

**PREVALENCE OF NAUSEA AND VOMITING IN PREGNANCY AND
FACTORS ASSOCIATED WITH HERBAL MEDICINE USE FOR
ALEVIATING SYMPTOMS: A CROSS-SECTIONAL STUDY AT MNAZI
MMOJA HOSPITAL DAR ES SALAAM TANZANIA**

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**MMed (Obstetrics and Gynecology) Dissertation
Muhimbili University of Health and Allied Sciences
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Muhimbili University of Health and Allied Sciences

Department of Obstetrics and Gynecology



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By

Brian Abraham

**A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree
of Master of Medicine (Obstetrics and Gynecology)**

**Muhimbili University of Health and Allied Sciences
October, 2021**

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: **“Prevalence of nausea and vomiting in pregnancy and factors associated with herbal medicine use for alleviating symptoms: A Cross-Sectional study at Mnazi Mmoja Hospital Dar es Salaam Tanzania”**, in (partial) fulfillment of the requirements for the degree of Master of Medicine (Obstetrics and Gynecology) of Muhimbili University of Health and Allied Sciences.

Dr. Peter J. Wangwe

(Supervisor)

Date

DECLARATION AND COPYRIGHT

I, **Brian Abraham**, declare that this **dissertation** is my own original work and that has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature..... **Date**.....

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DEDICATION

To the Nurses and Doctors who practice Obstetrics and Gynecology and take care of women's and children's health, for their difficult and hard work in clinical and research fields.

ABSTRACT

Background: Nausea and Vomiting in Pregnancy (NVP) is the most common medical condition in pregnancy with a varying prevalence between countries. Although prescribed anti-emetics are used, the use of non-prescribed herbal medicines for NVP has been reported to be high especially in low resource areas like Africa. Studying the local prevalence of the condition, describing the herbal medicines used and the factors associated with their use may be an important step towards the management of the problem for better pregnancy outcomes.

Aim of the Study: The study aims at determining the prevalence of NVP and herbal use, describe herbal medicines used and determine potential factors associated with the use of herbal medicines for NVP.

Materials and Methods: A cross-sectional study was conducted on 415 women attending ANC at Mnazi Mmoja hospital, Dar es Salaam. A structured interviewer administered questionnaire was used to collect socio-demographic and previous and current pregnancy information on women's experience of NVP. Data were analyzed using SPSS, statistical software version 23. Descriptive statistics was done and Chi square test and Poisson multivariate regression analysis were done to identify factors associated with herbal use, with a p-value <0.05 considered statistically significant.

Results: The prevalence of NVP was 82.89 % (344/415). The proportion of herbal medicine use for alleviating NVP was 47.97% (162/344) (95% CI 46.6 – 57.42%). Lemon, raw mangoes and tamarind were the most used herbs. Mild NVP (aPR=1.5, 95% CI=1.07 – 2.09) and previous use of herbal medicine for NVP (aPR=3.14, 95% CI=1.69 – 6.3) were independently associated with increased use of herbal medicines for NVP.

Conclusion: Nausea and vomiting in pregnancy is high in Dar es Salaam like in many other parts of the world. Almost half of pregnant women use commonly available food substances as herbal medicines for NVP relief. Mild NVP and previous use of herbal medicines for NVP are significantly associated with increased herbal use for NVP. However, Dar es Salaam is an urban setting with a diverse socio-cultural profile. A study in less diverse settings like districts may be done to identify areas with common use of harmful substances like soil that was reported to a negligible degree in this study, so that relevant interventions may be done.

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LIST OF ABBREVIATIONS

ANC	Antenatal care
BMI	Body mass index
BMQ	Beliefs about Medicine Questionnaire
FANC	Focused antenatal care
GA	Gestational age
hCG	Human chorionic gonadotropin
HG	Hyperemesis gravidarum
LBW	Low birth weight
MNH	Muhimbili National Hospital
MUHAS	Muhimbili university of health and allied sciences
NVP	Nausea and vomiting in pregnancy
PUQE	Pregnancy Unique Quantification of Emesis
WHO	World health organization

OPERATIONAL DEFINITIONS

Nausea and Vomiting in Pregnancy: Clinical symptoms ranging from mild nausea without vomiting, increased salivation and nausea with vomiting. NOTE: Although hyperemesis gravidarum is an extreme manifestation of NVP, patients with hyperemesis gravidarum were not included in this study.

Herbal medicines: Are natural plant products (fruits, leaves, stems, barks, roots) used as medicines for treatment purposes, in this case for alleviating NVP symptoms.

Factors associated with herbal medicines: These are socio-demographic, economic and clinical characteristics that are potentially associated with maternal use of herbal medicines for alleviating NVP during pregnancy.

1.0 INTRODUCTION

1.1 Background

Nausea and Vomiting of Pregnancy (NVP) is a medical condition in pregnancy that results from anatomical and physiological changes during pregnancy. However, it can result into severe complications especially if untreated or it is very severe. It is the most common medical condition of Pregnancy affecting up to 90% of pregnancies(1–3)

Nausea and vomiting of pregnancy has variable clinical manifestations ranging from mild nausea, increased salivation, through moderate nausea with or without vomiting to hyperemesis gravidarum(HG).Although NVP can occur in all trimesters of pregnancy, it is most common and severe in the first trimester of pregnancy(4,5) with symptom onset as early as 5weeks(2), a peak at around 8weeks(6) and decline at 12 weeks(2).

The modified Pregnancy Unique Quantification of Emesis score (PUQE Score) that classifies NVP into mild (score ≤ 6), moderate (score 7 - 12) and severe (score ≥ 13) based on the duration of nausea, frequency of vomiting and retching(7). This is a validated tool that can be used in clinical setting for management of NVP.

The pathogenesis of NVP is unknown but different hypotheses have been suggested. The most popular is hormonal changes suggesting the role of increased levels of hCG(8), estrogen and progesterone.

NVP has adverse effects on the mother and the fetus. Maternal adverse effects include different co-morbidities(9–11), as well as many negative socioeconomic and quality of life effects on the pregnant women(2,12–16). NVP has also been associated with fetal adverse effects like LBW and SGA(17), as well as impaired brain development, neuromotor immaturity, cranial malformations, and IUGR(18).

The WHO, national guidelines and recent international reviews have grouped interventions for NVP into Non-pharmacological and Pharmacological measures. Herbal medicines are among non-pharmacological interventions. Recommended herbs are; ginger, chamomile, lemon oil,

mint oil, peppermint and vitamin B6. The WHO has recommended herbal medicines are for mild to moderate NVP to prevent severe NVP(19–24).

Studies around the world have reported differences in prevalence's, treatment rates and interventions (herbal medicines, conventional medicines and others) used for NVP management between different regions and countries of the world(11,19,25–27). Unfortunately WHO recommendations for NVP management have been drawn from such data with limited evidence(23).

