

Master of Science in Public Health



**Association of Food Taboos and Pica with Dietary
Patterns among Pregnant Women in Public
Hospitals in Rawalpindi**

By

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Declaration

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I understand that plagiarism is the use or presentation of any work by others, whether published or not, and can include the work of other candidates. I also understand that any quotation from the published or unpublished works of other persons, including other candidates, must be clearly identified as such by being placed inside quotation marks and a full reference to their source must be provided in proper form.

This dissertation is the result of an independent investigation. Where my work is indebted to others, I have made acknowledgments.

I declare that this work has not been accepted in substance for any other degree, nor is it currently being submitted in candidature for any other degree.

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*This thesis is dedicated to my
beloved parents and my supportive
family...*

ABSTRACT

Background: Pregnant women's diets influenced by food taboos & pica practices. These stem from cultural, religious, and traditional beliefs, impacting health.

Objectives: Study aimed to find out association of food taboos and pica with dietary patterns in pregnant women in public hospitals in Rawalpindi, Pakistan.

Methodology: A cross-sectional study was conducted at Rawalpindi's public hospitals, involving 139 pregnant women chosen through non-probability consecutive sampling. SPSS version 26.0 was used for data entry and analysis. Association between sociodemographic factors, food taboos, pica, and dietary patterns in pregnant women was assessed. A significance level of $p < 0.05$ was used.

Results: More than half of the respondents aged 20-30 years ($n=89$, 64%). It was noted that 58% respondents ($n= 81$) did not know about food taboos. Fifty-six women (40%) reported to avoid some food items during pregnancy due to multiple reasons. Nearly 49% women ($n= 68$) were unaware about pica and 45% women ($n= 63$) reported to take non-food items during pregnancy. Overall, it was noted that women with poor dietary practices were slightly more in number ($n= 72$, 58%) as compared to those with good dietary practices. Dietary practices were significantly associated with education of women, education of husband, income, and residence ($p<0.05$). while source of nutritional information, whether food avoided during pregnancy or not and type of food avoided during pregnancy were also significantly associated with dietary practices among pregnant women ($p<0.05$).

Conclusion: Poor dietary practices were slightly more common than good practices in pregnant women. Food taboos significantly affect dietary habits, while pica not significantly associated with dietary intake.

Keywords: Antenatal care, Dietary practices, Food taboos, Pica, Pregnant women, Public hospitals, Rawalpindi.

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LIST OF ABBREVIATIONS

ANC	Antenatal Care Clinics
CI	Confidence Interval
DSMMD	Diagnostic and Statistical Manual of Mental Disorders
EFSA	European Food Safety Authority
EVOO	Extra Virgin Olive Oil
FFQ	Food Frequency Questionnaire
IRB	Institutional Review Board
MD	Mediterranean Diet
MUFAs	Mono-Unsaturated Fatty Acids
OCD	Obsessive-Compulsive Disorder
PUFAs	Poly-Unsaturated Fatty Acids
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

CHAPTER I: INTRODUCTION

Health status of women during the reproductive years and particularly during the period of pregnancy is an important indicator of their children's health, both in utero and during childhood. Pregnancy is an important period when physiological nutrient needs are significantly elevated. To meet this increased nutrient requirement for both the woman and the fetus, a pregnant woman is supposed to increase the amount and quality of foods she usually consumes (Bianchi et al., 2016). Inadequate nutrition during this crucial phase results in poor fetal growth and increase the risk of non-communicable diseases in later life (Olatona et al., 2021).

Dietary patterns are highly influenced by the sociocultural circumstances and economic status of an individual. Various societies have certain food taboos regarding dietary intake during pregnancy; thus limiting the dietary diversity and quality resulting in poor health and nutritional outcomes (Mohammed, Larijani & Esmailzadeh, 2019). Food taboos exist nearly in all societies and they are mainly linked with religion, culture and tradition. However, food taboos associated with culture are more prone to change due to the level of literacy that prevails in the society (Nkengla Asi, Tize Teri & Meyer-Rochow, 2018). Pregnancy related food taboos are commonly observed on the belief that breaking them may harm the unborn baby or threaten the health of the mother.

In developing countries where girls and women usually have discriminatory access to healthcare and education, maternal malnutrition remains a major problem. In such countries, insufficient food intake among pregnant women, especially in the second and third trimesters, is a common practice (Tela, Gebremariam & Beyene, 2020). These taboos are

commonly transmitted from one generation to the next, and can become normative in a particular community. Information regarding food taboos and other norms in a given community may be transferred from different sources. Grandmothers, elders, and experienced mothers who are considered influential in a given community play vital roles in diffusing information regarding which foods are prohibited during pregnancy and why (Placek, Madhivanan & Hagen, 2017).

