

Herbal medicine usage before and during pregnancy – a study in Northern Ghana

Abstract

Introduction: Herbal medicines are serving the health needs of several persons across the world especially those in developing countries. The hormonal and structural changes in pregnancy cause women to experience unpleasant signs and symptoms. Some pregnant women resort to herbal medicines to manage their conditions or make the delivery process uneventful oblivious of the effects some of these chemicals have on their developing foetuses. This study therefore assessed the use of herbal medicines among pregnant women in Tamale, a city in Northern Ghana.

Method: Using self-administered semi-structured questionnaires, and questionnaire guided interviews, data was collected from 370 self-confessed pregnant women in 28 randomly selected suburbs of the Tamale metropolis. The data was analyzed using Microsoft Excel, the Statistical Package for Social Science (SPSS) version 21.0 and Graph Pad Prism, Version 5.01 (GraphPad Software Inc., San Diego CA) to determine percentages, means and frequencies and associations between various variables. Statistical significance was assumed at $p < 0.05$ using confidence interval of 95%.

Results: The level of patronage of HM was 43.5% before and 52.7% during pregnancy with most of the herbal preparations used before (57.4%) and during pregnancy (48.2%) being pre-packaged. The 23 different raw plants materials used belong to 18 plant families with 22.2% belonging to the Fabaceae. The leaves were the most common (35.0%) part of the raw plant materials used. Being the Islamic faith believer, ($p=0.016$), living in an extended family setting ($p=0.004$) and being of the lower socio-economic status ($p=0.013$) were significantly associated with use of HM before pregnancy however only employment status was significantly associated with the use of HM during pregnancy ($p=0.012$) with the unemployed patronizing the HM most.

Conclusion: There is high patronage of HM especially pre-packaged herbal preparations by women in the Tamale metropolis before and during pregnancy. Health care providers should educate pregnant women about the possible effect herbal medicines could have on their babies. Manufacturers of herbal products should clearly indicate pregnancy being a contraindication and vendors should also be careful in selling these products to pregnant women.

Keywords: pregnancy, herbal medicine, patronage, tamale

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Introduction

In the African set up, bringing forth a child is one of the most glamorous events in the life of families especially for the women.^{1,2} It however becomes an anticlimax if the child is born with any form of physical or intellectual malformation. Such children may even be ostracized should they be allowed to live but in the extreme cases, such unfortunate children suffer various degrees of violence including being killed.³ Various factors are implicated in causing various forms of malformation but there is no doubt that drugs taken before and during pregnancy are culprits as about 10% of birth defects are attributable to various specific agents such as environmental agents, drugs, biologic or nutritional factors with 70% of the causes unknown.^{4,5} Several drugs including non-steroidal anti-inflammatory drugs such as Aspirin, anticancer agent such as cyclophosphamide, antibiotics such as tetracycline and quinolones, phenytoin, an anticonvulsant, among other drugs have been proven to cause structural and functional deformities in the foetuses of mothers who are exposed to them.⁴ During pregnancy, the hormonal changes cause various signs and symptoms such as nausea, vomiting, headaches,

lower abdominal cramps which make living uncomfortable for them.^{8,9} Normal pregnancy would not require drugs but some women have to use prescribed or over-the-counter medications to assist them to cope with these signs and symptoms.⁴ Other women who had preexisting conditions prior to the pregnancy would have to continue using them to safeguard their own lives. Some studies in developed countries of Sweden, North and South America, Europe, and Australia had shown up to 80% of pregnant women use at least one allopathic drug. Women in developing countries where up to 80% of their population depend on herbal preparation for their primary healthcare needs would invariably use herbal products for the management of the pregnancy associated signs and symptoms.¹⁰⁻¹² There is this notion among some users across the world that since herbal medicines are from natural sources, they are harmless or carry minimal risk so pregnant women also find them to be safer than orthodox medicines.¹¹⁻¹⁴ For even the very well researched orthodox medicines, there is always the fear that these drugs can cause various malformation in the unborn child hence some drugs are contraindicated in pregnancy.⁴ This belief in herbal medicines being safe may not be accurate since studies have found some plants be harmful. A typical example is a Chinese slimming tea

