Understanding forgotten exposures towards achieving Sustainable Development Goal 3: the case of herbal medicine use in Tanzania

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Abstract

Background: In most sub-Sahara African countries, herbal medicines are widely used during pregnancy and labour for various motives despite their unclear pharmacology and potential toxicity. Considering the United Nations Sustainable Development Goal (SDG) 3, exposure to herbs during pregnancy should be restricted in order to safeguard the health of mothers and newborns. This study aimed to assess the proportion of mothers using herbal medicines during pregnancy and delivery and to determine factors associated with the practice.

Methods: This cross-sectional quantitative study gathered information from 340 mothers who delivered a live baby in the preceding two years. Using a two-stage-sampling technique, we selected and interviewed mothers attending reproductive, maternal and child health clinics in Tabora, in central Tanzania. We compared proportions using chi-square test and performed a Poisson regression analysis to determine independent correlates of herbal use.

Results: Over 60% of mothers in Tabora used herbal medicines during pregnancy and delivery. Major reasons for use were shortening of labour duration, 81 (38.9%) and reducing labour pain, 58 (27.9%). Independent factors of herbal use were distance to the nearest health facility, adjusted prevalence ratio (aPR = 1.12, 95%CI = 1.00,1.25), perception of herbs as safe, (aPR = 1.16, 95%CI = 1.05,1.29) and health care providers' stance on the use of herbs, (aPR = 1.14, 95%CI = 1.04,1.25).

Conclusions: Use of herbal medicines during pregnancy and delivery in Tanzania is high. This calls for comprehensive investigations on the effects of herbs used during pregnancy and delivery as a step towards understanding contributions of forgotten exposures en route for achieving SDG 3. Additionally, health care providers ought to include health education messages during antenatal visits on the undesirable effects of using herbs.

Background

Recent global estimates indicate that maternal causes claimed about 300000 lives of women annually and most were observed in sub-Sahara African countries [1]. In Tanzania, there are unacceptably high rates of perinatal mortality, 39 deaths per 1000 pregnancies; neonatal mortality, 25 deaths per 1000 live births; and maternal mortality of 578 per 100000 live births [2]. Most of these deaths are preventable subject to appropriate management and quality of health care during pregnancy, delivery and postpartum periods.

The United Nations Sustainable Development Goal (SDG) number 3 that states "Ensure healthy lives and promote well-being for all at all ages" aims at reducing global neonatal mortality to 12 per 1000 live births or lower; and maternal mortality ratio to less than 70 per 100000 live births by 2030 [1]. In order to achieve this goal, efforts are being made to promote health facility delivery for all from about half of

them being attended by traditional birth attendants. This is with the understanding that facility delivery environment is conducive for supervised and hence safer births, whereas traditional system exposures are more likely to include use of herbal medicine.

Efforts by sub-Saharan countries geared towards attaining SDG 3 are however, focused at improving skilled attendance at delivery as end, without considering some of the practices that have undocumented contribution to the observed maternal and newborn burden of health. This study takes the first step towards contributing to understanding these exposures; starting with use of herbal medicines in pregnancy and labour that may also be common in many other countries.

Existing evidence supports high magnitude of exposures to herbal medicines whose safety is not known, subjecting mothers and newborns to potentially toxic substances just before, during or immediately after birth. For example, a recent systematic review of literature [3] focusing on use of herbal medicines to induce labour by pregnant women revealed proportions of herbal use in the most recent pregnancy ranging from 6.5% in Ghana [4] to 80% in Uganda [5]. Similarly, high proportions (23%) of women in Tanzania use herbal medicines during pregnancy and in inducing labour [6]. The commonly used herbs include a wide variety of herbs such as ginger (*Zingier officinale*), onions (*Allium cepa*) and Neem (*Azadirachta indica*)

Some of the reported reasons for using herbs during pregnancy and labour include incidents of nausea and vomiting, strengthening pregnancy and health of the woman and the fetus, ensuring positive pregnancy outcomes and easing labour [6–9]. Others comprise of conviction that herbal medicines have the ability of inducing labour and shortening its duration, alleviating labour pains, enhancing removal of a retained placenta, as well as toning the uterine muscles post-delivery [5, 10]. Furthermore, some mothers claim to use herbs as remedies to protect the fetus from evil in-vitro and to have a healthy baby [8].