Pregnancy is linked with various physical and psychological changes in a woman. Sometimes craving for a particular food is increased during this period. However, craving for a substance not commonly documented as food is termed as pica and is usually observed among pregnant women. The Diagnostic and Statistical Manual of Mental Disorders described pica as persistent intake of non-nutritive substances for at least one month that is inappropriate to developmental level and not part of a culturally supported or socially normative practice (Konlan et al., 2020). The most common types of pica are geophagy (consumption of earth), amylophagy (consumption of raw starches such as corn-starch or uncooked rice) and pagophagy (the consumption of large quantities of ice) (Ahmed et al., 2023).

In United States prevalence of pica among pregnant women is 68% (Shah et al., 2022), similarly in Kenya nearly 21% pregnant women experience the symptoms of pica (Kibr, 2021). In Pakistan, nearly 45% expecting mothers reported pica (Akhtar et al., 2021). Various factors are associated with the development of these practices. These include cultural influences, religious practices or sometimes in response to some underlying deficiency (Akhtar et al., 2021). Moreover, pregnancy complications, unintended pregnancies, stress and emotional factors, low socioeconomic status, learned behaviour, or

biochemical disorders are also linked with pica practices (Kibr, 2021). The phenomenon of pica practice among pregnant women poses significant health concerns, particularly in relation to iron deficiency and anemia during pregnancy. There exists compelling evidence that establishes a clear connection between pica and the occurrence of anemia in expectant mothers (Konlan et al., 2020).

1.1. Rationale

Pica and food taboos among pregnant women are becoming a growing public health issue due to their lasting physical and psychological health consequences. However, in Pakistan this topic remained untapped. Various studies have been conducted worldwide to document the impacts of pica and food taboos on health status of mother and children. However, little is known about the association of these practices with dietary patterns. The current study was carried out with the aim to highlight the association of pica and food taboos with dietary patterns of pregnant women. The results will be beneficial to create awareness how the food taboos and pica practices affect the dietary patterns among females during pregnancy.

1.2. Objectives:

- 1) To find out prevalence of food taboos and pica with dietary patterns among pregnant women in public hospitals of Rawalpindi
- 2) To determine the association of food taboos and pica with dietary patterns among pregnant women.

CHAPTER II: LITERATURE REVIEW

2.1. Food taboos and Pica:

Based on European Food Safety Authority (EFSA) guidelines, it is recommended that pregnant women aim for a mean weight gain of 12 kg during pregnancy to achieve optimal health outcomes for both the mother and the fetus. To support this weight gain, an average additional energy requirement of 320 MJ (76,530 kcal) is needed throughout the entire pregnancy. This translates to approximately 0.29 MJ/day (70 kcal/day) during the first trimester, 1.1 MJ/day (260 kcal/day) during the second trimester, and 2.1 MJ/day (500 kcal/day) during the third trimester. For exclusively breastfeeding mothers in the first six months postpartum, an additional 2.1 MJ/day (500 kcal/day) is required on top of the energy requirement before giving birth. This additional energy is necessary to account for milk production, which requires approximately 2.8 MJ/day (670 kcal/day), as well as an energy mobilization from maternal tissues of 0.72 MJ/day (170 kcal/day) (Köhler et al., 2018). Every year, over 3.5 million women in low-income countries lose their lives as a result of undernutrition, which is the root cause. Enhancing the nutritional well-being of women prior to and during pregnancy can minimize the chances of negative birth outcomes. Nonetheless, inadequate maternal nutrition during the earliest phases of life, particularly during fetal development, can lead to both immediate and enduring consequences (Amare et al., 2022). Pica refers to the strong desire and intentional consumption of non-food substances, and this behavior has been observed in various cultures. While the substances consumed can vary greatly, the most common forms of pica include eating soil (geophagy) and consuming raw

starches (amylophagy). Pica is prevalent among vulnerable groups, particularly pregnant women and children, and it has been linked to both positive and negative health outcomes. Pica can alleviate gastrointestinal discomfort and provide protection against harmful pathogens. However, pica has also been associated with risks such as heavy metal poisoning, iron deficiency, and helminth infections (Chung et al., 2019).

2.2. Food taboos during pregnancy:

In every society, regardless of whether it is rural or urban, there are specific taboos that are followed in various aspects of life. These taboos are particularly prominent in a woman's life, starting from her birth and continuing through menarche, marriage, childbearing, motherhood and widowhood. Many of these taboos are associated with pregnancy and the immediate postpartum period. These taboos primarily revolve around dietary restrictions but also extend to a woman's personal hygiene, rest and lifestyle choices. There is a widespread belief that adhering to these pregnancy-related taboos is crucial to avoid the risk of abortion or birth defects in newborns (Chakraborti et al., 2019). Pregnant women in most societies are typically advised to modify or adapt their diet for various reasons and they gather information about their dietary needs during pregnancy from various sources. Some women consult healthcare providers or rely on other resources they perceive as reliable and evidence-based. As an illustration, upon receiving information or reading about the impact of caffeine on pregnancy outcomes, pregnant women might choose to decrease their caffeine consumption. Nevertheless, a significant portion of pregnant women acquire information from cultural, tribal or religious sources. These sources may influence their dietary choices, leading them to avoid specific foods believed to be detrimental to the well-being of both the

mother and the child, based on cultural, traditional or religious beliefs (Iradukunda et al., 2019).