which have, *Aristolochia fangchi* as an important component had been found to contain Aristolochic acid which is said to be nephrotoxic.¹⁵ Another species of this plant, *Aristolochia manshuriensis* have even been reported to be genotoxic.¹⁶ In pregnancy, women also use plants for other non-medicinal reasons especially for culinary purposes as they are important sources of vitamins and minerals which are required for the growth and development of the foetus.¹⁷ The use of mostly untested and unregulated plants as medicines or foods by pregnant women poses a potential danger to the foetus and it is possible a percentage of the 70% birth defects of unknown aetiology could be due to the use of these plant materials which contains several unclassified chemical components. A multinational study by Kennedy et al.,¹⁸ across Europe, North and South America and Australia showed a 28.9% level of use of herbal medicine in pregnancy but a higher score of 31.4% and 50.4% was reported among women attending hospitals in Nigeria and Ethiopia respectively.^{11–18} Knowing the usage of herbal medicine among pregnant women would ensure that healthcare professionals, regulatory bodies and health educators work to address the unregulated use of herbal preparations among this special risk group. Studies have been conducted in several countries on herbal medicine use among pregnant women but there is paucity of information on this practice in Ghana especially the northern sector where accessibility to orthodox healthcare facilities is not the best. This study therefore accessed herbal medicine usage among pregnant women in Tamale, the only city in northern Ghana and factors that are associated with the use of these products before and during pregnancy.

Methods

Study design

Between the 4th May to 5th June, 2017, a cross-sectional study among self-confessed pregnant women was conducted in some suburbs of the Tamale metropolis, in the northern region of Ghana.

Study location

The study was conducted in 28 out of 112 suburbs in the Tamale metropolis namely; Police barracks, Gumani, Sakasaka, Sabon Zongo, Sabongida, Sheshigu, Kalpohin estate, Wamale, Lamashegu, Gurugu, Tunaayili, SSNIT, Kuku, Zogbeli, Biwater, Bilpela, Jisonaayili, Poluyafong, Tishegu, Kakpayili, Sognaayili, Sagnarigu kuku, Choggu yapelsi, Lamankara and Nyashegu. Tamale, the only city in northern Ghana is also the capital of the Northern region and one of the 26 administrative areas in the region. The metropolis has a total estimated land size of 646.9 km² and lies between latitude 9°16 and 9°34 North and longitudes 0°36 and 0°57 West.¹⁹

Study sample size determination

Sample size was calculated using the standard formula by Cochran (1977) for infinite population

$$N = (z^2 pq) / d^2$$

where: n= the desired sample size, z=the selected critical value of desired confidence level, which is 1.96 at 95% confidence interval, p= proportion in the target population estimated to have a particular characteristic,²⁰ based on in the previous studies done in Nigeria²¹ where almost 40% of pregnant women use herbal medicine, p=0.4d, the degree of accuracy=0.05

$$n = ((1.96)^2 \times 0.4 \times 0.6) / (0.05)^2$$

$$= (3.841 \times 0.4 \times 0.6) / 0.0025$$

Sample size = 368.73 approximately 370 respondents

Sampling procedure

A total of the 370 participants were selected from 28 randomly chosen out of 112 suburbs in the Tamale metropolis. This ensured respondents are equally selected from the 28 suburbs so that the outcome of the study would fairly represent the views of the respondents in the metropolis. Convenient sampling was used in selecting 14 pregnant women from each of the 28 suburbs in the metropolis for the study. Researchers arriving at any suburb enter the nearest home to ask if any woman was pregnant and using a snowball sampling, the next available pregnant woman is located in the neighborhood.

Data collection tool and techniques

A semi structured questionnaire was used to collect data. The questionnaire was in English language so for respondents who could neither read nor writes, researchers translated the questions into the Ghanaian languages which such respondents understood best which were Dagbanli, Hausa and Twi. The questionnaire was in two sections. Section A focused on demographic characteristics of the respondents, which included; age, income, religion, marital status, employment, and education. Section B was about herbal medicine usage in general and in pregnancy, reasons for usage and non-usage of herbal medicine, and the conditions that cause pregnant women to patronize herbal medicines.