In all international studies/reviews, there are very few studies from low income countries especially Africa. The Cochrane Review used by the WHO had only two(out of 41 studies) studies from Africa, indicating serious lack of information on the magnitude and how NVP is being managed in our settings especially the non-prescribed herbal medicines that are influenced by local African culture(19,23).

In general NVP is a very prevalent condition with significant medical and socioeconomic consequences on the pregnant women, care takers and the community. So far, prevalence, socio-demographic factors, pharmacological and non-pharmacological interventions of management differs between countries and regions in different parts of the world. Thus a study to investigate our local prevalence, herbal medicines used as well as the predictors for these treatments used is important in the evaluation of the condition and possible establishment of relevant information to the obstetric care givers to improve management of the problem and the overall pregnancy outcomes.

1.2 Literature Review

The prevalence of NVP

Nausea and Vomiting of Pregnancy is the most common medical condition in pregnancy and has been found to have a high prevalence all over the world. However there is relative variability at regional and country level such that the prevalence of one region or country may not be representative of another. A meta-analysis of 55(83,253 women) NVP studies to determine global rates of NVP found prevalence range from as low as 35% in India to 91% in Hong Kong and the United Kingdom, with a meta-analytic average prevalence estimate of 69.4%(1). But in this study there were only two studies from Africa (Nigeria and South Africa) (representing only 3%), no study from South America and only one study from India, something that suggests the paucity of relevant information in the developing countries which are otherwise victims of a host of other risk factors for poor pregnancy and neonatal outcomes(1). Another web based multinational study involving five regions of developed world, three in Europe (North, East and West) , North America and Australia involving 9113 women reported a prevalence of 73.5%(11) which is very similar to the meta-analytic average of approximating 70%(1) in the previous study.

A study that was done in Nigeria Reported 61% rate of NVP(28) which is slightly lower than estimated rates in most western countries where as a study done in Addis Ababa had an NVP prevalence rate of 74.5%(12) which was almost the same as the reported average in international studies. However, a different study focusing on HG only(the most severe form of NVP) that was done in Ethiopia found the prevalence of HG to be 4.8%, which is higher than the reported prevalence of 0.3 to 3.6% in the world for HG(29). This shows differences in the magnitude of the problem between countries and or regions of the world to be significant.

In Tanzania, a study done in Pemba Island reported prevalence of nausea of 63.7% and vomiting 69.6% (30) which was comparable to an older study done in Dar es Salaam Tanzania in 2004 that reported a 72%(31) prevalence estimate , all of which are close to the global average.

The prevalence of herbal medicine use for NVP

The WHO indicated herbal medicine use can be as high as 80% for health related problems (including during pregnancy) in developing countries(32) whereas average herbal medicine use during pregnancy in Europe, America and Australia was 28.9%(33) in a multinational study.

Country specific prevalence of herbal use in pregnancy for NVP varies even in similar epidemiological settings. A multinational study in western countries reported to be 69% in Russia, 49.8% in Poland and 43.8% in Australia, 51.9% in Eastern Europe, 35% in Iceland, 29% in USA, 37% in Austria, 27% in Western Europe and Italy, 25.2% in United Kingdom and lower prevalence in Sweden 4.3%, Finland 8.7%, 11.9% Northern Europe and France 15.5%(34).

Additionally, prevalence of herbal use in other regions of the world varies in a similar way. It was reported to be 27.2 % in Egypt(35), 49.2% in Iran(36), 70% in Bangladesh(37), 53.7% in Iraq(38), 40.0% in Palestine(39), and 33.6% in Taiwan(40).

The difference in herbal use in pregnancy for NVP and other reasons also differs in Africa setting. A systematic review in Sub-Saharan Africa reported different prevalence of herbal medicine use as follows; 47.8% Ethiopia, 62.7% in Sierra Leon, 69.9% in Zimbabwe, 79.9% in Mali, 67.5% in Nigeria and 20,4% in Uganda(41).

However, although herbal medicine use in pregnancy has reasons other than NVP which may account in part for the observed differences in prevalence between different regions of the world, NVP has been reported to be the most common indication for herbal medicine use and are used mostly in the first trimester(42)

The herbal medicines used for NVP

The WHO 2016 recommendations for NVP management were drawn from a 2015 Cochrane review of trials on non-pharmacological interventions done from only six high and mid-income countries (USA, Iran, Pakistan, China, Thailand and Australia). The recommended herbal medicines were: ginger, lemon oil, mint oil, chamomile, and vitamin B6. This is biased

and less applicable in the low-income communities particularly Africa where herbal use is higher(32) compared to high income countries(33).

Differences in the treatment exist between countries/regions of the world. A multinational study for herbal medicine use in pregnancy done in Europe, America and Australia showed ginger, cranberry, valerian and raspberry as the most used herbs for nausea(33) where in other studies artichoke was the most the used in Russia(11), ginger, cannabis and peppermint as the used herbal medicines for NVP in North America(43).

In the Middle East, thyme, peppermint, chamomile, sage, aniseeds, fenugreek and green tea as the used herbs for NVP(44), in Jordan chamomile, mint, rosemary, and sheeh tea were used with chamomile being the most useful herb for NVP(45). Additionally, another study done in Bangladesh reported Ginger, black seed, lemon tea, prune, and mustard oil were most commonly used herbal medicines for NVP(37).

In Africa, a study done in Nigeria reported Bitterkola (*Garcinia kola*) was the most frequently used herb, as well as native chalk, ginger, bitter leaves and fruits(28). Other two studies focusing on herbal medicine use in pregnancy that were done in Ethiopia showed that garlic, ginger, tenaadem, damakesse and eucalyptus were the used herbal medicines for NVP relief(46,47). Another multicenter study in Zambia reported lemon and ginger were commonly used for NVP(48).

The previous study that was done in Dar es Salaam for assessment of the prevalence of NVP reported 23% of women used either hospital or traditional medicines but no specific drug or herbal medicine used was reported (31).With reference to the studies above, almost all herbal medicines used are common foods that suit as herbal medicines for NVP and the difference is probably due availability.

The factors associated with herbal medicine use for NVP

A multinational study on herbal medicine use in pregnancy that was done in 23 western countries found that higher herbal medicine use for nausea and other pregnancy related ailments was associated with primiparity, being non-smoker, use of folic acid and alcohol

during pregnancy as well as being a student and having education other than a high school degree.

On the other hand, a systematic review of 50 studies on herbal medicine use in pregnancy from all regions of Africa, factors for predicting herbal medicine use in pregnancy showed interesting differences. In several studies herbal medicine use was significantly associated ($P < 0.05$) with a lower education level, increasing age, being married, low economic status, lower educational level of spouse, poor pregnancy outcome, previous herbal medicine use in pregnancy, perception that herbal medicines are effective, large family size, self-employment, unemployment and rural residence(42). On the contrary, some studies in the same review presented conflicting findings, for instance, Duru showed that index pregnancy did not significantly predict herbal use in pregnancy(50) and Alor reported that higher income status was found to be a strong predictor for herbal use(51).