2.2.1. Cultural beliefs:

Different countries have different taboos, misconceptions, and cultural beliefs surrounding certain types of food. For instance, in Mexico, there is a taboo among nursing mothers regarding the consumption of cold foods such as fruits and vegetables. Likewise, in South Eastern Nigeria, pregnant women consider snails and grasscutter meat as taboo, while children are discouraged from eating eggs based on cultural beliefs (Taddese et al., 2016).

2.3. Impact of food taboos on health:

Food insecurity and malnutrition pose significant challenges in sub-Saharan Africa, particularly for women of reproductive age, including pregnant women and children under the age of five. One prevalent issue in the region is what is known as "hidden hunger," where individuals suffer from a lack of or insufficient intake of essential micronutrients. This can lead to various forms of malnutrition, such as anemia and deficiencies in iron, vitamin A and zinc. It is possible for individuals to experience hidden hunger even when they have an adequate intake of energy and protein. Globally, approximately 9.8 million women are vitamin A deficient and iron-deficiency anemia is responsible for at least 18% of maternal deaths in developing countries. In addition to its immediate health implications, food insecurity and undernutrition also impact early childhood development as they compromise the child's brain and central nervous system (Gamuchirai & Charlie, 2019).

Pregnant women often observe food taboos, which involve avoiding certain types of foods due to cultural prohibitions. These taboos are influenced by various factors, including geography, ecology, religion, tradition and belief systems, resulting in unique dietary profiles and pregnancy food taboos across different communities. Each community provides different explanations for considering specific foods as taboo. In many cultural contexts, certain foods are deemed taboo due to perceived associations with reproductive health issues such as menstrual irregularities or complications during labor and delivery (Hassan et al., 2018). Observing food taboos can also be influenced by individual factors, including the pregnant woman's personal feelings during her pregnancy. Furthermore, it is believed that consuming tabooed foods during pregnancy can lead to health problems, specifically delayed delivery or obstructed labor due to the potential for a large fetus (Vasilevski V, 2016).

2.4. Association of food taboos with dietary intake during pregnancy:

The issue of malnutrition among women is a significant public health concern. The nutritional status of an expectant mother during pregnancy greatly affects the well-being of both the mother and the newborn infant and it continues to have an impact on the child's health throughout childhood and adulthood. Inadequate nutrition during pregnancy can lead to various negative outcomes, including spontaneous abortion, impaired fetal growth, poor weight gain during pregnancy, learning disabilities and behavioral problems in offspring. In developing countries, the primary factors contributing to intrauterine growth retardation are often related to the mother's poor health and nutritional status. Addressing the nutritional needs of expectant mothers is crucial to ensuring healthier outcomes for both mothers and

their children (Matthew et al., 2016). Developing nations account for 99% of all maternal deaths in the world (World Health Organization, 2015). The relationship between maternal dietary intakes during pregnancy and birth outcomes is multifaceted and influenced by various factors. Biological, socioeconomic, and demographic characteristics all play a role in shaping this association. Additionally, factors such as growth patterns and the occurrence of diseases, including infections, can also impact the relationship between maternal diet and birth outcomes. The interplay of these factors highlights the complexity of understanding the specific effects of maternal dietary intakes on birth outcomes (Katrine G. et al., 2017).

2.4.1. Maternal anemia:

Maternal anemia continues to be a significant public health issue worldwide, with limited progress in reducing its prevalence. Approximately 38% of women globally still experience anemia during pregnancy, and this condition contributes to 20% of maternal mortality cases. The burden of maternal anemia is particularly high in Africa and Asia, which together account for over 85% of the total cases. However, it is important to note that anemia affects 43% of pregnant women in low- and middle-income countries across the globe. These statistics highlight the ongoing challenge of addressing and reducing maternal anemia, emphasizing the need for comprehensive strategies and interventions to improve maternal health outcomes (World Health Organization, 2015).

Pregnant women, particularly those living in rural areas, may experience dietary deficiencies due to food taboos imposed by their communities. These taboos often restrict calorie intake and specific nutrients. While pregnancy typically requires an increased calorie intake, certain food items are considered either beneficial or harmful based on cultural beliefs within

different communities. Food taboos during pregnancy vary across cultures and communities, particularly in rural settings. Pregnant women who adhere to these food taboos may experience lower body weight and give birth to less healthy babies. These outcomes underscore the potential impact of cultural practices and beliefs on maternal and infant health during pregnancy. Food taboos during pregnancy are influenced by various factors, including access to dietary counseling and attendance at antenatal care (ANC) clinics. Younger age, lower educational status and being multiparous or pregnant also play a role in shaping these taboos. Additionally, cultural norms and personal beliefs significantly influence a pregnant woman's eating patterns during pregnancy. These cultural and belief-based factors can lead to specific dietary restrictions or preferences, which may impact the nutritional intake of pregnant women. Recognizing and understanding these factors is important for healthcare providers to provide appropriate support and guidance to pregnant women in order to ensure a healthy and balanced diet during pregnancy (Wollelaw, Wubie & Taddele., 2018).