Statistical analysis

The data was analyzed using Microsoft Excel, the Statistical Package for Social Science (SPSS) version 21.0 and Graph Pad Prism, Version 5.01 (GraphPad Software Inc., San Diego CA) to determine percentages, means and frequencies and associations between various variables. Statistical significance was assumed at p<0.05 using confidence interval of 95%.

Ethical consideration

The Ethics Committee of the School of Medicine and Health Sciences of the University for Development Studies gave approval for this study. At the start of the administration of the questionnaire, the pregnant women were told in the language they best understood that they were not under any compulsion to participate in the study and that by collecting and completing the questionnaire or by participating in the interview they had given their consent to be part of the study. Similar information about consent was also provided in the introductory section of the questionnaire for those who were literates.

Results

Demographic characteristics of respondents

Table 1 shows the demographic characteristics of respondents. Majority, 196 (53.0%) of the pregnant women were between the ages of 21 and 30 years, 314 (84.9%) were married, 210 (56.8%) were in nuclear families, 188 (50.8%) were self-employed and 239 (64.2%) were followers of the Islamic religion. Most respondents, 119 (32.2%) had up to senior high school level education, and 166 (44.9%) lived in a chamber and a hall type of accommodation.

Table 1 Demographic characteristics of respondents

Variable	Subgroup	Frequency	Percentage
Age (years)	10- 20	26	7
	21- 30	196	53
	31- 40	135	36.5
	41-50	13	3.5
Marital status	Single	39	10.5
	Co-habitant	17	4.6
	Married	314	84.9
Religious affiliation	Christianity	125	33.8
	Islam	239	64.2
	Traditionalist	6	1.6
	None	73	19.7
Educational level	Basic	92	24.9
	Secondary/ Vocational	119	32.2
	Tertiary	86	23.2
Family type	Nuclear	210	56.8
	Extended	160	43.2
	None	69	18.6
Type of employment	Self employed	188	50.8
	Private	49	13.2
	Government	64	13.2
	Single room	133	35.9
Type of accommodation	Chamber & Hall	166	44.9
	Apartment	69	18.6

Obstetrics history of the respondents

The obstetrics history of the respondents is shown in Table 2. Majority, 349 (94.3%) had visited antenatal clinics during the current pregnancy with 190 (51.4%) doing so between 3 and 5 times already. Majority, 266 (71.9%) have had previous pregnancies, 312 (84.3%) had up to 3 children previously, 275 (74.3%) never had a miscarriage, and 359 (97.0%) were holders of National Health Insurance cards. For those who had ever had miscarriages, most, 37 (39.4%) did not know what might have caused them to lose their pregnancies but up to about 21 (22.3%) attributed their miscarriages to drugs they had taken. Minority, 19 (5.1%) of respondents had children with some forms of disability with majority, 11 (57.9%) being persons who limp. For women with disabled children, majority 13 (68.4%) did not ascribe the cause to drugs they may have taken before or during pregnancy.

Herbal preparation usage before and during pregnancy

Before pregnancy, majority, 209 (56.5%) of respondents were not using herbal preparations. For those using herbal preparations prior to pregnancy, majority, 92 (57.1%) used pre-packaged products but 45 (28.0%) used raw plant materials. During pregnancy, up to 195 (52.7%), used herbal preparations for various conditions with

the pre-packaged form being the most common form used by most respondents, 94 (48.2%). Table 3 shows the herbal medicine usage before and during pregnancy by the respondents.