Timing of intense exposures to the possible toxic materials coincides with very early stages of labour, posing risk to both mother and newborn. The use of herbs at this phase is aimed to stimulate uterine muscles resulting to stronger contractions and thus, hastening labour [5]. These herbs may be taken via the oral route in which they are most often consumed as a strong tea or chewed; rectal or vaginal routes and sometimes rubbing on the pregnant abdomen [10].

Arguments of effectiveness of local herbs are, however, unfound as at the same time the health system has readily available and safe interventions such as the use of oxytocin and artificial rupture of membranes. If such simple and inexpensive interventions are accessed timely and adhered to, would alleviate some of the claims in case they happen. Consequently, the use of herbs during pregnancy should be a subject of concern as some plants might have parts that contain natural toxins that could be dangerous when they cross the placenta [11]. With the imperative need to attain SDG 3 by the year 2030, exposure to herbs during pregnancy and delivery has to be restricted in order to improve maternal and newborn health. Thus, this study determined the current magnitude of exposures to herbs as an input towards efforts to improving quality of care and hence achieving the goal of improving maternal health.

Methods

Study design

This was a cross-sectional quantitative analytical study.

Study setting

Tabora municipality is one of the districts in Tabora region, in central Tanzania. According to the most recent national population census of 2012, Tabora municipality has a total of 16709 women of childbearing age (15–49 years). Administratively, the municipality has two divisions; namely Tabora North and South with 14 and 15 wards (administrative units) respectively. The health system comprises of 44 health facilities of which 36 are public and they include three hospitals; three health centers and 30 are dispensaries. Of all public health facilities, 34 provide Reproductive, Maternal and Child Health (RMCH) services. According to an administrative report of the municipality out of the 12020 women who attended antenatal care clinics, 10450 (96%) delivered at health facilities.

Study population

Participants for the study were women who delivered a live baby in the preceding two years and attending RMCH clinics in the municipality of Tabora in central Tanzania

Sample size estimation

The minimum sample size was calculated using the formula $Z^2 p(1-p)/m^2$; whereby Z being a critical value of the normal distribution at 5% level of significance, p is an estimated proportion (23%) of pregnant women using herbal medicines [6] and 5% for m , an estimated margin of error. Allowing for a non-response rate of 20%, the ultimate sample size was 342 women.

Sampling technique

In Tabora North and South divisions there are 18 and 16 health facilities respectively that provide RMCH services. Proportionately, we estimated nine and eight health facilities respectively from Tabora North and South divisions. First, using systematic sampling technique, we selected health facilities from each of the two divisions. In the second stage, a random sampling technique was used to recruit women attending RMCH clinics and meeting the study criterion. The number of mothers selected in each facility was based on the proportion a facility contributed to maternal attendances in all selected facilities in a division put together in the previous month.

Data collection procedure

We collected data using semi- and structured interviews which elicited information on socio-demographic characteristics, use of herbs during the most recent pregnancy and delivery, perceived effects of using herbs in pregnancy, awareness of possible adverse effects as well as source of advice on the use of herbs. We assumed that all selected mothers were most likely to remember use of herbal medicines during their most recent pregnancy and delivery, thus, in position to give a self-report. In order to improve the content validity of the tool and other methodological issues as described by Castillo-Montoya [12] we pre-tested the instrument among a few women in a near-by health facility that was not included in the study. Only mothers consenting were interviewed in a calm environment within the health facility at exit. A team of four research assistants trained on the research objectives and fieldwork procedures collected the data in September 2018, for a period of three weeks. The research assistants were registered nurses but not working in the respective clinics.

Data processing and analysis

We processed and analysed data using statistical software (Statistical Package for Social Sciences, Version 24). Initially, by running the frequencies for all variables we were able to detect possible out-of-range values that were corrected. We summarized categorical variables using frequency tables. We performed bivariate analysis to assess the association between reported use of herbal medicines and selected independent variables using a Chi-square test. To assess independent predictors of obstetric herbal use, factors with p-value <0.2 in the binary analyses were selected to enter into the Poisson regression model [13] to predict use of herbs during the most recent pregnancy and delivery. Adjusted Prevalence Ratios (aPR) and their corresponding 95% confidence intervals are presented as both measures of association and their strengths. The significance level was set at 5%.

