

Prevalence and Factors Associated with Herbal Medicine Use during Pregnancy and Childbirth among Women Attending Selected District Hospitals in Mtwara Region, Tanzania: A Cross-Sectional Study

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Abstract

Background: Usage of herbal medicine is a common and rapidly increasing public health problem worldwide among pregnant women during pregnancy and childbirth. There are significant reported cases of pregnant women facing pregnancy complications following herbal medicine use during pregnancy and childbirth. This indicates that there is increasing self-medication of herbal medicine among pregnant women; however, data regarding this subject are scanty in our setting. This study aimed to assess the prevalence and factors associated with herbal medicine use during pregnancy and childbirth in Mtwara region, Tanzania. **Methods:** This was a cross-sectional study design that was conducted in 3 randomly selected district hospitals in Mtwara region between February 2023 and November 2024. **Results:** A total of 316 pregnant women were enrolled in the study. Among these, 260 (82.3%) participants reported history of herbal medicine use during pregnancy or childbirth. Living in the rural areas (OR: 10.19; 95% CI [4.22 - 24.59]; $p = 0.023$), low household income per month (OR: 5.97; 95% CI [2.82 - 43.6]; $p = 0.001$), low level of education (OR: 0.69; 95% CI [0.36 - 0.94]; $p = 0.045$) and history of unsuccessful pregnancy (OR: 29.12; 95% CI [3.96 - 213.89]; $p = 0.011$) were socio-demographic factors associated with herbal medicine use during pregnancy and childbirth. Health-related factors including long distance from health facility (OR: 6.18; 95% CI [3.34 - 11.45]; $p < 0.001$), inadequacy of health care (OR: 2.19; 95% CI [1.78 - 2.71]; $p = 0.042$) and traditional birth attendants or elders influence (OR: 2.26; 95% CI [1.18 - 3.34]; $p = 0.002$) were statistically signifi-

cantly associated with herbal medicine use during pregnancy and childbirth. Behavioral factors significantly associated with herbal medicine use during pregnancy and childbirth were positive history of herbal intake in previous pregnancies (OR: 3.74; 95% CI [2.50 - 8.01]; $p = 0.012$), advice from friends or relatives (OR: 20.80; 95% CI [7.30 - 59.27]; $p = 0.001$), positive history of herbal medicine use in other previous illnesses before pregnancy (OR: 8.93 [6.33 - 12.19]; $p = 0.016$) and antenatal clinic visits (OR: 4.83; 95% CI [2.43 - 8.99]; $p = 0.003$). Easy accessibility of and use (OR: 10.86; 95% CI [3.31 - 35.70]; $p < 0.001$), positive perception of being safe in pregnancy or childbirth safety (OR: 12.14 [1.64 - 89.92]; $p = 0.002$) and positive perception of herbals fastening and increasing effectiveness of contractions (OR: 6.69; 95% CI [4.47 - 11.94]; $p = 0.033$) were socio-cultural factors significantly associated with herbal medicine use during pregnancy and childbirth. **Conclusion:** This study demonstrated that the utilization of herbal medicine among pregnant women in this study was high, which may be an indicator for poor access to conventional western healthcare. Factors that were found to be significantly associated with herbal medicine use during pregnancy or childbirth included socio-demographic, healthcare-related, behavioral factors and socio-cultural factors. Addressing these factors and providing health education to women during early antenatal visits regarding the effects of the herbs during pregnancy and childbirth.

Keywords

Herbal Medicine Use, Prevalence, Factors, Pregnancy, Childbirth, Tanzania

1. Introduction

Over the past two decades, the use of herbal medicines during pregnancy has received increasing attention worldwide [1]. The World Health Organization (WHO) defines herbal medicines as medicinal products containing plant-derived materials or preparations as active ingredients, which may consist of raw or processed plant materials from one or more plants [2]. The prevalence of herbal medicine use during pregnancy and childbirth varies considerably across countries and regions [3]. In sub-Saharan Africa, the use of herbal medicines among pregnant women is common, although reported prevalence varies substantially between settings [4]. Studies from the region have reported prevalence estimates ranging from relatively low levels to almost universal use in some communities [5]. In Tanzania, however, evidence regarding the magnitude and determinants of herbal medicine use during pregnancy and childbirth remains limited and varies across geographical settings [6].

The widespread use of herbal medicines during pregnancy raises important concerns regarding their safety and efficacy because many herbal preparations have not been adequately evaluated for their potential maternal and fetal effects. Some studies have reported associations between herbal medicine use and adverse

pregnancy or childbirth outcomes, although the available evidence remains inconclusive [7]. Previous studies conducted in Tanzania have reported substantial use of herbal medicines during pregnancy and childbirth, with prevalence estimates varying between settings [8]. These findings highlight the need for continued investigation of the magnitude, determinants, and potential implications of herbal medicine use among pregnant women in Tanzania.

Herbal medicine use among pregnant women attending antenatal care varies across geographical and cultural settings. In Malawi, approximately 57.8% of pregnant women were reported to use herbal remedies, and some studies have reported pregnancy and childbirth complications among users, including preterm labor and other adverse outcomes [9]. In Tanzania, previous studies have also reported substantial use of herbal medicines during pregnancy and childbirth [10]. The types of herbal medicines used are influenced by sociocultural practices and local beliefs. Commonly reported remedies include ginger, lemon preparations, black seed, garlic, olive oil, and castor oil, while other locally specific preparations have also been documented in African communities [11]. These remedies are often used with the intention of reducing labor pain, accelerating or augmenting labor, treating pregnancy-related illnesses, or protecting the fetus from perceived spiritual harm [12].