Table 2 Obstetrics history of respondents

Variables	Subgroup	Number of respondents	Percentage
Ever visited antenatal clinic?	Yes	349	94.3
	No	21	5.7
Number of antenatal visits	0-2	126	34
	3-5	190	51.4
	6-8	54	14.5
Are you an NHIS holders?	Yes	359	97
	No	11	3
Gestational age of pregnancy (weeks)	0-10	7	1.9
	11-20	91	24.7
	21-30	155	41.9
Is this your first pregnancy?	31-40	118	31.7
	Yes	104	28.1
	No	266	71.9
Number of term pregnancies?	0-3	312	84.3
	4-7	58	15.7
Ever had miscarriage?	Yes	94	25.4
	No	275	74.3
	Not stated	1	0.3
If yes, what is the cause?	Not stated	5	5.3
	I don't know	37	39.4
	Accident	12	12.8
Have a child with disability?	Herbal preparation	8	8.5
	Orthodox drugs	13	13.8
	Medical conditions	13	13.8
What form of disability?	Witch craft	6	6.4
	Yes	19	5.1
	No	351	94.9
Do you think the drug you took during pregnancy may be the cause of the child's disability?	Deafness	2	10.5
	Limping	11	57.9
	Hand paralysis	1	5.3
Do you think the drug you took during pregnancy may be the cause of the child's disability?	Not stated	5	26.3
	Yes	6	31.6
Do you think the drug you took during pregnancy may be the cause of the child's disability?	No	13	68.4

Table 3 Herbal preparation usage before and during pregnancy

Variable	Subgroup	Frequency	Percent
Were you using herbal preparation before pregnancy?	Yes	161	43.5
	No	209	56.5
	Pre-packaged preparation	92	57.1
What form of herbal preparation were you using before pregnancy?	Raw herbs	45	28
	Both raw and pre-packaged	19	11.8
	Not stated	5	3.1
Are you currently using herbal preparations?	Yes	195	52.7
	No	175	47.3
	Pre-packaged preparation	94	48.2
What form of herbal preparation are you currently using?	Raw herbs	50	25.6
	Both raw and pre-packaged preparation	51	26.2

Raw herbal products used by the respondents in the management of various conditions during pregnancy

Table 4 shows the raw herbal materials used by the pregnant women in the management of various conditions during pregnancy. A total of 23 plants were indicated for the treatment of various conditions associated with pregnancy such as pains and constipation.

Table 4 Raw herbal materials used by the pregnant women in the management of various conditions during pregnancy

Common/(local name#)	Scientific name	Family	Diseases or conditions they are used for.	Parts commonly used
Moringa(Arizanda tia)	<i>Moringa oleifera</i>	Moringaceae	Blood pressure, malaria, gum bleeding, constipation	Leaves
Baobab/(Tua)	<i>Adansonia digitata</i>	Malvaceae	Cardiovascular conditions such as hypertension.	Leaves, fruits, bark,
Pawpaw (Gonda)	<i>Carica papaya</i>	Caricaceae	Worm infestation, malaria	Leaves,
African custard-apple/ (Bulimbugu)	<i>Annona senegalensis</i>	Annonaceae	Waist pain	Roots
Dawadawa/ (Dua)	<i>Parkia globosa</i>	Fabaceae	Piles, blood pressure, blood booster, gum bleeding	Bark, leaves, root, seed, fruits
(Dazuuri)	<i>Gardenia imperialis</i>	Rubiaceae	Headache, boils, body pain	Bark, leaves, root
Dirigutim(pupariga)	<i>Borassus aethiopum</i>	Arecaceae	Severe headache, catarrh	Root and leaves
(Gbirigu)	<i>Combretum molle</i>	Combretaceae	Diarrhea	Whole plant
Guava(guabeh)	<i>Psidium guajava</i>	Martaceae	Diarrhea, catarrh	Leaves, branches
Neem (Nyimsa)	<i>Azadirachta indica</i>	Maliaceae	Fever, stomach aches	Leaves, bark
(Paliga)	<i>Securidaca longepedunculata</i>	Polygalaceae	For health purpose (liver problems, food poisoning etc)	Root, bark, leaves
Lemon/(Leemo nya'mi)	<i>Citrus limon</i>	Rutaceae	Loss of appetite, body weakness	Leaves and fruits

These plants belong to 18 different families. While Annonaceae and Malvaceae families have 2 members each, Fabaceae has the largest number of 4 but the rest 16 families have a member each.

Parts of raw herbs used by pregnant women for the management of their conditions

The Figure 1 shows the parts of raw medicinal plants used by the pregnant women in the preparation of the medicines for their diseases and conditions. The leaves were the mostly used part followed by the roots, the barks, fruits and seeds and finally the whole plant.