Results

Background characteristics of study participants

We recruited 340 women who delivered in the preceding two years (participation rate 99.4%). The majority of the study participants, 142 (41.8%), were in the age category of 26-35 years. Slightly more than half, 175 (51.5%) reported completing primary education. Among all study participants, 285 (83.8%) were married or cohabiting. Majority of the respondents, 177 (52.1%) were either peasants or housewives whereas 159 (48.5%) of their spouses were also peasants. Despite of 255 (75.0%) mothers living within a walking distance of five km to the nearest health facility, only 141 (41.5%) attended at least four antenatal clinic (ANC) visits. Most of the women, 246 (72.4%) reported attending their first ANC when the gestational age was more than three months (Table 1).

Table 1: Distribution of respondents by their background characteristics (n=340)

Characteristic	Number (%)
Age group (years)	
16-25	83 (24.4)
26-35	142 (41.8)
36+	115 (33.8)
Marital Status	
Never married	25 (7.4)
Married/cohabiting	285 (83.8)
Previously married	30 (8.8)
Education	
None/primary incomplete	87 (25.6)
Primary complete	175 (51.5)
Above primary	78 (22.9)
Woman's occupation	
Peasant/housewife	177 (52.0)
Self-employed	127 (37.4)
Formally employed	36 (10.6)
Occupation of spouse (n=328)	
Peasant	159 (48.5)
Self-employed	91 (27.7)
Formally employed	78 (23.8)
Gestational age at booking	
0 - 3months	30 (8.8)
More than 3 months	246 (72.4)
Don't remember	64 (18.8)
Number of ANC visits	
1- 4	145 (42.6)
More than 4	141 (41.5)
Don't remember	54 (15.9)

Distance to a nearest clinic (Km)	
At most 5	255 (75.0)
More than 5	85 (25.0)

Herbal use during the most recent pregnancy and delivery

A large proportion of women, 208 (61.2%), reported using herbal medicines during their most recent pregnancy and delivery. While the majority, 138 (66.3%), reported high frequency use of herbal medicines (at least three times), 16 (7.7%) and 54 (26.0%) reported using herbal medicines either once or twice respectively. Of the 208 women who used herbal medicines, 57 (27.4%) said herbal medicines were easily available and 83 (39.9%) considered herbal medicines safe. The reported main routes of administration included oral, 135 (64.9%), intra-vaginal, 59 (28.4%), and topical application, 14 (6.7%).

Of the 340 respondents, less than half, 164 (48.2%) reported aware of adverse effects of using herbal medicines in pregnancy and delivery. Surprisingly, significantly more women, 153 (93.3%), reported aware of the effects of using herbal medicines during pregnancy and delivery as compared to 55 (31.3%) who were not aware ($p < 0.01$). Regardless of herbal use status, 70 (20.6%) mentioned uterine rupture, 51 (15.0%) excessive vaginal bleeding, 22 (6.5%) cited uterine infection and 21 (6.2%) reported a possibility of death of the mother or baby as untoward consequences of using herbs in pregnancy.

Among 208 mothers who ascertained having used herbs during their most recent pregnancy and delivery, 81 (38.9%) thought the most benefits of using herbal medicines were shortening of duration of labour and 58 (27.9%) alleviating labour pains as displayed on Figure 1.

Factors associated with use of herbal medicines in the most recent pregnancy and delivery

In Table 2, we present results of bivariate analysis between use of herbal medicine during the most recent pregnancy and selected independent variables. Factors that were significantly associated with herbal medicine use included living far from a health facility, perceiving herbs as safe, source of advice towards using herbs and receiving advice against using herbs from health care providers.