However, these studies were done to associate herbal medicine use for a variety of pregnancy related conditions of which NVP was one of them and was the most prevalent reason for herbal use in general. Considering the diversity of study findings from different parts, a study of the associated factors for herbal medicine use for alleviating NVP is important as it will help practitioners in reducing modifiable factors that propagate indiscriminate use of herbal medicine in pregnancy.

1.3 Conceptual framework

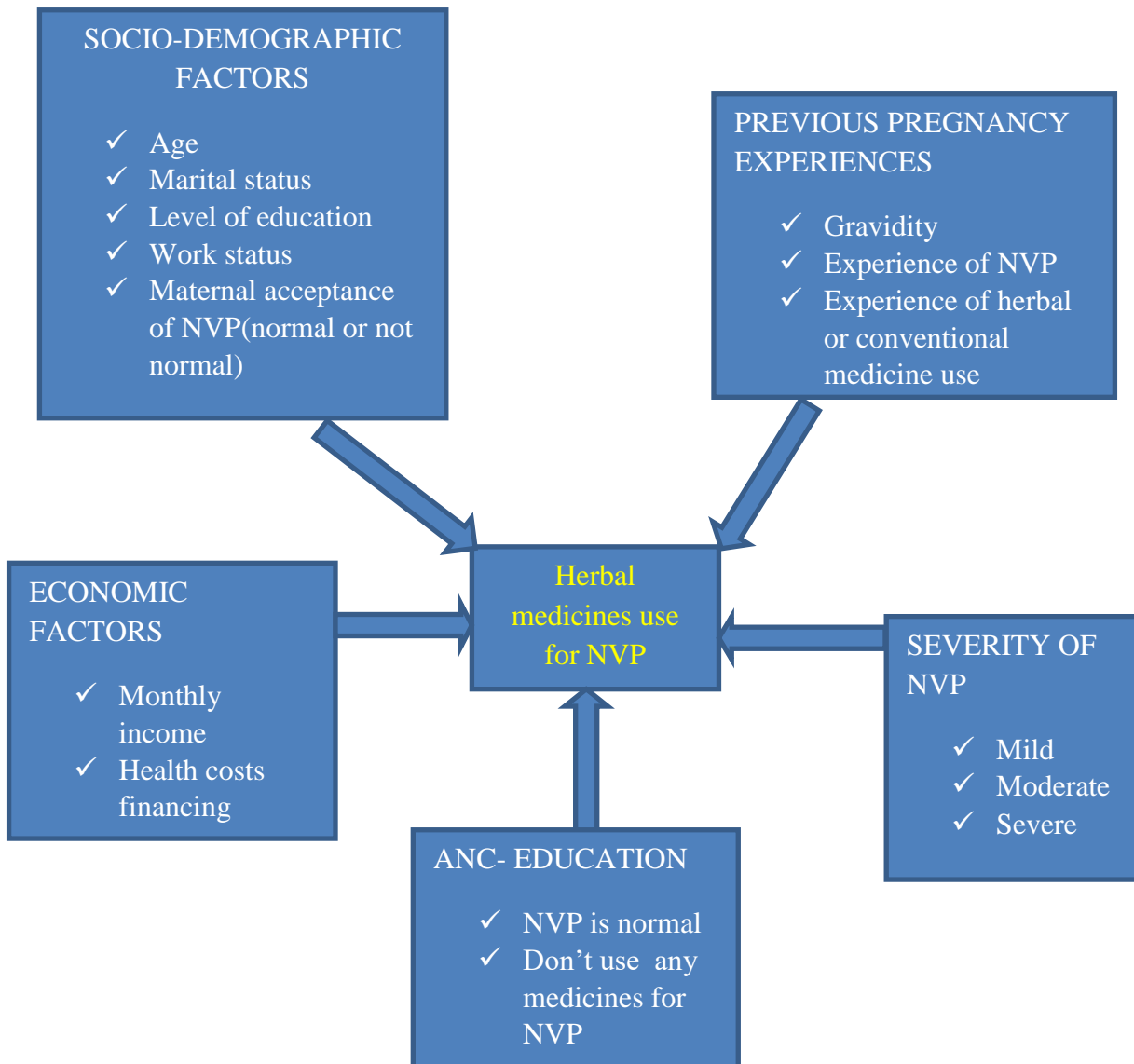


Figure 1: Conceptual framework

Dependent Variable(S): Herbal medicines use for NVP.

Independent Variables: Age, Marital status, Level of education, Work status, Monthly income, Health costs financing, gravidity, Experience of NVP in previous pregnancy, herbal use/conventional medicine use/ both medicines in previous pregnancy(s) ANC education severity of NVP and beliefs about herbal medicines.

1.4 Problem Statement

Nausea and Vomiting in Pregnancy is a global public health problem that affects up to seven in ten pregnant women in early pregnancy, although significant differences in the prevalence exist between countries worldwide. Not only that, there is a great diversity of the medicines used for NVP between and within countries in the world. Since the prevalence is high in Tanzania(31) and NVP is the most reported reason for herbal medicine use in pregnancy, herbal medicines used and the factors influencing their use are important information in the management of pregnancy for better outcomes.

Unfortunately, there is no current information on the prevalence of the problem, the herbal medicines used to relief the condition as well as the factors that may determine the pattern of herbal medicines used for NVP in Tanzania.

1.5 Rationale

This study may inform service providers the prevalence of NVP and the proportion of herbal medicines used for NVP, as well as used herbal medicines for NVP symptoms and the associated factors influencing their use in pregnancy. The information therefore may guide the obstetric care givers to know the current situation of the problem and non-prescribed herbal medicines which may affect pregnancy outcomes either positively or negatively.

Not only that, the knowledge of the associated factors for herbal medicines used may enlighten practitioners and researchers possible modifiable factors that may reduce self-administration of harmful herbal medicines that may cause poor pregnancy outcomes.

The study may also provide baseline information for performing future studies on safety and efficacy of the herbal medicines used by pregnant women as identified in this study, especially during the first trimester when they are used mostly and any potential teratogenic effects of the substances have to be avoided.

1.6 Research Questions

1. What is the prevalence of nausea and vomiting of pregnancy in women Dar es Salaam?
2. What is the proportion of herbal medicine use for NVP among women in Dar es Salaam?
3. What are herbal medicines used by pregnant women to alleviate NVP?
4. What are the factors associated with herbal medicines used in alleviating NVP?

1.7 Objectives

1.7.1 Broad Objective

To determine the prevalence of nausea and vomiting in pregnancy and factors associated with herbal medicines use for alleviating symptoms at Mnazi Mmoja Hospital.

1.7.2 Specific objectives

The study aimed to;

- i. determine the prevalence of NVP during pregnancy in Dar es Salam.
- ii. determine the proportion of herbal medicine use for NVP.
- iii. describe herbal medicines used by pregnant women to alleviate symptoms of NVP.
- iv. determine factors that are associated with herbal medicines use.