Several factors influence women's decisions to use herbal medicines during pregnancy. Women's motivation to achieve a natural or uncomplicated birth and their perceptions of autonomy in making decisions concerning childbirth may contribute to the use of complementary and traditional medicines [13]. Limited geographical and financial access to formal healthcare services may also encourage women to seek herbal medicines, particularly where such remedies are readily available within the community [14]. Other commonly reported reasons include the perception that herbal medicines are natural and therefore safe, the treatment of pregnancy-related symptoms, and the belief that herbal medicines can complement conventional healthcare [15].

However, concerns regarding adverse effects remain important. Previous studies have reported symptoms such as vomiting, drowsiness, dry mouth, and changes in heartbeat among some herbal medicine users [16].

Evidence regarding the relationship between herbal medicine use and pregnancy outcomes remains inconclusive. While some studies have reported potential adverse maternal and fetal outcomes associated with herbal medicine use, others have not demonstrated a significant association [17]. Differences in the types and doses of herbal preparations used, timing of exposure, study populations, cultural practices, and methodological approaches may partly explain these inconsistent findings. Therefore, further context-specific research is necessary to understand patterns of herbal medicine use and the factors associated with its use during pregnancy and childbirth.

Despite evidence from several parts of Tanzania, there remains limited information on the prevalence and factors associated with herbal medicine use among pregnant women in the Mtwara Region. Mtwara has distinct sociocultural prac-

tices in which traditional health practices remain important [18]. Understanding the extent and determinants of herbal medicine use in this setting is important for informing antenatal health education, improving communication between healthcare providers and pregnant women, and strengthening maternal and reproductive health interventions.

Therefore, this study aimed to determine the prevalence and factors associated with herbal medicine use during pregnancy and childbirth among women attending selected district hospitals in Mtwara Region, Tanzania.

2. Materials and Methods

2.1. Study Design

This was a multi-centered descriptive cross-sectional study design that employed a quantitative approach. The study was conducted in Mtwara region between February 2023 and November 2024. The cross-sectional study was selected due to the nature of this study which focuses on determining the prevalence and factors associated with the increased use of herbal medicine among pregnant women in Mtwara region in Tanzania.

2.2. Study Setting

The study was conducted in 3 randomly selected district hospitals in Mtwara region in Tanzania. Mtwara region is one among the regions of Tanzania mainland. It is the southernmost region. It lies between longitudes 38 degrees and 40,40 East of Greenwich. It is also situated between latitudes 10'05" and 11'25" south of the equator. It borders Lindi region to the north, the Indian Ocean to the east and separated from Ruvuma River from Mozambique in the south. To the west it borders Ruvuma region. The region occupies 1.9% of Tanzania mainland, it is the second smallest region after Kilimanjaro. Administratively it is divided into five districts which are, Mikindani, Newala, Masasi, Tandahimba and Mtwara Rural. The study was conducted at the selected district hospitals in Mtwara region because they have several departments, including Obstetrics and Gynecology. The study was done in Mtwara region since the region has different cultural diversity which influences the high rate of traditional practice including herbal medicine use [19] in the Mtwara region and those who consented for the study were included in the study. All pregnant women with acute conditions needing emergency care were excluded from the study.

2.3. Study Population, Eligibility Criteria, Sample Size Estimation, Sampling Procedure and Study Variables

2.3.1. Study Population and Eligibility Criteria

The study population comprised pregnant women attending ANC services or women admitted to the labour wards during childbirth at the three selected district hospitals in Mtwara Region. Women were eligible if they were attending the selected facilities during the study period, were able to communicate in Kiswahili, and provided written informed consent. Women with acute or critical conditions

requiring emergency medical care or those unable to provide informed consent were excluded.

2.3.2. Sample Size Estimation

The sample size (n) for all respondents was calculated using formula by Cochran

(1977) (*i.e.* $n = \frac{Z^2 P(1-P)}{\epsilon^2}$) [20], where n = minimum sample size, z = normal

deviate of the standard normal distribution at a determined level of confidence = 1.96, p = prevalence of the characteristics in the population, 10.6% [6] and ϵ = margin of error which is 5%. Therefore, $n = [1.96^2 (0.106) (1 - 0.106)] / (0.05)^2 = 146$. Adding 10% of non-response in the field (*i.e.* $146 + 15 = 161$), the minimum sample size was estimated to be 161. Although the minimum required sample size was 161 participants, a total of 316 eligible women were enrolled during the study period. All eligible women attending the selected health facilities who met the inclusion criteria and provided informed consent were recruited consecutively until the end of the data collection period. Enrolling a larger sample increased the statistical power and precision of the study estimates.

2.3.3. Sampling Procedure

A multistage sampling procedure was used. First, three district hospitals were selected from five district hospitals in Mtwara Region using a simple random lottery method. The selected hospitals were Newala, Tandahimba, and Masasi (Mkomaindo) District Hospitals. Second, eligible women attending ANC clinics or admitted to labour wards were recruited consecutively during the study period. All eligible women who consented to participate were enrolled until completion of the data-collection period.