Table 2: Association of herbal use in the most recent delivery and selected characteristics

Characteristic	Herbal use Number (%)	Chi-square, p-value
Age group (years)		1.68, 0.431
16-25	46 (55.4)	
26-35	88 (62.0)	
36+	74 (64.3)	
Education level		2.85, 0.239
None/prim incomplete	50 (57.5)	
Primary complete	104 (59.4)	
Secondary and above	54 (69.2)	
Occupation of spouse (N=316)		4.59, 0.101
Peasant	103 (64.8)	
Formerly employed	40 (51.3)	
Self-employed	59 (64.8)	
Distance to nearest facility (km)		5.35, 0.014
≤ 5	147 (57.6)	
> 5	61 (71.4)	
Perceived availability of herbs		1.51, 1.139
Easily available	39 (68.4)	
Not easily available	169 (59.7)	
Perceived safety of herbs (N=321)		11.73, < 0.01
Safe	64 (77.1)	
Not safe	144 (56.0)	
Source of advice		42.02, < 0.01
Friends	65 (89.0)	
Parents	33 (40.2)	
Traditional birth attendant	57 (54.3)	
Spouse	41(66.1)	
Own decision	6 (50.0)	
HCP's† stance towards herbs use		13.15, < 0.01

Discouraged use	112 (53.6)
Did not discourage	96 (73.3)

† Health Care Providers

In Table 3, we present independent factors associated with herbal use during the most recent pregnancy and delivery among mothers who attended reproductive and child health clinics. Significant correlates were distance to the nearest health facility, women's perception of herbal safety and whether the health care provider discouraged use of herbal medicines or not during antenatal visits. For example, mothers who perceived herbal medicines as being safe had 16% adjusted prevalence ratio to use herbal medicines, (aPR = 1.16, 95%CI = 1.05,1.29) as compared to those perceiving herbal medicines being unsafe. Furthermore, mothers confirming that during antenatal care visiting, health care providers did not discourage use of herbal medicines had almost 15% higher prevalence ratio of herbal medicine use as compared to those saying that health care providers discouraged the use of herbal medicine, (aPR = 1.14, 95%CI = 1.04,1.25).

Table 3: Factors associated with herbal use during the most recent pregnancy and delivery

Factor	Herbal use Number (%)	aPR (95%CI)	p- value
Occupation of spouse			
Peasant	103 (64.8)	1.05 (0.92, 1.20)	0.455
Formal employment	40 (51.3)	1.12 (0.96, 1.30)	0.143
Self-employment	59 (64.8)	Reference	
Distance to nearest health facility (km)			
≤ 5	147 (57.6)	1.12 (1.00, 1.25)	0.049
> 5	147 (57.6)	Reference	
Perceived safety of herbs			
Very safe	64 (77.1)	1.16 (1.05, 1.29)	0.004
Not safe	144 (56.0)	Reference	
Health care provider's stance towards herbs use			
Did not discourage use of herbs	112 (53.6)	1.14 (1.04, 1.25)	0.002
Discouraged use	96 (73.3)	Reference	

Discussion

In this study, we assessed the use of herbal medicines during pregnancy and delivery. We also examined factors associated with the use of herbs among mothers who delivered in the preceding two years in Tabora, central Tanzania. The findings show that use of herbal medicines during pregnancy or delivery was very high (60%). Significant factors associated with the use of herbs were long distance to the nearest health facility, perception that herbal use was safe and whether health care providers discouraged use of herbal medicines or not during antenatal visits.

The level of use of herbal medicine is similarly high in a number of other studies in sub-Saharan Africa, Asia and Middle East, where the proportions of use have been observed to range between 20–80% [5, 6, 14–16]. Findings in all these studies ratify dramatic increment in the use of herbal medicines in pregnancy and delivery. These same countries are however, also reporting high maternal and newborn morbidity and mortality. On the other hand, a recent analysis of data from the Tanzania Reproductive Health Survey which involved 3530 women of reproductive age (15–49 years) found a herbal use rate of 10.9% [17]. This proportion is lower than what has been documented in many related studies. The difference could perhaps be attributed to the larger sample size and the use of secondary data as most of the other surveys used primary data and covered fewer respondents. Although the coexistence of herbal medicine use and high maternal and newborn mortality could be coincidental, the high unchecked use of herbs should invite a concern. It is even more serious as the unproven perceived safety can lead to rapid increase in promotion of traditional medicines in the society as well as the media. It is common to see posters advertising traditional medicines and herbalists in various parts Tanzania. In such advertisements, herbal medicines are often promoted as natural and safe, attracting their wide use, especially among pregnant women who are concerned about the whole process of childbirth and health of the unborn child.