2.5. Prevalance of pica practices among pregnant women worldwide:

Pica is a term used to describe the strong cravings and intentional consumption of nonfood substances. Three types of Picas are commonly reported. These include geophagia, which involves the consumption of substances like earth, clay, chalk, mud, or soil. Another type is amylophagia, which refers to the consumption of starch. Lastly, pagophagia involves the consumption of ice or freezer frost. These cravings and consumption patterns of nonfood

substances are considered a typical behavior and can have potential health risks (Fawcett et al., 2016).



Figure 1: Common Pica cravings during pregnancy

Pica has been associated with various health complications and risks. These include an increased likelihood of parasitic infections, disturbances in electrolyte balance, gastrointestinal complications, oral and dental injuries, lead poisoning and iron-deficiency anemia. Pica has also been linked to higher rates of maternal and prenatal mortality. Infants born to mothers with pica during pregnancy may have lower head circumferences compared to those born to non-pica women. The prevalence of pica during pregnancy can vary widely depending on the characteristics of the population being studied. For example, in Zahedan, a city in southeast Iran, the reported prevalence of pica during pregnancy is 25.3%. This highlights the importance of understanding and addressing pica as a potential health concern during pregnancy (Neda et al., 2015).

2.5.1. Prevalance of Pica practices:

The prevalence of pica during pregnancy can vary significantly across different populations and regions. Studies have reported a wide range of prevalence rates, ranging from 0.7% to 67% (Shah et al., 2022). Examples include a prevalence of 74% in Kenya, 27% in India,

23% in Argentina, 46% in the United States, and 60.5% in Iran. These variations highlight the cultural, geographical, and socioeconomic factors that contribute to the prevalence of pica in different populations (Galali et al., 2021). Pica practice is influenced by a combination of cultural traditions, biological factors, demographic status and midwifery factors.

2.5.2. Cultural factors:

Cultural traditions play a significant role in shaping pica practices. Some cultures believe that certain nonfood substances consumed during pregnancy can increase breast milk production or have other perceived benefits. These cultural beliefs and traditions contribute to the prevalence of pica in specific communities (Konlan et al., 2020).

2.5.3. Biological factors:

Biological factors such as anemia, nutrient deficiencies, cravings, and reduced nausea and vomiting can also influence pica. For example, anemia and nutrient deficiencies may lead to unusual cravings for nonfood substances as the body seeks to obtain missing nutrients. Additionally, reduced nausea and vomiting during pregnancy may increase the likelihood of consuming nonfood substances (Neda et al., 2015).

2.5.4. Demographic factors:

Demographic factors, including socioeconomic status and educational level, can influence the occurrence of pica. It has been observed that pica is more common in populations with lower socioeconomic status and limited access to healthcare and nutritional resources (Fawcett et al., 2016).

2.5.5. Midwifery factors:

Midwifery factors, including the role of healthcare providers, can impact pica practices. Adequate antenatal care, counseling and support from midwives and healthcare professionals can help address pica behaviors and provide appropriate guidance for pregnant women. Overall, the complex interplay of cultural, biological, demographic, and midwifery factors contributes to the practice of pica during pregnancy. Understanding these influences is crucial for addressing and managing pica-related behaviors and promoting maternal and fetal health (Shahrzad, Reza & Azita., 2023).

2.6. Causes of pica practices among pregnant women:

Sufficient consumption of nutrients plays a vital role in promoting the health and overall well-being of individuals, especially during pregnancy. The nutritional status of expectant mothers significantly influences the outcome of their pregnancies. Many populations commonly experience cravings and deliberate consumption of non-food substances. However, misconceptions and misinformation about ingesting non-food items can lead to significant health risks for pregnant women. A prevalent example is the consumption of clay by most pregnant women to satisfy their cravings, which can result in severe complications such as constipation and anemia. In Ghana, it was revealed that a higher number of pregnant women craved for white clay (61.16%), followed by red clay (16.53%). Ice block was the third most prevalent pica item (8.26%) (Norman et al., 2015). The occurrence of pica behavior among women varies based on factors such as iron and zinc deficiency, nutritional needs, psychological distress, deficiencies in essential nutrients, and insufficient family and social support (Caitlyn & Edward., 2013).

2.7. Impacts of Pica on Health:

It is commonly anticipated that pregnancy cravings will occur throughout the nine-month period of pregnancy. The traditional example often cited is the craving for pickles and ice cream. In reality, approximately 68% of pregnant women will experience cravings, often attributed to hormonal fluctuations. As pregnancy progresses, the varying hormone levels can make women more sensitive to certain food smells, sometimes even to the extent of inducing nausea (Deepa & Varuna, 2021). While pica can negatively affect physical functioning, its impact on social functioning is generally minimal. However, it is often observed in conjunction with other disorders. The most severe cases of comorbidity are often seen in individuals with autism spectrum disorder, intellectual disability and to a lesser extent, schizophrenia and obsessive-compulsive disorder (OCD). Additionally, pica can coexist with trichotillomania or excoriation, where individuals may consume their own hair or skin (Neha et al., 2020).