2.3.4. Study Variables

The primary outcome variable was herbal medicine use during pregnancy or childbirth. Independent variables were categorized into socio-demographic, healthcare-related, behavioral, and socio-cultural factors. Socio-demographic variables included age, marital status, occupation, education, household income, area of residence, and place of interview. Healthcare-related variables included distance from the health facility, healthcare costs, perceived inadequacy or unavailability of healthcare services, influence of TBAs or elders, and reasons for using herbal medicines. Behavioral variables included previous herbal medicine use, previous illness-related use, timing of ANC initiation, advice from friends or relatives, knowledge of herbal medicines and associated complications, and health-seeking behaviour. Socio-cultural variables included perceived effectiveness, accessibility, safety, and beliefs regarding the ability of herbal medicines to facilitate labour and prevent adverse pregnancy outcomes.

2.4. Data Management

2.4.1. Data Collection Tool

A structured questionnaire was used as a data collection tool and face to face re-

searcher-administered questionnaire approach was used to collect data. This approach was appropriate and suitable for data collection since other information was sensitive, so it required a technique to acquire such information from participants. The questionnaire was translated into the Swahili language for better understanding since is the language used by all of the study participants. The questionnaire consisted of the closed-ended questions. The questionnaire was divided into five (5) sections, to cover socio-demographic characteristics, herbal medicine use, socio-cultural, health system and behavioral factors. Health systems and behavioral factors associated with the increase of herbal medicine use during pregnancy and childbirth among women in the Mtwara region. The researcher was responsible for the supervision of the whole process of data collection, including protecting the rights, safety, and welfare of subjects involved in the study.

2.4.2. Data Collection Technique

During data collection, the researcher explained the purpose and procedures of the study, including the potential benefits and risks, eligibility criteria, voluntary nature of participation, and measures taken to ensure confidentiality. Women who agreed to participate provided written informed consent before being enrolled in the study. Data were collected through face-to-face interviews conducted by the researcher and trained research assistants using a structured questionnaire. Each participant was interviewed individually in a quiet and private room within the health facility to maintain privacy and confidentiality. The same questionnaire was administered consistently to all participants, and responses were recorded as provided by the participants. The research team used respectful, polite, and easily understandable language throughout the interviews. Participants were informed of their right to decline to answer any question or withdraw from the study at any time without penalty or any effect on the healthcare services they received.

2.4.3. Training of Research Assistants

Two researcher assistants with experience, skills in data collection, and research activities with good communication skills in the Swahili language were recruited and trained for two (2) days on using the tool; the researcher assistant was not be obtained from the same setting to minimize conflict of interest. The researcher assistant was trained on how to use the tool to collect data, recruit subjects, safeguard the confidentiality of the subjects, prepare reports and materials and assess the needs of the clients.

2.4.4. Pre-Testing of the Tool

Pre-testing of the data collection tool was conducted at Mwanayamala regional referral hospital consisting of sixteen (16) pregnant women but they were not included in the study sample to enhance the validity and reliability of the data collection tool before the commencement of the actual study. Misinterpretation of some of the questions identified in the tool and were reviewed and rephrased to match with participants' observations before the commencement of the actual data collection.

2.4.5. Validity

Validity refers to the degree to which an instrument measures what it is supposed to measure [21]. In this study, the validity of the tool was achieved by reviewing all questions with the help of research experts and providing opinions on the items, content, and coverage of the research objectives. The comments from reviewers were compared and analyzed to assure the validity of the tool.

2.4.6. Reliability

Reliability is the degree to which an instrument measures the same way each time when used under the same conditions with the same subjects [22]. Therefore, the pre-test was conducted to ensure the instrument's ability and accuracy. Sixteen (16) pregnant women which were ten (10%) of the sample size of this study were recruited from Mwananyamala regional referral hospital to pretest the tool before the commencement of the actual study but these were not included in a sample size of this study. The findings obtained from the pilot study were used to make necessary adjustments to change the tools. Therefore, to enhance reliability, the researcher and researcher assistant were involved in the data collection tools using the same tool which was administered to all participants.

2.4.7. Statistical Data Analysis

Data were entered, coded, cleaned, and analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics were used to summarize participants' characteristics. Categorical variables were presented as frequencies and percentages, while continuous variables were summarized using means and standard deviations (SD) or medians and interquartile ranges (IQR), as appropriate. Individual, cultural, and healthcare-related factors associated with herbal medicine use during pregnancy and childbirth were described using frequencies and proportions. Logistic regression analysis was performed to assess the association between herbal medicine use (dependent variable) and potential predictor variables (independent variables). The strength of association was measured using odds ratios (ORs) and their corresponding 95% confidence intervals (CIs). Both univariate and multivariable logistic regression analyses were conducted, with results reported as crude odds ratios (CORs) and adjusted odds ratios (AORs), respectively. Variables that demonstrated a potential association with herbal medicine use during pregnancy or childbirth at a significance level of $p < 0.20$ in the univariate analysis were included in the multivariable logistic regression model to identify independent factors associated with herbal medicine use. Statistical significance was considered at a p -value < 0.05 .

3. Results

3.1. Participant's Characteristics

A total of 316 pregnant women attending antenatal clinic and labor ward in three district hospitals in Mtwara were subjects for this study. Most of the participants were recruited from Newala district hospital 33.5% (106); many were between the

age 25-31 years 52.5% (166); married 72.5% (229); self-employed 69.0% (218); secondary graduates 34.8% (110); living under 250,000 Tsh household income per month 55.1% (174); in their second antenatal visit 49.7% (157); having one child 31.0% (98); with no history of unsuccessful pregnancy 71.2% (225) and; living in urban 52.8% 167). **Table 1** shows participant's characteristics.

Table 1. Participant's characteristics.