A significant association has been documented between education status of a woman and utilization of herbal remedies during pregnancy and delivery. For example, some studies in Africa suggest that women of low educational status as compared to those highly educated had a higher likelihood of using herbal remedies [18, 19]. However, the current data do not support such an association. It is important to note that factors associated with use of herbs may vary from one area to another depending on the type of study and population involved.

Plants used for herbal remedies are less expensive as compared to modern medicines and they have been culturally considered as an effective and acceptable option even when modern health facilities are available [20]. Similar to observations elsewhere, use of herbal medicines in this study is significantly associated with perceived beliefs about their safety [21] and local availability [20–22]. Some studies have associated use of herbs during pregnancy and delivery with lack of access to public health care [3]. In our study, women who resided far away (at least 5 km) to the nearest health facility had more than 10% adjusted prevalence ratio to use herbal medicines compared to women living closer to the health facilities. This may suggest that accessibility to public health care is an important attribute to using herbs

during pregnancy, similar to observations in other areas [3, 18, 23]. Distance to the nearby health facility has been quite often given as major reason for women to deliver under the care of unskilled attendants. Such deliveries by unskilled attendants may be compounded by use of medicinal herbs while there might also be silent exposures even when a birth takes place in a health care facility.

Whereas response to such high exposures to herbs would be required, the most important concern is lack of awareness and knowledge of pregnant women [9] and the community about potential effects of using herbal medicines on the mother and the fetus [3, 24]. In the current study, less than half of the respondents were aware of the adverse effects of herbs in pregnancy and only a few of them were able to mention some of the major effects. In Ethiopia and Norway for example, merely 14% and 12% respectively of pregnant women reported to have received health advice from healthcare workers on the use of herbs [19, 20]. Compared to women who were discouraged by health care providers against the use of herbs during pregnancy, significantly more women in the Tabora study who did not receive such advice used herbs ($p < 0.01$). This finding suggests that if women get appropriate information during pregnancy they will greatly evade using herbs.

Oral or vaginal administration of herbal medicine may lead to systemic presence of the medicines and consequently exposures to the unborn child. Similar to studies in Ghana [10] and Ethiopia [18], oral route was the commonest means (64.9%) for taking herbs during pregnancy and labour in the current study. In all these studies, women most often chewed or consumed herbs as a strong tea. On the contrary, findings in a related study in a referral hospital in rural north-western Tanzania revealed that less than a fifth of women reported using herbs orally [25]. However, that study looked at only women who used herbs for inducing abortion.

The main motive for using herbs in the current study was to shorten labour duration (38.9%). For many years, women used herbal medicines in pregnancy to sort out several conditions during pregnancy and the delivery process. Similar to findings in Tabora, studies indicate that pregnant women in some communities use herbs for the purpose of easing pain, accelerating labour, preventing antepartum and postpartum haemorrhage, increasing milk production, and aiding postpartum uterine involution [7, 15, 26]. The grounds for the high usage of herbs could in addition be attributed to their easy accessibility, perceptions that they are safe; as well as the general lack of awareness of the potential side effects [18, 24, 27]. Thus exposure to herbal medicines in pregnancy is not only during unskilled attendance but it takes place even when a pregnant woman is being prepared to a facility for skilled attendance birthing.

Perceived safety of the herbs and the stance of health care providers towards use of the herbs were significant correlates of herbal use among the respondents in the current study. The statistically significant association between perception of safety and use of herbal remedy during pregnancy is in line with the findings of various related studies elsewhere [12, 14, 28]. These studies indicate that pregnant women who perceive herbal remedies as being safe tend to use them more than their colleagues who perceive them otherwise.

This study has several potential limitations which should be acknowledged to enable readers construe the findings. First, although we assumed that mothers who gave birth within the preceding two years were likely to remember use of herbal medicines in their most recent pregnancy and delivery; we are unable to completely rule out the possibility of information bias due to individual's ability to recall. If some of women were unable to remember, this bias could have contributed to the low estimates. Second, some women were aware that use of herbal medicine during pregnancy was discouraged by health care providers. Therefore, due to social desirability bias, there is a possibility that some women concealed reporting use of herbal medicines, thus, leading to under-estimating the proportion of herbal use. Third, there is possibility that the variables we considered as independent may not be exhaustive. Despite all these, to our knowledge, this is the first study to attempt to look at herbal medicine use during pregnancy and delivery as a forgotten exposure when adopting strategies to attain SDG 3 target on reduction of maternal and newborn mortality