2.0 METHODS

2.1 Study design

This study was a cross-sectional hospital based study.

2.2 Study setting

The study was done at Mnazi Mmoja hospital located in Dar es Salaam town center, the commercial capital city of Tanzania. Dar es Salaam has a population of 5,147,070 (52). Mnazi Mmoja is a government hospital, provides maternal care including other medical services to women from all parts of Dar es Salaam city, and covers patients of different social cultural and economic backgrounds because of its location. As it is not a referral hospital, most patients seen there have uncomplicated, normal pregnancies. The maternal and child health unit offers family planning, routine antenatal and postnatal clinic care, HIV testing and counseling in pregnancy and vaccinations for both mother and child.

The antenatal care services are done daily from Monday to Friday. Women booking for the first time in their index pregnancy are seen on Mondays and Fridays, while women on follow-up ANC visits are seen on Tuesday, Wednesday and Thursday. The clinic starts with registration of every woman to be seen followed by health education on general antenatal care of pregnancy that is given by an ANC nurse before attending these women individually. The principle investigator got introduced after the health education session and explained about the study and important aspects to create awareness and better cooperation of the participants.

2.3 Study population

All women attending ANC, at Mnazi Mmoja hospital, June 2021.

2.4 Study sample

Selected women attending ANC at Mnazi Mmoja in June 2021, with GA \geq 14 weeks and fitting the inclusion criteria were be studied.

2.5 Inclusion Criteria

- Pregnant women with GA \geq 14 weeks to 42 weeks.

2.6 Exclusion Criteria

- Pregnant women with known Gastro-esophageal Reflux Disorder (GERD), peptic ulcer disease.
- Women with hyperemesis gravidarum
- Women with mental illnesses/communication impairment.

2.7 Sample size

Sample size was calculated using the formula below.

$$n = \frac{Z^2 P (1-P)}{E^2}$$

Whereby;

n= estimated sample size

Z = coefficient corresponds to 95% level of significance

P = since the prevalence of Herbal use in pregnancy is 0.55 in Tanzania(53), I will use a proportion of 0.5 to get the maximum estimate of the minimum sample size required to study the factors.(The value of P=0.5 provides the maximum sample size from the formula above for any prevalence of the studied outcome)

E = maximum error

Then;

$$Z = 1.96, P = 0.5, E = 5\% = 0.05$$

$$n = 1.96^2 * 0.5(1-0.5) / 0.05^2$$

$$n = 384(\text{when } P=0.55, n=380)$$

Then by adjusting for non-respondents:

Total estimated sample size “n” will be obtained using the formula

$$n' = n * \text{adjusted factor}$$

$$\text{Adjusted factor} = 100\% / (100\% - f\%)$$

f% = Estimated percentage of women who will not respond=10%

$$n' = 384 * 100\% / (100\% - 10\%)$$

$$n = 426$$

2.8 Sampling technique

A simple random sampling method was used, where names of registered patients meeting the inclusion criteria on were assigned corresponding serial numbers then Microsoft excel generated a sample of random numbers corresponding to registered names of patients as study participants. About 25 women were expected to be interviewed every day.

2.9 Data collection

Collection of data was done at the Mnazi Mmoja ANC. A research team of the principle investigator and two trained research assistants collected the data. Names of all women who met the inclusion criteria were selected during their registration process and each name had a designated serial number that was entered into Microsoft Excel. The 14 weeks GA was used because NVP is more common in the first trimester so these women are likely to have the information of NVP experience and medicines they used. To observe equal chances of selection of participants, names of all women with 14weeks and above on that day were assigned designated numbers that were entered into the computer and simple random numbers generated for the names of corresponding women. After selection of the names of participants during their registration for ANC, general introduction of the research team was done and overview of the study given before starting ANC during the antenatal health education session. Names of participants were called and women were seen by the research team members before (during waiting) or after being attended by the ANC nurse. Simple random sampling process selected 25 participants per day from a pool of 60 to 75 women who met the inclusion criteria everyday of data collection. During the study period in June 2021, 1264 women attended ANC, 430 women were selected but only 415 had complete data for analysis. Seven women were excluded because of rejecting to participate, four because of rejecting complete interview before completion and other four required urgent medical attentions. For each woman, consent and documented signing for participation in the study was sought after exclusion of possible clinical features as per exclusion criteria and explanation of the study aim. Marking of ANC cards of interviewed women with a small red marker pen dot at a specified corner of the card was done to avoid repeating participants into the study on subsequent ANC visits.

2.10 Data collection tool

Swahili version of a structured interviewer administered questionnaire was used to extract required information from study participants. The questionnaire was pretested at the same clinic whereby 40 women were interviewed by the principle investigator and necessary improvements were done to enhance relevancy of the tool for the aim of the study. The questionnaire had 3 parts; the first part for collection of socio-demographic information second for previous pregnancy experience of NVP and the third part for assessing NVP and used herbal medicines in the index pregnancy. A list of reported herbal medicines in literature was made and any other medicines reported were documented. The names of the mentioned medicines were collected using common names but corresponding generic/scientific names were used for analysis and report purposes. Severity of NVP in the current pregnancy was assessed using Swahili translated Modified-PUQE (Pregnancy Unique Quantification of Emesis) score to classify the participants as having Mild (≤ 6), Moderate (7-12) or Severe (≥ 13) NVP.

2.11 Quantitative data management and analysis

Quantitative data was collected by Swahili version of the questionnaire and entered into a database created on a Statistical Package for Social Sciences (SPSS) version 23. During data entry, an English template of the questionnaire was made in SPSS, coding was performed for all variables for data entry. Data was assessed for completeness and cleaned for inconsistencies. Categorical variables were analyzed and reported as proportions in the tables, pie chart and bar chart. The Numerical variables were analyzed and presented as median and range, since they were not normally distributed. χ^2 test and its P-value was used as statistical test of significance for association of potential factors for herbal use where by factors with p-value less than 0.2 were included for multivariate analysis. Because the proportion of herbal use was $> 20\%$, Poisson multivariate analysis (which provides prevalence ratios) was done to avoid overestimation of an association. Any variable with p value < 0.05 in the multivariate analysis was regarded as independently associated with herbal use for NVP. Composite scores of the PUQE score were made then categorized as mild (≤ 6) and moderate/severe (> 6) NVP

then entered in the bivariate and multivariate analysis to determine association with other factors for herbal use.

Graphs were plotted using Graphpad Prism version 8.

2.12 Ethical consideration

The ethical clearance for the study was given by the Senate Research and Publication Committee of Muhimbili University of Health and Allied Sciences (MUHAS) after satisfaction of the necessary requirements of the dissertation proposal. Permission to conduct the study was obtained from the Ilala district medical officer, director of hospital services and the nurse in charge of the RCH unit of Mnazi Mmoja Hospital.