Variables	Category	Frequency	Percentage (%)
Age group	18 - 24	36	11.4
	25 - 31	166	52.5
	32 - 38	114	36.1
Marital status	Single	60	19.0
	Married	229	72.5
	Separated/divorced	27	8.5
Occupation	Not-employed	29	9.2
	Employed	69	21.8
	Self-employed	218	69.0
Education level	Primary	103	32.6
	Secondary	110	34.8
	University/college	103	32.6
Approximate household income per month	Less than 250,000	174	55.1
	250,000 - 500,000	101	32.0
	Above 500,000 - 750,000	22	7.0
	Above 750,000 - 1,000,000	19	6.0
Place of interview	Newala district hospital	106	33.5
	Tandahimba district hospital	105	33.2
	Masasi (Mkomaindo) district hospital	105	33.2
Number of antenatal visit	First	74	23.4
	Second	157	49.7
	Third	40	12.7
	Fourth	36	11.4
	Five and above	9	2.8
Number of children	None (prime)	69	21.8
	One	98	31.0
	Two	42	13.3
	Three	71	22.5
	Four and above	36	11.4
History of unsuccessful pregnancy	Yes	91	28.8
	No	225	71.2
Area of residence	Rural	149	47.2
	Urban	167	52.8

3.2. Herbal Medicine Use among Pregnant Women

A total of 260 (82.3%) participants reported history of herbal medicine use during pregnancy or childbirth. Of these, 133 (51.2%) reported intake in their first trimester of pregnancy, with majority of them, 114 (43.8%) consuming the herbal medicine for less than a week. The patterns for herbal medicine use during pregnancy or childbirth are detailed in **Table 2**.

Table 2. Herbal medicine use patterns during pregnancy or childbirth.

Variable		Frequency	Percent (%)
Herbal medicine use during pregnancy or childbirth	Yes	260	82.3
	No	56	17.7
	Total	316	100.0
Stage of gestation herbal medicine were taken	0 - 12 weeks (1 st trimester)	133	51.2
	13 - 27 weeks (2 nd trimester)	101	38.8
	28 - 40 weeks (third trimester)	2	0.8
	Labour (intrapartum)	24	9.2
	Total	260	100.0
Times herbal medicine were taken	1 day	99	38.1
	less than 1 week	114	43.8
	more than 1 week	18	6.9
	Month	29	11.2
	Total	260	100.0

3.3. Factors Associated with Herbal Medicine Use during Pregnancy or Childbirth

The factors predicting herbal medicine use during pregnancy or childbirth were categorized into four: 1) Socio-demographic factors; 2) Healthcare systems factors; 3) Behavioral factors and; 4) Socio-cultural factors.

3.3.1. Socio-Demographic Factors Associated with Herbal Medicine Use during Pregnancy/Birth

Regarding bivariate analysis using chi-square test, age ($p < 0.001$), marital status ($p = 0.021$), level of education ($p = 0.038$), household income per month ($p < 0.001$), number of antenatal visit ($p < 0.001$), number of children ($p = 0.032$), history of unsuccessful pregnancy (miscarriage/abortion) ($p = 0.011$) and area of residence ($p = 0.002$) were factors significantly associated with herbal medicine use during pregnancy or childbirth (**Table 3**).

Table 3. Bivariate analysis of socio-demographic and patient's factors predicting herbal medicine usage in pregnancy or childbirth.

Independent variables	Herbal medicine use		Chi-square	p-value
	Yes (N = 260)	No (N = 56)		
Age				
18 - 24	23 (63.9)	13 (36.1)	189.415	<0.001

Continued

25 - 31	159 (95.8)	7 (4.2)		
32 - 38	78 (68.4)	36 (31.6)		
<i>Area of residence</i>				
Urban	107 (71.8)	42 (28.2)	36.264	0.012
Rural	153 (91.6)	14 (8.4)		
<i>Occupation</i>				
Not-employed	23 (79.3)	6 (20.7)		
Employed	59 (85.5)	10 (14.5)	0.821	0.102
Self-employed	178 (81.7)	40 (18.3)		
<i>Marital status</i>				
Single	42 (70.0)	18 (30.0)		
Married	205 (89.5)	24 (10.5)	9.245	0.021
Separated/divorced	13 (48.1)	14 (51.9)		
<i>Education</i>				
Primary	100 (97.1)	3 (2.9)		
Secondary	78 (70.9)	32 (29.1)	9.760	0.038
University/college	82 (79.6)	21 (20.4)		
<i>Household income per month</i>				
Less than 250,000	168 (96.6)	6 (3.4)		
250,000 - 500,000	68 (65.3)	33 (34.7)	58.178	<0.001
Above 500,000 - 750,000	12 (54.5)	10 (45.5)		
Above 750,000 - 1,000,000	12 (57.8)	7 (42.2)		
<i>Place of interview</i>				
Newala district hospital	87 (82.1)	19 (17.9)		
Tandahimba district hospital	88 (83.8)	17 (16.2)	0.663	0.417
Masasi district hospital	85 (81.0)	20 (19.0)		
<i>Number of antenatal visits</i>				
One				
Two			83.551	<0.001
Three				
Four				
<i>Number of children</i>				
None (prime)	54 (78.3)	15 (21.7)		
One 98	97 (99.0)	1 (2.0)		
Two 42	31 (71.4)	11 (26.2)	6.323	0.021
Three 71	52 (73.2)	19 (26.8)		
Four and above	26 (72.2)	10 (27.8)		
<i>History of unsuccessful pregnancy (miscarriage/abortion)</i>				
Yes	86 (94.5)	5 (5.5)	24.219	0.011
No	174 (77.3)	51 (22.7)		

3.3.2. Healthcare Systems Factors Associated with Herbal Medicine Use during Pregnancy/Birth

Figure 1 below shows health related factors associated with use of herbal medicine among pregnant. With regard to bivariate analysis, the distance from health facility ($p = 0.004$), hospital costs ($p = 0.014$), inadequacy of health care ($p < 0.001$), counteraction of side effects of conventional medicine ($p = 0.023$), TBA or elders influence ($p = 0.019$), treatment of illness and diseases ($p < 0.001$), health of the fetus ($p = 0.001$) and normal delivery ($p = 0.011$) were found to be significantly associated with intake of herbal medicine during pregnancy or childbirth (**Table 4**).