Conclusions

To conclude, the results of the present study point out that as high as 60% of women possibly in most municipal settings in Tanzania use herbs for various reasons during pregnancy and labour. Perceived safety of the herbs and health care providers' stance towards their use as well as physical distance to the nearest facility were significant correlates of the use of herbs. The study forms basis for designing intervention programs to address use of herbs during pregnancy and underscores the important role of health care providers attending pregnant women in the antenatal clinics. This is important given the high prevalence of the use of herbs during pregnancy and delivery in our community, and the relative lack of evidence of safety. Understanding the magnitude of herbal use and addressing its correlates is a fundamental step towards achieving SDG 3. Therefore, first, we recommend that researchers consider designing comprehensive investigations on adverse effects of herbal medicines used in pregnancy on the mother and the fetus. Second, health care providers ought to include health education messages on the undesirable effects of using herbs in the routine sessions they provide to women when attending antenatal care services.

Abbreviations

ANC

antenatal clinic; aPR:adjusted prevalence ratio; CI:confidence interval; RMCH:reproductive, maternal and child health; SDG:Sustainable Development Goal

Declarations

Ethics approval and consent to participate

The Muhimbili University of Health and Allied Sciences (MUHAS) Institutional Review Board reviewed and approved the protocol (Ref. No. DA.287/298/01/A/). We explained the aims and benefits of the study to each selected participant. We emphasized voluntary participation such that each participant was free to respond or not, to each question and to stop responding to any question at any point regardless of the services she was expecting to get. We assured strict anonymity and confidentiality to all participants. Before the interviews, we requested each potential respondent to sign (or thumbprint) the consent form.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analyzed during this study are included in this article and are available upon request from the corresponding author.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

ATK and GCM conceptualized and developed the protocol. ATK guided data collection. GCM supervised field activities. ATK and GCM analyzed and interpreted the data. GCM drafted the manuscript. ATK revised the manuscript. ATK and GCM read and approved the final manuscript.

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References

1. United Nations. Report of the Secretary-General on SDG Progress 2019 Special Edition. New York; 2019.

2. Ministry of Health. Community Development, Gender, Elderly and Children (MoHCDGEC) [Tanzania Mainland], Ministry of Health (MoH)[Zanzibar], National Bureau of Statistics (NBS) Office of the Chief Government Statistician (OGS) and ICF. 2016.2015-16 TDHS-MIS Key Findings. Rockville, Maryland, USA: MoHCDGE, MoH, NBS, OGS, and ICF.
3. Ngoma CM, Siachapa B. Use of herbal medicines to induce labour by pregnant women: A systematic review of literature. *JOJ Nurs Heal Care*. 2017;2(3):7–12.
4. Adusi-Poku Y, Vanotoo L, Detoh E, Oduro J, Nsiah R, Natogmah A. Type of herbal medicines utilized by pregnant women attending ante-natal clinic in Offinso north district: Are orthodox prescribers aware? *Ghana Med J*. 2015;49(4):227–32.
5. Kamatenesi-Mugisha M, Oryem-Origa H. Medicinal plants used to induce labour during childbirth in western Uganda. *J Ethnopharmacol*. 2007;109(1).
6. Dika H, Dismas M, Iddi S, Rumanyika R. Prevalent use of herbs for reduction of labour duration in Mwanza, Tanzania: Are obstetricians aware? *Tanzan J Health Res*. 2017;19(2).
7. Attah AF, O'Brien M, Koehbach J, Sonibare MA, Moody JO, Smith TJ, et al. Uterine contractility of plants used to facilitate childbirth in Nigerian ethnomedicine. *J Ethnopharmacol*. 2012;143(1):377–82.
8. Nalumansi PA, Kamatenesi-Mugisha M, Anywar G. Medicinal Plants used during Antenatal Care by Pregnant Women in Eastern Uganda. *Afr J Reprod Health*. 2017;21(4):33–44.
9. Panganai T, Shumba P. The African Pitocin - A midwife's dilemma: The perception of women on the use of herbs in pregnancy and labour in Zimbabwe, Gweru. *Pan Afr Med J*. 2016;25(5).
10. Addo VN. Herbal medicines: socio-demographic characteristics and pattern of use by patients in a tertiary Obstetrics and Gynaecology Unit. *J Sci Technol*. 2007;27(3):149–55.
11. Maliwichi-Nyirenda CP, Maliwichi LL. Medicinal plants used for contraception and pregnancy- related cases in Malawi: A case study of Mulanje District. *J Med Plants Res*. 2010;4(24).
12. Castillo-Montoya M. Preparing for Interview Research: The Interview Protocol Refinement Framework. *Qual Rep*. 2016;21(5):811–31.
13. Martinez BAF, Leotti VB, Silva G, de SE, Nunes LN, Machado G, Corbellini LG. Odds Ratio or Prevalence Ratio? An overview of reported statistical methods and appropriateness of interpretations in cross-sectional studies with dichotomous outcomes in veterinary medicine. *Front Vet Sci*. 2017;4.
14. John LJ, Shantakumari N. Herbal medicines use during pregnancy: A review from the Middle East. *Oman Med J*. 2015;30(4):229–36.
15. Bayisa B, Tatiparthi R, Mulisa E. Use of Herbal Medicine Among Pregnant Women on Antenatal Care at Nekemte Hospital, Western Ethiopia. *Jundishapur J Nat Pharm Prod*. 2014;9(4):4–8.
16. Ahmed M, Hwang JH, Choi S, Han D. Safety classification of herbal medicines used among pregnant women in Asian countries: a systematic review. *BMC Complement Altern Med*. 2017;17(1).
17. Fukunaga R, Morof D, Blanton C, Ruiz A, Maro G, Serbanescu F. Factors associated with local herb use during pregnancy and labor among women in Kigoma region, Tanzania, 2014–2016. *BMC*