2.8. Importance of healthy diet during pregnancy:

The theory of "early life programming" suggests that environmental factors and lifestyle choices during pregnancy can have a significant impact on the future risk of developing chronic diseases and overall lifelong health in offspring. This theory proposes that the conditions experienced in the womb can program gene expression and influence physiological processes in ways that may have long-lasting effects on health outcomes later in life. Therefore, the prenatal environment and maternal lifestyle can play a crucial role in shaping the health trajectory of the child and their susceptibility to chronic diseases in adulthood (Fall et al, 2023). The reproductive period is a crucial stage for determining the

future risk of chronic diseases in offspring. Nutrition plays a pivotal role during this developmental period, as it can influence the long-term risk of disease.

Consequently, nutrition represents a potentially modifiable risk factor that can be targeted to mitigate disease risks throughout an individual's lifetime. In the past, public policy guidelines did not include pregnant or lactating women or infants under the age of 2. Fortunately, the 2020 to 2025 Dietary Guidelines for the first time include recommendations for infants, toddlers and pregnant women that will provide added benefits for healthcare professionals and the public. The USDA released its final guideline document (USDA 2020–2025 Dietary Guidelines) in December 2020 (Nicole E. et al., 2022).

The Mediterranean Diet (MD) and adherence to the Mediterranean Diet (MDA) are characterized by specific dietary patterns for pregnant women. This eating approach emphasizes a high consumption of fruits, vegetables, whole grain cereals, legumes, fish and nuts. It also involves a moderate intake of dairy products and limited quantities of red meat. The diet is low in saturated fats and rich in antioxidants, fiber and monounsaturated and polyunsaturated fatty acids. These beneficial fats are primarily derived from extra virgin olive oil (EVOO) in the form of monounsaturated fatty acids (MUFAs), as well as from oily fish as a source of omega-3 polyunsaturated fatty acids (n-3 PUFAs) (Federica et al., 2019).



Figure 2: Healthy diet during pregnancy

2.9. Association of pica and dietary intake during pregnancy:

Food classifications are not uniform or consistent across different cultures and regions, and they can vary significantly. Different cultures have unique dietary traditions, culinary practices and preferences, resulting in diverse food classifications. What may be considered a staple or a particular food group in one culture might not hold the same categorization in another. These variations in food classifications reflect the cultural, geographical and historical factors that shape dietary patterns and culinary traditions in different regions (Asim et al., 2021).

2.10. Food taboos and pica practices among pregnant women in Pakistan

The risk of a woman dying as a result of pregnancy or childbirth during her lifetime is approximately 1 in 180 in developing countries as compared to 1 in 4,900 in developed countries. In the Asia and Pacific region, the burden of poor maternal health remains disproportionately high. The average maternal mortality ratio, which represents the number of maternal deaths per 100,000 live births, stands at 239 in this region. This figure is significantly higher compared to the average of developed countries, which is just 12 maternal deaths per 100,000 live births (World Health Organization, 2018). The inherent attitudes of a patriarchal society, where men are considered superior to women, combined with a religious thought process that emphasizes monitoring and controlling women, create

significant barriers for women in accessing appropriate and timely health services. These societal norms and beliefs often lead to gender inequalities, discrimination and limited autonomy for women, particularly in making decisions about their own health. Women may face challenges in seeking reproductive healthcare, including antenatal care, skilled birth attendance, family planning services and postnatal care (Maryam et al., 2020).

2.10.1. Cultural Beliefs:

Cultural food habits play a significant role in shaping women's dietary choices during pregnancy. For instance, South Asian women often continue to adhere to their traditional food practices while pregnant. Ethnicity has been found to influence birth outcomes, and maternal nutritional habits have a direct impact on the health of the fetus and newborn. During and after pregnancy, women partake in various cultural food practices, such as consuming special meals prepared with ingredients like clarified butter, wheat flour, and sugar, which are believed to provide strength and nourishment to both the pregnant woman and the unborn baby. Additionally, there is a cultural observance of a 40-day postpartum period aimed at protecting the mother and baby from perceived negative influences, such as the "evil eye" or ill-wishing. These cultural beliefs and practices surrounding food and postpartum rituals reflect the importance of cultural traditions in shaping women's experiences during pregnancy and childbirth. Indeed, women often consume fat and protein-rich foods during the postpartum period to aid in their recovery and regain strength after delivery (Bsharat et al., 2021).