Written informed consent was obtained from the women, after they were informed on the purpose of the study and the benefits obtained from the study findings as well as being told of their full autonomy without jeopardizing any element of their care. Women's information was kept confidential. The research data obtained will be kept for 5 years after the study dissemination and publication, and thereafter destroyed.

3.0 RESULTS

During the study period 1264 women attended ANC of whom 430 of selected by simple random sampling. Fifteen women were excluded due to different reasons including refusal to participate(7), incomplete interview(4) and 4 needed urgent medical intervention. Almost half, 46.3% (192/415) were in the age group 26 to 35years and the median age was 27 years (18 to 44 years). More than half 52.5% (218/415) came from Ilala District which is the district of location of the hospital. Half of women 51.1% (212/415) had secondary level of education and more than three quarter, 77.6% (322/415) were living together with their partners as a married or cohabiting relationship. Refer to Table 1.

Table 1: Socio-demographic and clinical characteristics , N=415

Variables	Frequency, n (%)
Age	
18 - 25	165(39.8)
26 - 35	192(46.3)
36 - 44	58(14.0)
Median age in years(Range) 27 (18 - 44)	
Residence(Districts)	
Ilala	218(52.5)
Kinondoni	75(18.1)
Temeke	68(16.4)
Ubungo	46(11.1)
Kigamboni	8(1.9)
Level of education	
College	73(17.6)
Secondary	212(51.1)
Primary	123(29.6)
No formal education	7(1.7)
Marital status	
Married/Cohabiting	322(77.6)
Single	74(17.8)
Divorced	19(4.6)
Maternal work status	
Employed	68(16.4)
Self-employed/business woman	213(51.3)
Unemployed/not working	134(32.3)
Median monthly income(Range)TShs	200,000(20,000-800,000)

Health costs financing	
Cash	359(86.5)
Insurance	56(13.5)
Gravidity	
1 - 3	366(88.2)
≥ 4	49(11.8)
GA	
2 nd trimester	226(54.5)
3 rd trimester	189(45.5)
NVP severity†	
Mild(≤ 6)	238(69.2)
Moderate(7 - 12)	94(27.3)
Severe (≥ 13)	12(3.5)
Maternal acceptance of NVP†	
Normal	327(78.8)
Not normal	88(21.2)
Previous herbal use for NVP†	
Yes	84(24.4)
No	260(75.6)
ANC education-NVP is normal†	
Yes	306(89.0)
No	38(11.0)
ANC education-No NVP medicines use†	
Yes	201(58.4)
No	143(41.6)

†-n=344(Women with NVP in the current pregnancy)

Majority of participants, 88% (366/415) were gravida three or less and 69% (238/344) had mild NVP as determined by the modified PUQE score.

3.1 The prevalence of NVP

Women who reported to have experienced NVP in the index pregnancy were 344 out of 415, giving an estimated prevalence of 82.89%. Figure 2.below.

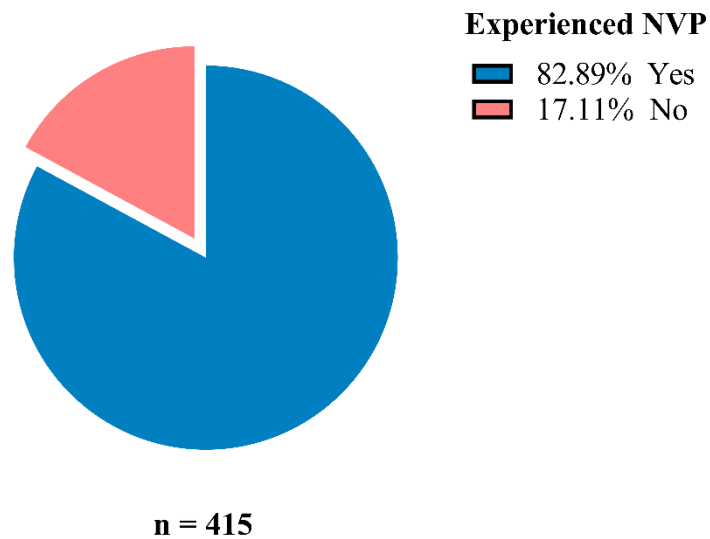


Figure 2: The prevalence of NVP

3.2 The proportion of herbal use

The estimated proportion of herbal use was 47.97 % (95% CI 46.6 – 57.42%), whereby 162 women out of 344 with NVP used herbal medicines. Refer Figure 3.

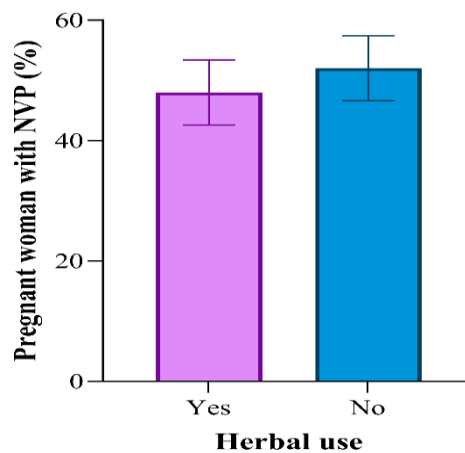


Figure 3: Proportion of herbal use

3.3 Herbal medicines used

Eleven different herbal medicines were used, all of which were food stuffs as either fruits or spices. However, inedible, non-food stuffs like soil, ashes and ndulele (*Solanum incanum*) were also used.

Lemon was the most frequently used fruit (24.2%) as a herbal medicine for NVP whereas ginger was the most used spice (7.3%). Overall, lemon, raw mangoes and tamarind were the used most used herbal medicines for NVP. Refer Figure 4 below.