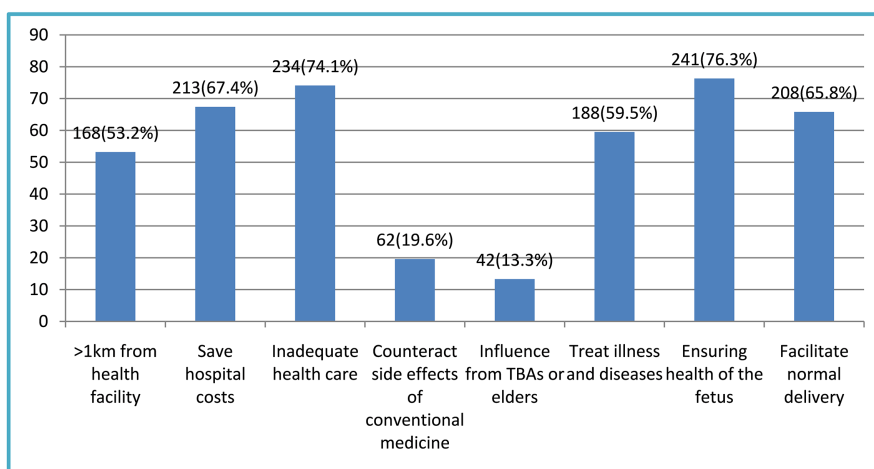


Figure 1. Healthcare related factors associated with herbal use in pregnancy or childbirth.

Table 4. Bivariate analysis of healthcare-related factors predicting herbal medicine usage in pregnancy or childbirth.

Independent values	Herbal medicine use		Chi-square	p-value
	Yes (N = 260)	No (N = 56)		
<i>Distance from health facility</i>				
≤1 km	95 (64.2)	53 (35.8)	6.565	0.004
>1 km	165 (98.2)	3 (1.8)		
<i>Save hospital costs</i>				
Yes	200 (94.0)	13 (6.0)	12.872	0.014
No	60 (58.3)	43 (41.7)		
<i>Inadequacy of health care</i>				
Yes	213 (91.0)	21 (9.0)	54.776	<0.001
No	47 (57.3)	35 (42.7)		
<i>Counteraction of side effects of conventional medicine</i>				
Yes	61 (98.4)	1 (1.6)	9.665	0.023
No	199 (78.3)	55 (21.7)		
<i>TBA or elders influence</i>				
Yes	40 (95.2)	2 (4.8)	23.098	0.019
No	221 (80.7)	53 (14.6)		

Continued

<i>Treatment of illness and diseases</i>				
Yes	175 (93.1)	13 (6.9)	76.326	<0.001
No	85 (66.4)	43 (33.6)		
<i>Ensuing health of the foetus</i>				
Yes	219 (90.9)	22 (8.1)	66.833	0.011
No	41 (54.7)	34 (45.3)		
<i>Facilitate normal delivery</i>				
Yes	200 (96.2)	8 (3.8)	21.867	0.031
No	60 (55.6)	48 (44.4)		

3.3.3. Behavioral Factors Associated with Herbal Medicine Use during Pregnancy and Birth

Figure 2 below shows behavioral factors associated with herbal medicine use during pregnancy and birth. During cross tabulation under bivariate analysis by using chi-square test, use of herbal medicine in previous pregnancies ($p < 0.001$), use of herbal medicine in other previous illnesses before pregnancy ($p < 0.001$), trimester at first antenatal visit ($p = 0.040$), advice from friends or relatives ($p < 0.001$), knowledge of some herbs ($p = 0.005$) and health seeking behavior ($p = 0.018$) were positive predictors of herbal intake during pregnancy or childbirth (**Table 5**).

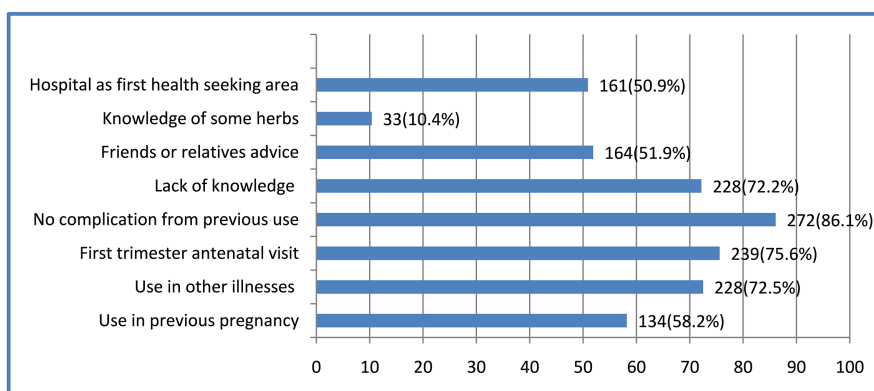


Figure 2. Behavioral factors associated with herbal use in pregnancy or childbirth.