2.11. Conceptual Framework:

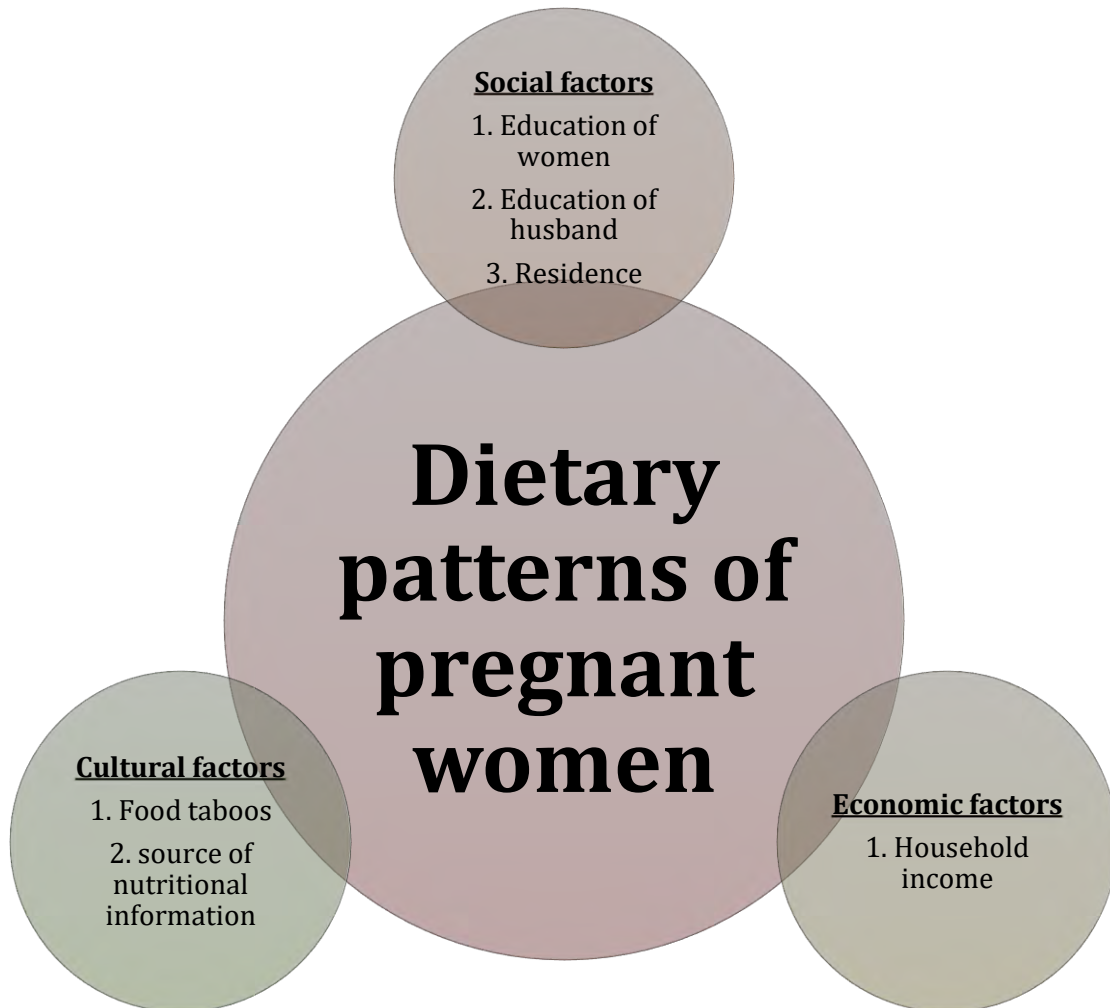


Figure 3: Conceptual framework of association between dietary patterns and food taboos among pregnant women

2.12. Operational Definitions:

1. Pica:

Pica is the recurrent consumption of non-food substances, driven by compulsive urges (Ellis et al., 2009). Pica behavior was assessed using four questions about non-food item ingestion.

2. Food taboos:

Food taboos encompass traditional, religious, and prejudicial limitations on certain foods, shaping consumption patterns. These constraints, also known as food fads, vary based on cultural and religious affiliations. Five questions gauged knowledge and adherence to these taboos during pregnancy.

3. Dietary patterns:

Dietary patterns refer to the habitual consumption of various foods, drinks, and nutrients in specific quantities, proportions, and combinations. A food frequency questionnaire, comprising 26 items on a 4-point Likert scale, assessed these patterns. Respondents with scores below 43 (median) were labeled as having poor dietary intake, while those with scores above 43 were considered to have good dietary intake.

4. Antenatal care:

Antenatal care (ANC) is skilled healthcare during pregnancy, encompassing risk assessment, disease prevention, management, and health education (Nasloon et al., 2020).

5. Food Frequency Questionnaire (FFQ):

A widely used nutritional epidemiology tool, the dietary survey assesses population eating habits. Design should consider study population's socio-cultural factors (Garcia et al., 2019).

CHAPTER III: METHODOLOGY

3.1 Study design

A quantitative research approach using cross-sectional study design was used for the current study.

3.2. Study Duration:

Study period for the current research was six months from April 2023-September 2023.

3.3. Study Setting:

The study was carried out at two public hospitals in Rawalpindi.

3.4. Study Participants:

Pregnant women visiting the public hospitals were included in the study.