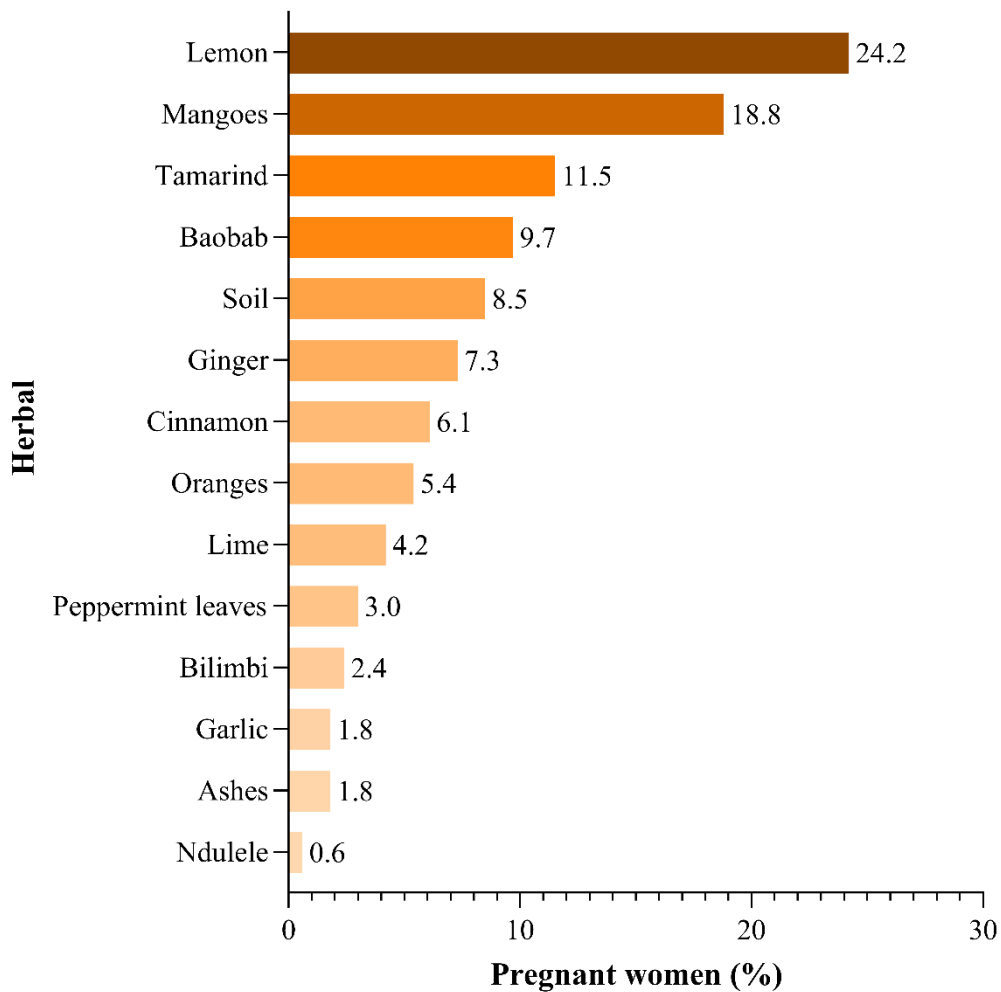


Figure 4: Herbal medicines used for NVP

3.4 Factors associated with herbal use for NVP

Chi-square test for potential socio-demographic and clinical factors was done

As shown in Table 2 below.

Table 2: Association between herbal use for NVP(n=165) among women with NVP(N=344) and various clinical and socio-demographic factors(Chi square test)

Variable	Category	Herbal medicine used		P - value
		Yes n (%)	No n (%)	
Gravidity	1 to 3	149(48.9)	156 (51.1)	0.357
	≥4	16 (41.0)	23(59.0)	
Previous herbal use for NVP	Yes	57 (67.9)	27 (32.1)	< 0.001
	No	108 (41.5)	152(58.5)	
NVP Severity (PUQE score)	≤ 6 (mild)	150 (63.0)	88 (37.0)	< 0.001
	>6 (moderate/severe)	15(14.2)	91 (85.8)	
Maternal NVP consideration	Normal	152(58.5)	108(41.5)	< 0.001
	Not normal	13(15.5)	71(84.5)	
NVP-previous pregnancy	Yes	84 (50.0)	84(50.0)	0.719
	No	22 (44.0)	28(56.0)	
ANC-NVP is normal	Yes	154 (50.3)	152 (49.7)	0.013
	No	11 (28.9)	27 (71.1)	
ANC-don't use any NVP medicines	Yes	112 (55.7)	89(44.3)	<0.001
	No	53 (37.1)	90 (62.9)	
Age groups(yrs)	18 - 25	76 (53.5)	66 (46.5)	0.224
	26 - 35	67 (44.1)	85 (55.9)	
	36 - 44	22 (44.0)	28 (56.0)	
Health costs financing	Cash	143(48.0)	155(52.0)	0.984
	Insurance	22(47.8)	24(52.2)	
Work status	Employed	26(48.1)	28(51.9)	0.165
	Self-employed/business	75(43.4)	98(56.6)	
	Unemployed/not working	64(54.7)	53(45.3)	
Level of education	college	22(37.3)	37(62.7)	0.142
	Secondary	97(52.4)	88(47.6)	
	Primary	42(44.7)	52(55.3)	
	No formal education	4(66.7)	2(33.3)	
Male partner	Living together	126(47.4)	140(52.6)	0.682
	Not living together	39(50.0)	39(50.0)	
Monthly income(TShs)	≤300,000	76(46.1)	89(53.9)	0.622
	>300,000	18(41.9)	25(58.1)	

In table 2 above, factors with bolded p-values ($p < 0.2$) were taken for Poisson regression analysis to determine their independent association with herbal use. NVP severity, previous herbal use, ANC education that NVP is normal and ANC education not to use any medicines for NVP were significantly associated with herbal use. Table 2.

The Poisson regression analysis for potential factors for herbal use for NVP was done with their estimated prevalence ratios and their corresponding p values calculated for determining associations of the factors with the outcome. Table 3 below.

Table 3: Poisson Univariate and Multivariate analysis of factors associated with use of herbal medicines among pregnant women who experience NVP, n=165

Variable	Univariate analysis			Multivariate analysis		
	cPR	95% CI	P - value	aPR	95% CI	P - value
Age group (years)						
36 - 44	0.82	0.50 – 1.30	0.418			
26 - 35	0.82	0.59 – 1.14	0.247			
18 - 25	Ref					
Male partner						
Not Living together	1.056	0.728 – 1.496	0.764			
Living together	Ref					
Maternal level of education						
Secondary	1.41	0.90 – 2.29	0.149	1.18	0.75 – 1.93	0.503
Primary	1.20	0.72 – 2.04	0.492	0.98	0.58 – 1.70	0.939
No formal education	1.79	0.52 – 4.67	0.285	1.27	0.36 – 3.41	0.672
College	Ref					
Maternal work status						
Self-employed/employed	0.90	0.59 – 1.43	0.645			
Unemployed/ not working	1.14	0.73 – 1.82	0.583			
Employed	Ref					
Gravidity groups						
1 - 3	1.19	0.74 – 2.07	0.507			
≥ 4	Ref					
ANC- don't use any NVP medicine						
Yes	1.50	1.09 – 2.10	0.014	1.02	0.72 – 1.48	0.897
No	Ref					
ANC- NVP is normal						
Yes	1.74	0.99 – 3.41	0.076	0.96	0.51 – 1.96	0.893
No	Ref					
Maternal NVP consideration						
Not normal	3.78	2.23 – 7.00	< 0.001	1.65	0.84 – 3.49	0.168
Normal						
Previous herbal use						
Yes	1.63	1.18 – 2.24	0.003	1.50	1.07 – 2.09	0.018
No	Ref					
NVP severity						
≤ 6(mild)	4.45	2.71 – 7.90	< 0.001	3.14	1.69 – 6.30	< 0.001
> 6(moderate/severe)	Ref					

Key: cPR: crude Prevalence Ratio, aPR: adjusted Prevalence Ratio, Ref: Reference group

Table 3 above; in the Poisson multivariate regression analysis, previous herbal use for NVP and mild NVP (≤ 6) are independent factors for herbal use. Previous herbal use is associated with up to 1.5 times more herbal use for NVP than those with no previous herbal use ($p=0.018$) whereas mild NVP is associated with up to 3.14 chances of herbal use than those with moderate/severe NVP ($p < 0.001$). Maternal consideration that NVP is normal in pregnancy, ANC education that NVP is normal in pregnancy as well as ANC education that women shouldn't take any medicines for NVP are not independent predictors for herbal use NVP and may possibly be potential confounders.