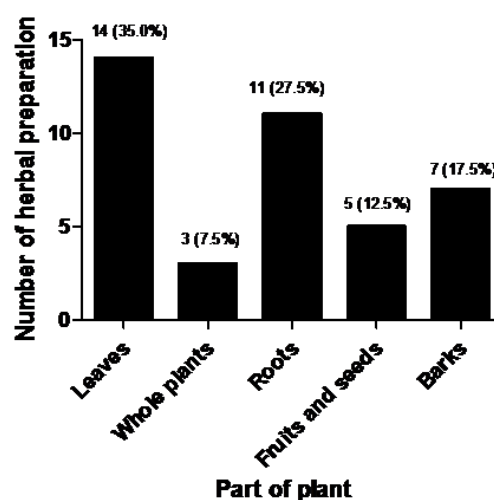
**Figure 1** Parts of the plants used for the herbal preparation.

Table continued...

Common/(local name#)	Scientific name	Family	Diseases or conditions they are used for.	Parts commonly used
Pepper (naazowa)	<i>Capsicum anuum</i>	Solanaceae	Spice, nausea, use as part of enema materials for treatment of constipation	Fruits, and leaves
Songpuglitim(atizoo)	<i>Tapinanthus bangwensis</i>	Loranthaceae	Lower abdominal pain	Bark
(Yalga)	<i>Grewia mollis</i>	Malvaceae	Severe headache	Root, whole plant
(Zuumbiengu)	<i>Haematostaphis barteri</i>	Anacardiaceae	For edema of the feet, hands and face	Root
(Kpaliga)	<i>Detarium microcarpum</i>	Fabaceae	Edema of the body(feet, hands, face etc)	Root
(Naasiri)	<i>Prosopis africana</i>	Fabaceae	Lower abdominal pain	Root
(Puhiga)	<i>Tamarindus indica</i>	Fabaceae	Body weakness	Leaves, whole plant
(Vobiga)	<i>Bombax spp</i>	Bombacoideae	Headache, malaria	Leaves, root
Millet (Za)	<i>Pennisitumn glaucum</i>	Poaceae	For skin rashes, jaundice	Seeds
Ebony tree (Gaa)	<i>Diospyros mespiliformis</i>	Ebenaceae	Headache, convulsion	Bark, root
(Ma'ni)	<i>Annona glauca</i>	Annonaceae	For easy delivery	Leaves, branches

#The local names are in the Dangbanli language which is the most common language spoken in Tamale

Association between socio-demographic characteristics of respondents and their usage of herbal preparation before and during pregnancy.

Table 5 shows the association between sociodemographic characteristics of respondents and their use of herbal medicine before and during pregnancy. There was no statistically significant difference between the married and unmarried pregnant women use of herbal medicines before and during pregnancy although married women have greater propensity to use herbal preparation before (45.2% vrs 33.9%) and during pregnancy (53.2% vrs 46.4%). Before pregnancy, women who are followers of African Traditional Religion significantly used herbal preparations than their Christian and Moslem colleagues (100% vrs 44.8% and 41.4%, $p=0.016$) however during pregnancy, there was increases in use of herbal medicines by Christians and Moslems, while there was a dip in the users who ascribe to the African Traditional Religion (ATR) faith but the difference not significant. Before pregnancy, women with secondary school level education used herbal medicines most (48.7%) with tertiary school leavers least enthused with herbal medicines (33.7%). There was increase in the use of herbal preparations during pregnancy irrespective of educational levels although there seem to be an increase in patronage as level of educational qualification falls with those with no formal education using it most. Women living among extended families before and during pregnancy used more herbal preparations than those in nuclear families but the difference in use of these products was significant before pregnancy (50.0% vrs 35.0%; $p=0.004$) but not during pregnancy. Unemployed (43.5%) and self-employed (45.2%) women used more herbal preparation before pregnancy than those employed by private sector (40.8%) or government (40.6%). Whereas, during pregnancy there were increases for unemployed (62.3%), self-employed (55.3%) and private sector employed (46.9%) women, that of government workers (35.9%) decreased with the differences found to be statistically significant ($p=0.002$). Using the type of accommodation as a proxy to determine the income level of the women, those in the low-income bracket who live in single rooms (37.6%) and Chamber and Halls (51.8%) used more herbal medicines

than the higher earning colleagues (34.8%). Before pregnancy, there was a statistically significant difference in use of herbal preparation based on economic level of the women but that was not so during pregnancy although there was increased usage irrespective of economic status with the high earning ones (44.9%) most reluctant to use herbal preparations.