3.4.1. Inclusion Criteria:

1. Pregnant women of child-bearing age were included in current study.
2. Pregnant women visiting public healthcare facilities were only included.
3. Women who want to participate.

3.4.2. Exclusion Criteria:

1. Women with twin pregnancy were excluded.
2. Women who are not willing to participate.

3.5. Sample Size Calculation:

Sample size was calculated using proportion formula for sample size calculation in Open-Epi menu, Version 3.01 software. Previous prevalence of food taboos among pregnant women of rural Sindh was taken as 90% (Bala et al., 2021). Calculated sample size was 139 with 95% confidence interval (C.I) and 5% margin of error.

Sample Size for Frequency in a Population

Population size(for finite population correction factor or fpc)(<i>N</i>):	1000000
Hypothesized % frequency of outcome factor in the population (<i>p</i>):	90%+/-5
Confidence limits as % of 100(absolute +/- %)(<i>d</i>):	5%
Design effect (for cluster surveys- <i>DEFF</i>):	1

Sample Size(*n*) for Various Confidence Levels

ConfidenceLevel(%)	Sample Size
95%	139
80%	60
90%	98
97%	170
99%	239
99.9%	390
99.99%	545

Equation

$$\text{Sample size } n = [\text{DEFF} * N * p(1-p)] / [(d^2 / Z^2_{1-\alpha/2} * (N-1) + p*(1-p)]$$

Results from OpenEpi, Version 3, open source calculator--SSPropor
 Print from the browser with ctrl-P
 or select text to copy and paste to other programs.

Figure 4: Sample size for the current study

3.6. Sampling Strategy:

Selection of public hospitals was carried out using simple random sampling through lottery method while pregnant women were selected using non-probability convenience sampling.

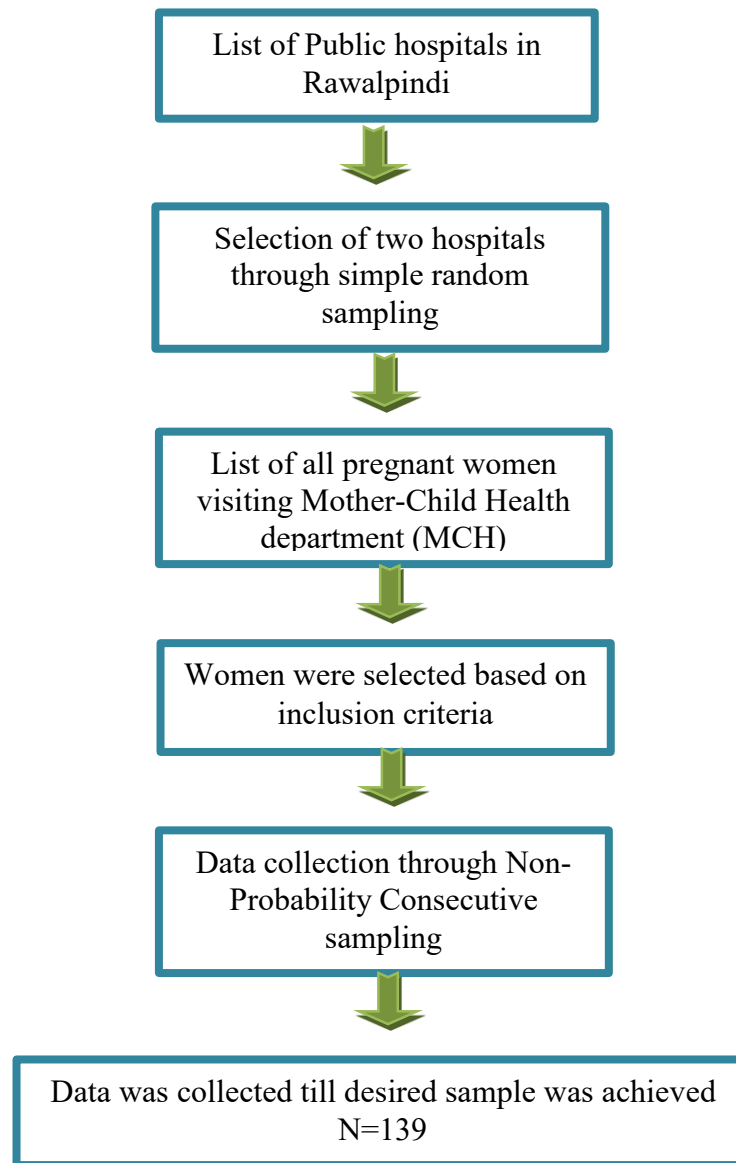


Figure 5: Non-Probability Consecutive Sampling Strategy

3.7. Data Collection Tool:

3.7.1. Questionnaire Design:

Data was collected using an interview-based questionnaire. A Performa was developed to collect data regarding sociodemographic characters of the respondents, pica practices, food taboos and dietary patterns. Questionnaire was adapted from a previous study (Solimeo et al., 2012).