Table 5. Bivariate analysis of behavioral factors predicting herbal medicine usage in pregnancy or childbirth.

Independent variables	Herbal medicine usage		Chi-square	p-value
	Yes (N = 260)	No (N = 56)		
<i>Use of herbal medicine in previous pregnancies</i>				
Yes	129 (96.3)	5 (3.7)	67.112	<0.001
No	131 (72.0)	51 (28.0)		
<i>Use of herbal medicine in other previous illnesses before pregnancy</i>				
Yes	220 (96.5)	8 (4.5)	65.911	<0.001
No	40 (45.5)	48 (54.5)		

Continued

<i>Trimester at first antenatal visit</i>				
Yes	228 (95.4)	11 (4.6)	6.978	0.040
No	32(41.6)	45 (58.4)		
<i>Advice from friends or relatives</i>				
Yes	160 (97.6)	4 (2.4)	29.221	<0.001
No	100 (65.8)	52 (34.2)		
<i>Knowledge of some herbs</i>				
Yes	32 (97.0)	1 (3.0)	7.998	0.005
No	228 (80.6)	55 (19.4)		
<i>Health seeking behaviour</i>				
Yes	159 (98.8)	2 (1.2)	11.776	0.018
No	101 (65.2)	54 (34.8)		
<i>Lack of knowledge on associated complications and pregnancy outcomes</i>				
Yes	222 (97.4)	6 (2.6)	21.998	0.041
No	34 (38.6)	50 (56.8)		

3.3.4. Socio-Cultural Factors Associated with Herbal Medicine Use during Pregnancy or Childbirth

Socio-cultural factors associated with herbal medicine use during pregnancy and birth are shown in **Figure 3** below. Using bivariate analysis, it was found that perceived efficacy in healing pregnancy induced illnesses ($p = 0.031$), easily accessible and use ($p < 0.001$), perceived safety of the herbs to use in pregnancy ($p = 0.012$), perceived fasting and effective contractions ($p = 0.018$), perceived congenital malformations ($p < 0.001$) and perceived prematurity or miscarriage ($p = 0.022$) were socio-cultural factors significantly associated with herbal medicine use during pregnancy and birth as shown in **Table 6** below.

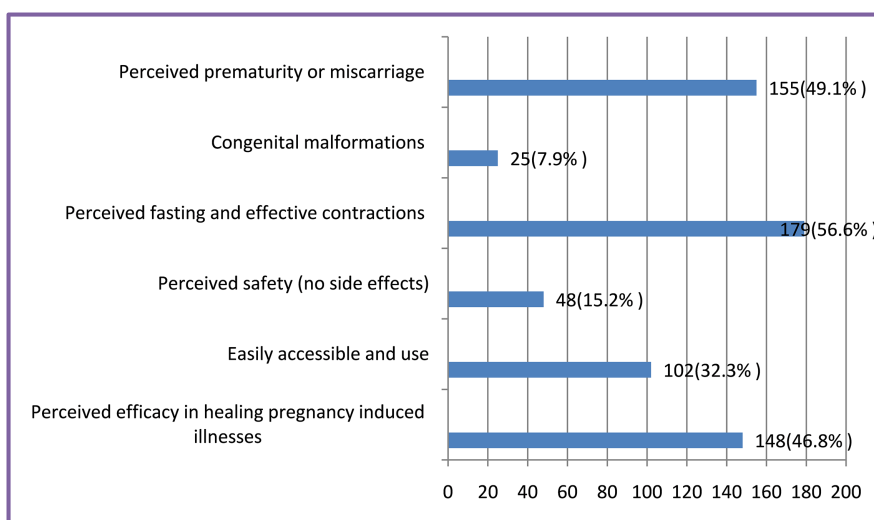


Figure 3. Socio-cultural factors associated with herbal medicine use during pregnancy and birth.

Table 6. Bivariate analysis of socio-cultural factors predicting herbal medicine usage in pregnancy or childbirth.

Independent variables	Herbal medicine usage		Chi-square	p-value
	Yes (N = 260)	No (N = 56)		
<i>Perceived efficacy in healing pregnancy induced illnesses</i>				
Yes	136 (91.9)	12 (8.1)	15.955	0.031
no	124 (73.8)	44 (26.2)		
<i>Easily accessible and use</i>				
Yes	97 (95.1)	5 (4.9)	59.112	<0.001
No	163 (76.2)	51 (23.8)		
<i>Perceived safety of the herbs to use in pregnancy</i>				
Yes	46 (95.8)	2 (4.2)	11.944	0.012
No	214 (79.9)	54 (20.1)		
<i>Perceived fasting and effective contractions</i>				
Yes	168 (93.9)	11 (6.1)	8.996	0.018
No	92 (67.2)	45 (32.8)		
<i>Perceived congenital malformations</i>				
Yes	24 (96.0)	1 (4.0)	43.991	<0.001
No	236 (81.1)	55 (18.9)		
<i>Perceived prematurity or miscarriage</i>				
Yes	148 (95.5)	7 (4.5)	9.562	0.022
No	112 (69.6)	49 (30.4)		

3.3.5. Multivariate Logistic Regression Analysis of Factors Predicting Herbal Medicine Usage in Pregnancy or Childbirth

Table 7 below presents the multivariate logistic regression analysis of factors independently associated with herbal medicine use during pregnancy or childbirth. Among socio-demographic factors, low household income (OR = 5.97, 95% CI: 2.82 - 43.60, $p = 0.001$), rural residence (OR = 10.19, 95% CI: 4.22 - 24.59, $p = 0.023$), and a history of unsuccessful pregnancy (OR = 29.12, 95% CI: 3.96 - 13.89, $p = 0.011$) were significant predictors of herbal medicine use, while higher education was associated with reduced odds of use (OR = 0.69, 95% CI: 0.36 - 0.94, $p = 0.045$).