Pregnancy Childbirth. 2020;20(1).

18. Laelago T, Yohannes T, Lemango F. Prevalence of herbal medicine use and associated factors among pregnant women attending antenatal care at public health facilities in Hossana Town, Southern Ethiopia: Facility based cross sectional study. *Arch Public Heal*. 2016;74(1).
19. Olowokere AE, Olajide O. Women's perception of safety and utilization of herbal remedies during pregnancy in a local government area in Nigeria. *Clin Nurs Stud*. 2013;1(4):9–22.
20. Chikezie PC. Herbal Medicine: Yesterday, Today and Tomorrow. *Altern Integr Med*. 2015;4(3).
21. Mohamad TAST, Islahudin F, Jasamai M, Jamal JA. Preference, perception and predictors of herbal medicine use among malay women in Malaysia. *Patient Prefer Adherence*. 2019;13:1829–37.
22. Mothupi MC. Use of herbal medicine during pregnancy among women with access to public healthcare in Nairobi, Kenya: A cross-sectional survey. *BMC Complement Altern Med*. 2014;14(1).
23. Nyeko R, Tumwesigye NM, 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 Childbirth*. 2016;16(1).
24. Zamawe C, King C, Jennings HM, Mandiwa C, Fottrell E. Effectiveness and safety of herbal medicines for induction of labour: A systematic review and meta-analysis. *BMJ Open*. 2018;8(10).
25. Rasch V, Sørensen PH, Wang AR, Tibazarwa F, Jger AK. Unsafe abortion in rural Tanzania - The use of traditional medicine from a patient and a provider perspective. *BMC Pregnancy Childbirth*. 2014;14(1).
26. Peprah P, Agyemang-Duah W, Arthur-Holmes F, Budu HI, Abalo EM, Okwei R, et al. "We are nothing without herbs": a story of herbal remedies use during pregnancy in rural Ghana. *BMC Complement Altern Med*. 2019;19(1).
27. Nordeng H, Havnen GC. Use of drugs in pregnancy: A survey among 400 Norwegian Women. *Pharmacoepidemiol Drug Saf*. 2004;13(6):371–80.
28. Hollyer T, Boon H, Georgousis A, Smith M, Einarson A. The use of CAM by women suffering from nausea and vomiting during pregnancy. *BMC Complement Altern Med*. 2002;2(5).

Figures

Figure 1

Most perceived benefits of using herbal medicines in pregnancy and labour