4.0 DISCUSSIONS

The prevalence of NVP was found to be very high, almost eight out of every ten pregnant women. Of these women NVP, almost half of them used herbal medicines for alleviating their NVP.

Almost all herbal medicines used were regular food stuffs as fruits and spices. Lemon, raw mangoes and tamarind were the most used herbal medicines. Lemon was the most used fruit and ginger was the most used spice for NVP control. Previous use of NVP medicine and mild NVP were independent predictors of herbal medicine use.

In this study, the prevalence of NVP is within the world wide prevalence range reported in meta-analysis of international studies. However these studies report significant differences in the prevalence exist between countries(1)(15). Similar prevalence were reported in Japan(1), United Kingdom(1)(11), and United states of America(11)(1) and in Iceland, Sweden, Finland, and Norway in another multinational study(11). Higher prevalence was reported in Hong Kong, United States of America, United Kingdom in the meta-analysis for quantification of global rates of NVP (1) which also reported lower rates in India, Netherlands and Canada(1) while similarly low rates were found in a multinational study in Russia, Serbia, Poland, Croatia and Austria(11). Additionally in Africa, a study done in Nigeria reported 61%(28) where as the one in Addis Ababa Ethiopia was 74.5%(12).

The observed differences highlight the importance of investigation of individual country burden of NVP. However the variation in the prevalence may reflect true burden of the problem in different countries or may be related to differences in the operational definition of NVP studies (some done for nausea only, some for vomiting only, others including increased salivation as part of NVP spectrum, others including HG), different methods and reporting of studies, health care systems, cultural systems which may affect women's acceptance, reporting of NVP and foods eaten as well as different levels of education that may affect acceptance of NVP as normal or not normal and ANC attendances/health seeking behavior.

In Tanzania, older studies reported lower prevalence for Nausea(alone) and vomiting(alone) in Pemba(30) and for Nausea in Dar es salaam(31). This difference could be due to definition of NVP being limited to nausea or vomiting alone (not including increased salivation which was included in this study) during their data collection as well as increased level of education, awareness and thus ANC attendance and reporting of NVP as well as improved health care accessibility over that course of time in Tanzania. The relative rural setting in Pemba Island and increased population in Dar Es Salaam may also contribute to the prevalence difference.

The prevalence of herbal use in this study was 47.97%. Similar reports have been found in Eastern Europe and Poland(33), Ethiopia(53)(54), Iran(36), and Iraq(38). However, lower rates of herbal medicine use was reported in Uganda(41,54), Taiwan(40), Palestine(39) and Egypt(35), whereas higher rates of herbal use have been reported in Mali, Nigeria, Zimbabwe, and Sierra Leon(41,53,54), Russia(33), and Bangladesh(37). Very lower rates of herbal use were reported in Finland, Sweden, France and Northern Europe(33).

As reported in literature, the same factors that contribute to the differences and similarities in the prevalence of herbal use also contribute to the difference in the proportions of herbal medicine use among women experiencing NVP in different parts of the world

This study reported lemon, raw mangoes and tamarind as the most frequently used herbs for NVP. Lemon and ginger were the most used fruit and spice respectively, as herbal medicines for alleviating NVP. Similarly, lemon and ginger were also reported in Zambia(48),America(43), and Bangladesh(55), Iran(36) and twenty different countries in Europe and North America reported ginger as the most used herbal medicine(11). In contrast, bitterkola was frequently used herb in Nigeria(28), chamomile most used in Jordan(45), thyme, peppermint, chamomile, sage, aniseeds, and green tea are used in the middle East(44), cannabis and peppermint in America(43). However; soil, ashes and ndulele have been reported in this study only. Although they were used for NVP, they may be used due to pica of pregnancy or vitamin deficiencies in women.

Generally, almost all studies in different parts of the world have been done in urban settings like Dar es Salaam and have reported commonly available fruits and spices as herbal medicines used for NVP alleviation. The similarities and differences observed between different countries may be contributed by differences in available foods in different geographical locations, eating behaviors, culture, acceptance according to safety and effectiveness of different herbal medicines.

Mild NVP has been found to be associated with herbal use for NVP with up to 1.5 times increased chances of herbal use than moderate and severe NVP. Women with mild symptoms are more likely to have their symptoms controlled by taking herbal medicines most of which are fruits, spices, other foods that are rich in multivitamins. This is actually consistent with the WHO recommendation that encourage herbal medicines use for mild NVP symptoms (23). Control of symptoms encourages them and prevents them from experiencing severe NVP. None of the reviewed studies in literature have reported severity of NVP to be associated with herbal use for NVP.

Previous herbal use for NVP was found to be associated with herbal use by up to 3.14 times than women without previous herbal use for NVP. Similar findings have been reported in Uganda where by it increased herbal use by up to 8 times (57), in Kenya Nairobi (58) and in Zambia that reported up to five times increase than those without previous herbal use in pregnancy(48). Since the prevalence for herbal use in Uganda Kenya were less than half in this study, previous herbal use may be a strong determinant of herbal use in pregnancy even where there are different proportions of herbal use. However, previous use may also be an indicator of effectiveness of a particular herbal medicine for NVP alleviation. By identifying specific herbs that are repeatedly used in subsequent pregnancies for NVP control, some more information may be sought about their effectiveness.

This is a cross-sectional study involving only one health facility in a big city, so the sample may not be truly representative of the actual situation especially considering that the hospital is a government facility and so people higher socio-economic statuses that always use private hospitals could not be included.

Additionally, since the study is done in an urban setting where there is relatively good access to health care services, it is not generalizable to rural areas where there scarce health care and different socio-demographic and ethnobotanical characteristics.

Also, recall and information bias may have limited proper recall of past experience of NVP (all women were in their second and third trimesters) and some women may have hidden other details because of general fear of healthcare workers (ANC education against use of any medicines for NVP was being given to the mothers) especially considering ongoing parallel increase of local herbalists advertisements.

5.0 CONCLUSION

Nausea and vomiting in pregnancy is high in Dar es Salaam, affecting up to 8 in every 10 women. Almost half of women experiencing NVP use commonly available fruits or spices as herbal medicines to relief the symptoms. In this urban setting most used herbal medicines are lemon, raw mangoes and tamarind with ginger and lemon being the most used spice and fruit respectively. Mild NVP and previous use of herbal medicines for NVP are significantly associated with increased herbal use for NVP.