Health system-related factors significantly associated with herbal medicine use included inadequacy or unavailability of healthcare services (OR = 2.19, 95% CI: 1.78 - 2.71, $p = 0.042$), long distance to health facilities (OR = 6.18, 95% CI: 3.34 - 11.45, $p < 0.001$), and influence from traditional birth attendants or elders (OR = 2.26, 95% CI: 1.18 - 3.34, $p = 0.002$).

Behavioral factors associated with increased herbal medicine use were previous use during pregnancy (OR = 3.74, 95% CI: 2.50 - 8.01, $p = 0.012$), advice from friends or relatives (OR = 20.80, 95% CI: 7.30 - 59.27, $p = 0.001$), prior use for other illnesses (OR = 8.93, 95% CI: 6.33 - 12.19, $p = 0.016$), and antenatal clinic attendance (OR = 4.83, 95% CI: 2.43 - 8.99, $p = 0.003$).

Among socio-cultural factors, easy accessibility of herbal medicines (OR = 10.86, 95% CI: 3.31 - 35.70, $p < 0.001$), perception that herbal medicines are safe during pregnancy or childbirth (OR = 12.14, 95% CI: 1.64 - 8.92, $p = 0.002$), and the belief that they hasten labor and increase contraction effectiveness (OR = 6.69, 95% CI: 4.47 - 11.94, $p = 0.033$) were significantly associated with herbal medicine usage in pregnancy or childbirth.

Table 7. Multivariate logistic regression analysis of factors associated with herbal medicine usage in pregnancy or childbirth.

Variables	Odds Ratio (95% CI)	<i>p</i> -value
<i>Socio-demographic factors</i>		
Lowest household income	5.97 [2.82 - 43.6]	0.001
Education level	0.69 [0.36 - 0.94]	0.045
Living in rural area	10.19 [4.22 - 24.59]	0.023
Prior history of unsuccessful pregnancy	29.12 [3.96 - 21.89]	0.011
<i>Health system related factors</i>		
Inadequacy /unavailability of health care	2.19 [1.78 - 2.71]	0.042
Long distance from health facility	6.18 [3.34 - 11.45]	<0.001
Influence from TBA or elders	2.26 [1.18 - 3.34]	0.002
<i>Behavioral factors</i>		
Positive history of herbal intake in previous pregnancies	3.74 [2.50 - 8.01]	0.012
Advice from friends or relatives	20.80 [7.30 - 9.27]	0.001
Positive history of herbal medicine use in other previous illnesses before pregnancy	8.93 [6.33 - 12.19]	0.016
Antenatal clinic visits	4.83 [2.43 - 8.99]	0.003
<i>Socio-cultural factors</i>		
Easy accessibility of and use	10.86 [3.31 - 5.70]	<0.001
Positive perception of being safe in pregnancy or childbirth safety	12.14 [1.64 - 9.92]	0.002
Positive perception of herbals fastening and increasing effectiveness of contractions	6.69 [4.47 - 11.94]	0.033

4. Discussion

Herbal medicine use during pregnancy and childbirth has been reported in both low- and high-income countries, although the prevalence and patterns of use vary substantially between populations [22]. The prevalence of herbal medicine use during pregnancy and childbirth varies substantially across geographical settings and population [23]. In the present study, 82.3% of participants reported using herbal medicines during pregnancy or childbirth. This prevalence was lower than the 85.2% reported in Malaysia [24], but was comparable to the high levels reported in some other settings [25]. However, the prevalence observed in the present study was higher than those reported in Zimbabwe, Egypt, the Democratic Republic of Congo and Nigeria [26].

High levels of herbal medicine use have also been reported in Mali and Uganda

A systematic review of medicinal plant use among pregnant women in Africa demonstrated substantial variation between regions and studies [27]. Similarly,

systematic reviews of traditional medicine use in maternity care have reported considerable geographical and cultural variation [28]. Differences in prevalence may be explained by variations in cultural beliefs, accessibility and affordability of healthcare and herbal products, study design, sample size, study setting and the characteristics of the populations studied.

In Tanzania, herbal medicine use during pregnancy and childbirth has also been reported in different settings. Studies from Kigoma and Mwanza have documented the use of local herbs during pregnancy and labor [29]. The high prevalence observed in the current study therefore adds further evidence that herbal medicine use remains an important maternal-health issue in Tanzania.

In the present study, low household income was independently associated with herbal medicine use. Women from households with the lowest income had higher odds of using herbal medicines than women from higher-income households. Similar associations have been reported in Ethiopia [30]. This may be partly explained by the affordability and accessibility of herbal preparations compared with conventional healthcare services.

Rural residence was also independently associated with herbal medicine use. This finding is consistent with evidence from African studies indicating that geographical and healthcare-access factors influence the use of medicinal plants during pregnancy [30]. Similar findings have been reported in Ethiopia [31]. However, previous research from Uganda did not identify residence as a significant determinant of herbal medicine use [32]. Differences between studies may reflect variations in healthcare infrastructure, cultural practices and accessibility of health services.

Lower educational attainment was associated with increased herbal medicine use in the present study. Similar findings have been reported in Ethiopia and Tanzania [20]. Lower educational attainment may be associated with reduced access to health information and differences in health-seeking behavior. However, findings are not consistent across all settings; for example, research from Saudi Arabia reported herbal medicine use among more highly educated women [33]. These contrasting findings suggest that the influence of education may depend on the social, cultural and healthcare context.