Association between obstetric history of respondents and their patronage of herbal medicines during current pregnancy.

Table 6 indicates the association between obstetric history of respondents and their use of herbal medicine during their current pregnancy. Greater number of women who were carrying their first pregnancy used herbal medicines than those who had ever have been pregnant (54.5% vrs 51.3%) but the difference was not significant. Herbal preparations were used by most women in their first trimester (62.5%) but the patronage reduced for those in their second (52.8%) and third (50.0%) trimesters. The age of pregnancy was not significantly associated with the use of herbal medicines. Although increased antenatal visitation was found to decrease the use of herbal preparation among the pregnant women, the differences were not significant. The highest use of herbal medicines was among those who had 0 to 2 antenatal visit (60.3%) with 49.5% and 42.5% level of patronage recorded among those who visited the antenatal clinic for 3 to 5 times and more than 5 times respectively. Women who had more than 5 full term pregnancies used herbal medicines most (66.7%) followed by those with 0 to 2 (52.1%) whilst those with 3 to 5 recorded the least usage (50.9%) but these differences were not significant. Greater proportion of women who had ever had miscarriage or stillbirth (55.3%) were still using herbal medicines during their current pregnancy as compared to those who have never had any miscarriage. There was however no significant difference based on ever suffered a miscarriage or not. Non National Health Insurance Scheme card holders (81.8%) used herbal medicines in this pregnancy than insurance holder (51.3%) but the difference was not significant.

Table 5 Association between sociodemographic of respondents and their use of herbal medicines before and during pregnancy

Variable	Subgroup	Using herbal medicines before pregnancy?			Using herbal medicines during current pregnancy?		
		Yes	No	p-value	Yes	No	p-value
Marital status	Unmarried	19 (33.9%)	37 (66.1%)	0.143	26 (46.4%)	30 (53.6%)	0.385
	Married	142 (45.2%)	172 (54.8%)		167 (53.2%)	147 (46.8%)	
Religion	Islam	99 (41.4%)	140 (58.6%)	0.016*	128 (53.6%)	111 (46.4%)	0.184
	Christianity	56 (44.8%)	69 (55.2%)		60 (48.0%)	65 (52.0%)	
	Traditional	6 (100.0%)	0 (0.0%)		5 (83.3%)	1 (16.7%)	
Level of Education	None	32 (43.8%)	41 (56.2%)	0.183	43 (58.9%)	30 (41.1%)	0.473
	Basic	42 (45.7%)	50 (54.3%)		49 (53.3%)	43 (46.7%)	
	Secondary	58 (48.7%)	61 (51.3%)		61 (51.3%)	58 (48.7%)	
Family type	Tertiary	29 (33.7%)	57 (66.3%)		40 (46.5%)	46 (53.5%)	0.143
	Nuclear	56 (35.0%)	104 (65.0%)	0.004*	76 (47.5%)	84 (52.5%)	
	Extended	105 (50.0%)	105 (50.0%)		117 (55.7%)	93 (44.3%)	
Employment status	None	30 (43.5%)	39 (56.5%)	0.9	43 (62.3%)	26 (37.7%)	0.012*
	Self employed	85 (45.2%)	103 (54.8%)		104 (55.3%)	84 (44.7%)	
	Private sector	20 (40.8%)	29 (59.2%)		23 (46.9%)	26 (53.1%)	
Type of living accommodation	Government	26 (40.6%)	38 (59.4%)		23 (35.9%)	41 (64.1%)	0.287
	Single room	50 (37.6%)	83 (62.4%)	0.013*	68 (51.1%)	65 (48.9%)	
	Chamber and Hall	86 (51.8%)	80 (48.2%)		93 (56.0%)	73 (44.0%)	
	Apartment	24 (34.8%)	45 (65.2%)		31 (44.9%)	38 (55.1%)	

