metabolism. 2003; 17(2) pg 237-251

11. Tabatabace, M. Use of herbal medicine among pregnant women referred to Valiasr Hospital in Kazeroon, Fars, South of Iran. Journal of Medicinal Plants; 2011 10(37):96–108.
12. Farah MH, Edwards R, Lindquist M, Leon M and D Shaw. International monitoring of adverse health effects associated with herbal medicines. Pharmacoepidemiology of Drug Safety; 2000 9(2):105–12
13. Juliana Y, Zaleha AM and Rushdan MN. Use of complementary and alternative medicine in pregnancy and its impact on obstetric outcome. Complementary Therapies in Clinical Practice, 2016 25:155-163
14. Chan LY, Chiu PY and Lau TK. An in-vitro study of guisenoside Rb1-induced teratogenicity using a whole rat embryo culture model. Journal of Human Reproduction; 2003 18:2166–8.
15. Gruber CW and O'Brien M. Uterotonic plants and their bioactive constituents. Journal of Plant Medicine; 2011 77(3):207–20.
16. Adams C and Cannel S. Women's beliefs about "natural" hormones and natural hormones replacement therapy. Menopause; 2001 8(6):433–40.
17. Uganda Bureau of Statistics 2016. *Uganda Demographic and Health Survey report*.
18. Kiguba R, Ononge S, Karamagi C and Sheila M. Herbal medicine use and linked suspected adverse drug reactions in a prospective cohort of Ugandan inpatients. *BMC Complementary and Alternative Medicine* 2016 16:145.
19. World Health Organization, 2008. Traditional medicine Fact sheet N°134, http://www.who.int/mediacentre/factsheets/2003/fs134/en/. Accessed 19 Dec 2018.
20. Tamuno I, Omole-Ohonsi A and Fadare J. Use of herbal medicine among pregnant women attending a tertiary hospital in northern Nigeria. *International Journal of Gynecology and Obstetrics*. 2011 Vol. 15, issue 2.
21. Titilayo OK, Rasaq A and Ismail EM. Attitude and use of herbal medicines among pregnant women in Nigeria. *BMC Complementary and Alternative Medicine*; 2009 issue 9: pg 53
22. Nyeko R, Tumwesigye NM and Halage AA. Prevalence and factors associated with use of herbal medicines during pregnancy among women attending postnatal clinics in Gulu district, Northern Uganda. BMC Pregnancy and Childbirth 2016 Vol. 16: pg296
23. Kennedy AD, Lupattelli A, Koren G and Nordeng H. Herbal medicine use in pregnancy: results of a multinational study; *BioMedCentral Complementary and Alternative Medicine*, 2013 issue 13: page 355 available at http://www.biomedcentral.com/1472-6882/13/355
24. Mpigi District Annual Performance report, 2018.
25. Gharoro EP and Igbafe AA. Pattern of drug use amongst antenatal patients in Benin City, *Nigeria. Medical Scientific Monitoring*; 2000 issue 6: pg 84-7.
26. Mothupi MC. Use of herbal medicine during pregnancy among women with access to public healthcare in Nairobi, Kenya: A cross-sectional survey. *BMC Complementary and Alternative Medicine*; 2014 issue 14: pg 432.
27. Banda Y, Chapman V, Goldenberg RL, Stringer JSA, Culhane JF, Sinkala M, Vermund SH and Chi BH. Use of traditional medicine among pregnant women in Lusaka, Zambia. *Journal of Alternative and Complementary Medicine*; 2007 13 (1): pg 123–8
28. Mbogo S. Traditional healers ask MPs to pass law to regulate their work. *The daily monitor*, available at www.monitor.co.ug 2015 accessed on 15th July 2019.
29. Mekuria AB, Erku DA, Gebresillassie BM, Birru BM, Tizazu B and Ahmedin A. Prevalence and associated factors of herbal medicine use during pregnancy. *BMC Complementary and alternative medicine* 2017 Vol 4: 123-30.
30. Frawley J, Adams J, Steel A, Broom A, Gallois C and Sibbritt D. Women's use and self-prescription of herbal medicine during pregnancy; An examination of 1,835 pregnant women; *Women's Health;* 2015 Issues 25-4, Pages 396-402.
31. UBOS, 2018. Agriculture sector gender statistics profile. MoFPPED
32. Mukhaye, D and Atukunda N. How government insurance will work. *The New Vision Online*, available at https://www.monitor.co.ug/News/National/How-government-health-insurance-will-work/688334-5171568-phtghl/index.html accessed on 4th July 2019.
33. Nabunya, C 2005. 70-80% Birth deliveries in Uganda conducted by Traditional Birth Attendants. *Uganda Radio Network news* available at https://ugandaradionetwork.com/story/70-80-percent-birth-deliveries-in-uganda-conducted-by-traditional-birth-attendants accessed on 4th July 2019.
34. Turinawe EB, Rwemisisi JT, Musinguzi LK, de Groot M, Muhangi D, de Vries DH, Mafigiri DK, Katamba A, Parker N and Pool R. Traditional birth attendants (TBAs) as potential agents in promoting male involvement in maternity preparedness: insights from a rural community in Uganda. *Journal of Reproductive Health* 2016
35. Adatara P, Afaya A, Baku EA, Salia SM and Asempah A. Perspective of Traditional Birth Attendants on Their Experiences and Roles in Maternal Health Care in Rural Areas of Northern Ghana. *International Journal of Reproductive Medicine* Volume 2018, Article ID 2165627,
36. Miller T. Establishing partnerships with traditional birth attendants. *BMC pregnancy and child birth.* 2017 Vol 234: Page 167-69..