A history of unsuccessful pregnancy was strongly associated with herbal medicine use in the current study. Women with a previous unsuccessful pregnancy had substantially higher odds of using herbal medicines than women without such a history. Similar associations have been reported in studies examining traditional medicinal plant use during pregnancy [34]. Previous adverse pregnancy experiences may increase women's desire to take additional measures that they believe will protect the current pregnancy.

Distance from the health facility was another important predictor. Women living farther from health facilities had higher odds of using herbal medicines. Similar findings have been reported in Kenya and Tanzania [35]. In contrast, no significant association between distance and herbal medicine use was reported in

Namibia [36]. Long distance may increase transportation costs and the time required to access formal healthcare, making locally available herbal remedies a more convenient option.

Inadequacy or unavailability of healthcare services was also independently associated with herbal medicine use. Similar associations have been documented in Cameroon [37]. Limited availability and accessibility of maternity services may encourage women to seek alternative sources of care, including traditional medicine.

Influence from traditional birth attendants or elders was significantly associated with herbal medicine use. This finding is consistent with previous research showing the important role of traditional knowledge and social networks in maternal healthcare decisions [38]. Traditional birth attendants, elders, relatives and other influential community members may therefore contribute to the continuation of traditional practices, including herbal medicine use.

Previous herbal medicine use was also strongly associated with current use. Women who had used herbal medicines during previous pregnancies were more likely to use them during the current pregnancy. This finding is consistent with previous research [39]. Previous positive experiences may reinforce women's confidence in herbal medicines and increase the likelihood of repeated use.

Advice from friends or relatives was another important behavioral factor. Similar findings have been reported in studies from the Nigeria [40]. Friends and relatives constitute an important source of health information and may influence women's perceptions of the benefits and safety of herbal medicines.

The current study also found that easy accessibility of herbal medicines was independently associated with their use. This finding is consistent with previous evidence from Ethiopia [41]. Herbal medicines may be readily available within communities and may be perceived as affordable and convenient alternatives to formal healthcare.

Perceived safety was strongly associated with herbal medicine use. Women who believed that herbal medicines were safe during pregnancy or childbirth had substantially higher odds of using them. Similar findings have been reported in Malawi [42]. Perceptions of safety are therefore an important target for antenatal health education.

Finally, women who believed that herbal medicines could hasten labor or increase the effectiveness of contractions were more likely to use them. Similar beliefs have been reported among pregnant women in other settings in Ethiopia [43]. Such perceptions may be particularly important during late pregnancy and labor, when women may seek interventions believed to shorten labor or facilitate normal delivery. However, evidence regarding the effectiveness and safety of herbal medicines for labor induction remains insufficient for many preparations [44].

This study has several limitations. First, because the study used a cross-sectional design, temporal relationships between herbal medicine use and the identified associated factors cannot be established. Second, information on herbal medicine

use was self-reported and may therefore have been affected by recall and social desirability bias, particularly because some participants may not have considered locally prepared herbal remedies to be medicines. Third, the study was conducted in only three district hospitals in Mtwara Region; therefore, the findings may not be generalizable to all pregnant women in Tanzania or to women receiving care in other settings. Finally, the study did not chemically characterize the herbal preparations used by participants, and therefore the safety or pharmacological effects of individual herbal products could not be determined.

5. Conclusion

This study found a high prevalence of herbal medicine use during pregnancy and childbirth among women attending selected health facilities in Mtwara Region, Tanzania, with 82.3% reporting herbal medicine use. Herbal medicine use was associated with socio-demographic, healthcare-related, behavioral, and socio-cultural factors. The findings highlight the importance of strengthening maternal health education, particularly during early antenatal care, regarding the potential benefits, risks, and uncertainties associated with herbal medicine use during pregnancy and childbirth. Healthcare providers should routinely ask pregnant women about herbal medicine use and provide culturally sensitive counselling without discouraging women from openly reporting traditional medicine practices. Further research is recommended to identify and characterize the herbal products commonly used in Mtwara Region and to assess their safety, pharmacological properties, and potential effects on maternal and fetal outcomes. Larger studies involving multiple regions of Tanzania are also needed to determine the national pattern of herbal medicine use during pregnancy and childbirth.

Ethical Considerations

Ethical approval for the study was obtained from the Institutional Research Ethics Committee of Hubert Kairuki Memorial University, Dar es Salaam, Tanzania (HKMU/IREC/27.10/166). Permission to conduct the study was also granted by the National Institute for Medical Research (NIMR). Prior to enrollment, all eligible participants were provided with detailed information about the study objectives and procedures, and written informed consent was obtained from those who agreed to participate. Participants were informed that their participation was entirely voluntary and that they could withdraw from the study at any stage without any penalty or effect on the care they received. Confidentiality and privacy were strictly maintained throughout the study. All collected data were anonymized, securely stored, and accessible only to authorized members of the research team.

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Author Contributions

AM: Participated in the conception and design of the study, performed the data collection, performed the statistical analysis and served as the lead author of the manuscript. NW and BKM: Participated in the design of the study, revised subsequent drafts of the paper, supported statistical analysis, critically reviewing and finalization of the manuscript. In addition, AM was the corresponding author and supervised the study. All authors contributed to the study and have read and approved the final manuscript.

Conflicts of Interest

The authors declare that they have no competing interests. The study was not funded by any external body.

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