Table 6 Association between obstetric history of respondents and their use of herbal medicine during current pregnancy

Variable	Subgroup	Currently using herbal medicines?		p-value
		Yes	No	
Is this your first pregnancy?	Yes	55 (54.5%)	46 (45.5%)	0.641
	No	138 (51.3%)	131 (48.7%)	
Stage of pregnancy	1s Trimester	20 (62.5%)	12 (37.5%)	0.409
	2 nd Trimester	65 (52.8%)	58 (47.2%)	
	3 rd Trimester	106 (50.0%)	106 (50.0%)	
Number of antenatal visits	0 to 2	76 (60.3%)	50 (39.7%)	0.053
	3 to 5	94 (49.5%)	96 (50.5%)	
Number of full term pregnancies	>5	23 (42.5%)	31 (57.4%)	0.753
	0 to 2	134 (52.1%)	123 (47.9%)	
Had ever had still birth or miscarriage?	3 to 5	54 (50.9%)	52 (49.1%)	0.475
	>5	4 (66.7%)	2 (33.3%)	
Are you NHIS holder?	Yes	52 (55.3%)	42 (44.7%)	0.064
	No	140 (50.9%)	135 (49.1%)	
	Yes	184 (51.3%)	175 (48.7%)	
	No	9 (81.8%)	2 (18.2%)	

Discussion

With up to 80% of people living in developing countries depending on traditional medicine for their healthcare needs, the use of herbal medicine by pregnant women is inevitable. Prevalence of use of herbal preparation across the world differs with John and Shantakumari, (2015) reporting between 22.3 and 82.3% usage in the Middle East.²² A multinational survey in 23 countries in Europe, North and South America, and Australia showed a 28.9% usage of herbal medicine in pregnancy.¹⁸ This study found 43.5% of the pregnant women using herbal medicine prior to their pregnancy but the level of patronage increased to 52.7%. This prevalence rate is higher than 31.4% and 36.8% recorded by Tamuno et al, 2010 and Duru et al, 2016 in studies in Teaching hospitals in Nigeria.¹¹⁻²¹ There were even lower usage levels of 27.3% reported in Egypt²³ and a 6.5% in Offinso North District which is in the middle belt of Ghana.²⁴ Variation in prevalence rate can be due to differences in methodology, time of study, and even the study setting. The lower prevalence rate in the Nigerian, Ghanaian and Egyptian studies could be attributed to the study settings. Pregnant women are usually more reluctant to speak to their usage of herbal preparations during antenatal visit because of the fear that the researchers might inform the health professionals who would then abuse them. Prevalence level of 50.4% and 51.4% were reported in Ethiopia and Malaysia respectively.^{25,26} According to Peters, (1993) teratogenic chemicals affect all stages of the reproductive cycle and also the organs of the foetus may have been almost completed before most women would know that they were pregnant²⁷ so for about two-fifth of the pregnant women in this study to be using some herbal preparation before pregnancy can be a source of worry. Could this high pre-conception prevalence of use of herbal medicines account for the 5.1% disabled children reported by the pregnant women in this study? The 5.1% disability prevalence in this study is close to the 4.8% recorded by the Ghana Statistical Service 2010 national census for urban areas of Northern region which has Tamale as the capital²⁸ but it is higher than the national disability prevalence rate of 3.1%²⁹ This study found a significantly more Muslim women using HM prior to pregnancy than Christian which can be attributed to the higher muslim population in northern Ghana with the 2010 population census showing 60% of residents in Northern region ascribing to the Islamic faith.²⁸ This study found pregnant women who live among extended family setting significantly used more herbal medicines than those in nuclear families before pregnancy. Even during pregnancy, a lot more persons in extended family set up used more HM than their counterparts in nuclear families although the difference was not significant. In the African traditional set up, mothers or older female relations of pregnant women move into the homes of their daughters or pregnant relatives in urban areas to help them through the pregnancy and these relatives who come from the rural areas where they use a lot more HM may be encouraging these pregnant women to use these plant products. Pregnant women in self-contained apartment who may belong to the middle to high social class are most hesitant to take HM possibly because they were financially endowed so they are able to renew their NHIS cards or pay out of pocket. The study found those without NHIS cards to use a lot more HM than the holders of this cards. Due to the lack of money, those in the lower socio-economic class may find HM more affordable and would resort easily to their use. Unemployment was found to be the only factor that caused significant increase in the use of HM during pregnancy. This study, just as reported by Bayisa et.,²⁵ in Ethiopia, found the first trimester of pregnancy to be the stage pregnant women used HM most