6.0 RECOMMENDATIONS

More research should be done in areas with less diverse cultural practices so that, use of potentially harmful herbal medicines (like soil) can be identified and interventions be done. Additionally, pregnant women should be asked about any other non-prescribed medicines during ANC so as to avoid the ones which may cause bad pregnancy outcomes especially considering the outbreak of many herbal therapies advertised currently.

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APPENDICES**Kiambatisho 1 : Dodoso****Sehemu 1.****A. Taarifa za kijamii**

1. Umri wa mshiriki : (miaka)
2. Wilaya unayoishi :
3. Hali ya ndoa:
 - 1) Nimeolewa/ninaishi na mwenza
 - 2) Sijaolewa/sijawahikuishi na mwenza
 - 3) Nimetengana/nimetalikiana na mwenza
 - 4) Mjane
4. Kiwango cha juu cha elimu ulichofikia :
 - 1) Chuo kikuu
 - 2) Elimu ya sekondari
 - 3) Elimu ya msingi
 - 4) Sikusoma elimu rasmi
5. Kazi unayofanya :
 - 1)Nimeajiriwa
 - 2)Nimejiajiri (shughuli zake/biashara)
 - 3)Sina ajira/sifanyi kazi yoyote

B. Taarifa za Kiuchumi

6. Kipato chako kwa mwezi ni kiasi gani ?.....(TShs)
7. Unalipaje huduma za matibabu ?
 - 1) Bima ya afya
 - 2)Fedha taslimu

Sehemu 2.**C. Taarifa za ujauzito uliopita**

8. Umeshawahi kupata ujauzito mara ngapi ?..... (kama ni 1,nendasehemu ya 3)
9. Ulipata kichefuchefu/ kutapika kwenye ujauzito(KKU)uliopita ?
- 1) Ndiyo 2) Hapana
10. Kama jibu ni ndio, je ulitumia dawa yoyote kupunguza/kuondoa hizo dalili ?
- 1) Ndiyo 2) Hapana
11. Ulitumia dawa gani ?
- 1) Dawa za hospitalini 3) Dawa za asili na za hospitalini
- 2) Dawa za asili 4) Sikutumia dawa yoyote
12. Taja jina la dawa uliotumia/ulizotumia kupunguza dalili hio
-

Sehemu 3.**Ujauzitohuu**

13. Umri wa mimba kwa wiki.....
- 14 Uliwahi kupata kichefuchefu/ kutapika/kujaa mate mengi mdomoni kwenye mimba hii?
- 1) Ndiyo 2)Hapana
- 15 Ulilichikuliaje/ulilionaje tatizo hilo ?
- 1) Kawaida 2) Sio kawaida
- 16 Uliambiwa na mtoaelimu ya afya ya kliniki ya wajawazito kua tatizo hilo ni la kawaida ?
- 1) Ndiyo 2). Hapana
- 17 Uliambiwa na mtoaelimu ya afya ya kliniki ya wajawazito usitumie dawa yoyote?
- 1) Ndiyo 2) Hapana

18 Ulitumia dawa yoyote kupunguza dalili hizo ?

- 1) Ndiyo 2) Hapana

19 Ulitumia dawa gani ?

- 1) Dawa za hospitalini 3) Dawa za asili na za hospitalini
2) Dawa za asili 4) Sikutumia dawa

20 Tajajina la dawa uliotumia/ulizotumia

.....

21 Nani alikushauri/alikuambia utumie hio/hizo dawa ?

- 1) Mwenyewe 2) Mganga wa jadi
2) Rafiki/ndugu 4) Mtandao/redioni /makala mbalimbali

22 Daktari/nesi wa kliniki ya wajawazito alijua umetumia hizo dawa ?

- 1) Ndiyo
2) Hapana

Kipimo cha kiwango cha makali ya dalili ya kichefuchefu/kutapika kwenye ujawazito

(Modified PUQE score)

Jibu kutokana na siku uliopata dalili kali zaidi toka uwe mjamzito.

23 Kwa wastani kwa siku, ni muda wa masaa mangapi ulijisikia kichefuchefu?				
Sikusikia kabisa	< Saa moja	Masaa 2-3	Masaa 4-5	>masaa 6
1	2	3	4	5
24 Kwa wastani kwa siku, ni mara ngapi ulitapika?				
Sikutapika kabisa	Mara 1-2	Mara 3-4	Mara 5-6	≥ mara 7
1	2	3	4	5
25 Kwa wastani kwa siku, ni mara ngapi ulitapika bila kutoa kitu tumboni?				
Haikutokea kabisa	Mara 1-2	Mara 3-4	Mara 5-6	≥ mara 7
1	2	3	4	5

Part two

C. Previous pregnancy information

- 8 How many pregnancies have you had ?..... (if gravida 1, go to part 3)
- 9 Did you experience nausea and vomiting in previous pregnancy?
- 1) Yes 2) No
- 10 If the answer in question 9 is yes, did you use any medicine to relief the symptoms?
- 1) Yes 2) No
- 11 What medicine did you use to relief the symptoms?
- 1) Conventional medicines 3) Both
- 2) Herbal medicines 4) None
- 12 What is the name of the medicine you used?
-

Part three.

Current pregnancy

- 13 What is the gestational age of this pregnancy? (weeks)
- 14 Did you experience nausea and vomiting in this pregnancy
- 1) Yes 2) No
- 15 How did you consider/perceive that problem ?
- 1) Normal 2) Not normal
- 16 Were you told by the ANC health education provider (nurse/doctor) that NVP is normal?
- 1)Yes 2). No

17 Were you told by the ANC health education provider (nurse/doctor) not to use any medicines for NVP?

1) Yes

2) No

18 Did you use any medicines for NVP relief ?

1) Yes 2) No

19 If yes, what medicine did you use for NVP relief?

1) Conventional medicine

3) Both

2) Herbal medicine

4) None

20 Mention the name of the medicine you used.

.....

21 Who advised you to use that medicine you used ?

1) Self initiative

3) Traditional healer

2) Family/friends

4) Media (internet, radio, articles)

22 Did the ANC doctor or nurse know that you have used the medicine you used?

3) Yes

4) No

Assessment of the severity of NVP by Pregnancy Unique Quantification of Emesis (Modified PUQE score)

23 On average in a day, for how long did you feel nauseated or sick to your stomach ?				
Not at all	< 1 hr	2-3 hrs	4-5 hrs	> 6 hrs
1	2	3	4	5
24 On average in a day, how many times did you vomit ?				
Not at all	1-2 times	3-4 times	5-6 times	≥ 7 times
1	2	3	4	5
25 On average in a day, how many times did you have retching or dry heaves without bringing anything up?				
Not at all	1-2 times	3-4 times	5-6 times	≥ 7 times
1	2	3	4	5