although the difference with other trimesters was not significant.²⁵ This trend can be attributed to several pregnancy related sicknesses that occur at that early stage of pregnancy and women would look for remedies to manage them. It is also possible that with more visits to the antenatal clinic, they are advised against use of drugs during pregnancy and that could account for the decrease in use of HM during the other trimesters. However, Rahman et al.,²⁶ found a contrary result in Malaysia where the HM was used most during the 3rd Trimester of pregnancy.²⁶ Almost half of the respondents in this study who use herbal medicine before or during pregnancy used prepackaged form of the drug as also reported by Omane-Adjekum³⁰ About a quarter of the pregnant women go in rather for raw plant materials for the preparation of their herbal medicine with the leaves being the most useful part of the plants just as reported by Asase et al.,³¹ in their study in Southern Ghana.³¹ This study found the Fabaceae to be most prominent family of the plants used by the pregnant women which was also among the most important source of herbal medicine reported by Asase et al.,³¹ Several of the pregnant women mentioned the use of a herbal preparation called *Kaligutim* obtained from traditional birth attendants. The herbal preparation according to the pregnant women, assist in the management of several conditions such as severe headache, lower abdominal pains, nausea and vomiting and also eases labour thereby preventing complications of child birth. *Kaligutim* is said to be a combination of various plants such as *Diospyros mespiliiformis*, *Haematostaphis barteri*, *Bombax* spp, *Tamarindus indica*, *Detarium microcarpum* among others. These plants used by the pregnant women may be providing some remedies to alleviate the undesirable effects of pregnancy, there is the need for some more studies to determine their safety in pregnancy. Since most of the preparations used by the pregnant women were pre-packaged by herbal medicine companies, there is the need for the Food and Drugs Authority of Ghana to clearly caution the manufacturers to work with the herbal medicine vendors and practitioners to discourage their use in pregnancy. Because Tamale is just one city in Ghana, and having used convenience sampling in getting the respondents, the results may not be representative of the population of pregnant women in Ghana hence the results of the study has some limitation as it cannot be generalized. Another limitation worth noting is that with about two-fifth of the respondents being illiterate or had only basic level education, there was the need for the investigators to interpret or explain some of the questions to them in languages the respondents would best understand and this can invariably affect the presentation of the questions and the corresponding responses. Despite these limitations, this study is important as it is the first to document the plants used by pregnant women in the savanna zone of Ghana and since the vegetation is almost similar for the other regions of northern Ghana, it may be presentative of what pertains in the northern sector of Ghana. Northern region has the Guinea savannah vegetation which is different from the forest vegetations of most part of southern and middle belts of Ghana as some plants may be unique to the study area and are worth studying.

Conclusion

The use of herbal medicine among women in Tamale before and during pregnancy is high. Although religion, living in an extended family setting and lower socio-economic status were associated with use of HM before pregnancy, only unemployment was statistically associated with patronage of HM during pregnancy. Prepackaged herbal preparation was the most commonly used herbal preparation

but up to a quarter used raw plant materials with most of the plants belonging to the Fabaceae family. There is the need for healthcare professionals to be interested in knowing the use of herbal preparations by their clients and counsel appropriately since there is possibility of drug-herb interactions or possible teratogenic effect of these herbal preparations.

Declaration

Ethics approval and consent to participate

The Ethics Committee of the School of Medicine and Health Sciences of the University for Development Studies gave approval for this study. At the start of the administration of the questionnaire, the pregnant women were told in the language they best understand that they were not under any compulsion to participate in the study and that by collecting and completing the questionnaire or by participating in the interview they had given their consent to be part of the study. Similar information about consent was also provided in the introductory section of the questionnaire for those who are literates.

Competing interest

The authors declare that they have no competing interest.

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