3.7.2. Content of the Questionnaire:

The questionnaire consisted of five sections:

1. **Section 1** included questions related to Sociodemographic characteristics of the respondents such as age, monthly income etc. This section contained a total of ten questions.
2. **Section 2** included Antenatal information of the pregnant mothers such as history of disease, pregnancy issues etc. This section contained a total of six questions.
3. **Section 3** included knowledge of the pregnant mothers regarding food taboos such as source of nutrition information, food avoiding during pregnancy etc. The section contained a total of five questions. The questions were adapted from a previous study conducted in Eastern Ethiopia (Amare et al., 2022).
4. **Section 4** included pica practices of pregnant mothers such as eating non-food item during pregnancy. The section contained a total of three questions. The questions were adapted from previous studies conducted in Ghana and Pakistan (Shah et al., 2022; Konlan et al., 2020).

5. **Section 5** included food frequency questionnaire (FFQ) to determine the dietary practices of pregnant mothers. It included questions regarding different food items such as cereals, meat, other protein sources, fats and oils, dairy, fruits, vegetables etc. It was a 4-point Likert Scale ranging from 0= never to 3= daily. Total items were 26.

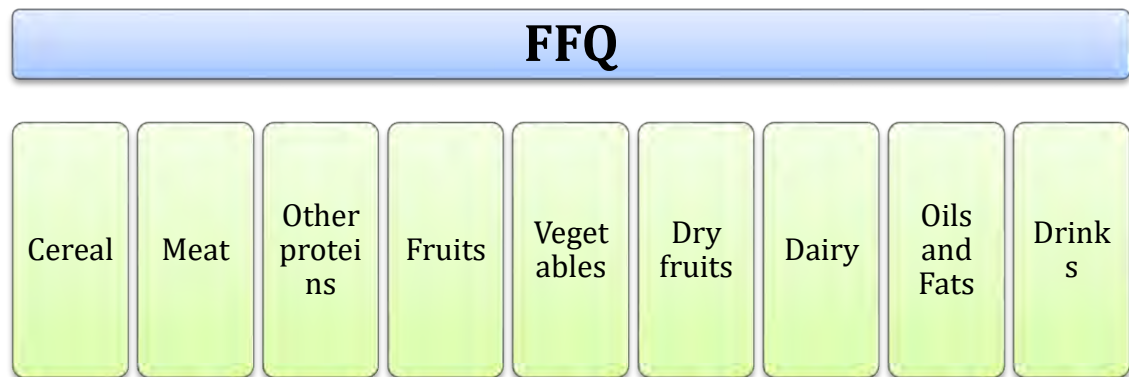


Figure 6: Food items covered in FFQ

3.7.3. Study Variables:

3.7.3.1. Outcome Variable:

Dietary practices among pregnant women were taken as outcome variable in current study. Dietary practices were assessed using food frequency questionnaire.

3.7.3.2. Independent Variable:

Data on independent variables was collected through a structured Performa that is constructed after international and national literature review. The Performa included sociodemographic variables, knowledge about pica and food taboos.

3.8. Data Collection Process:

3.8.1. Pilot Testing:

Pilot testing was performed before starting the formal data collection procedure by including 10% of the actual sample size ($n = 16$). Performa was tested for any future changes. Four items of FFQ were excluded from the final questionnaire after pilot testing. Reliability of the scale was checked through the value of Cronbach's alpha which after adjustments came to be 0.71.

Cronbach's Alpha	N of Items
.710	26

Figure 7: Reliability of FFQ for assessing dietary practices of Pregnant women

3.8.2. Data Collection:

All the pregnant women (age 20-40 years) visiting antenatal care in public hospitals were approached. Consent was taken from the women and they were informed about the purpose of the research. Only those pregnant women were selected who agreed to take part in the research process and fulfill the inclusion criteria. After taking the consent, the respondents were interviewed and their responses were recorded by the researcher. Data collection was completed in approximately one month.

3.9. Data Analysis Procedure:

Code book was developed and data was entered in Statistical Package for Social Sciences (SPSS) version 26. After careful data entry, data was checked for any error before proceeding to the further analysis.

3.9.1. Data Cleaning:

After careful data entry, data was checked for any missing values and any error that could possibly affect the further analysis. Double entries were eliminated before continuing the further analysis.

3.9.2. Data Transformation:

Computed response for FFQ was calculated for each respondent by adding the individual responses in SPSS. Computed scores for all food item domains were also calculated. Continuous variables were categorized in order to proceed the analysis. Dietary practices were categorized into two categories poor and good based on median score which was 43. Respondents with FFQ score less than 43 were categorized as having poor dietary intake while those with score more than 43, were termed as having good dietary intake.

3.9.3. Descriptive Analysis:

Descriptive statistics were generated for sociodemographic characteristics and outcome variable. Data was summarized in the form of frequencies and percentages and presented in table form, Bar chart and Pie chart.

3.9.4. Inferential Analysis:

Pearson Chi Square test of Independence was used to determine the association between dietary practices and pica, food taboos and socio-demographic characteristics of the respondents. P value less than 0.05 was considered statistically significant.

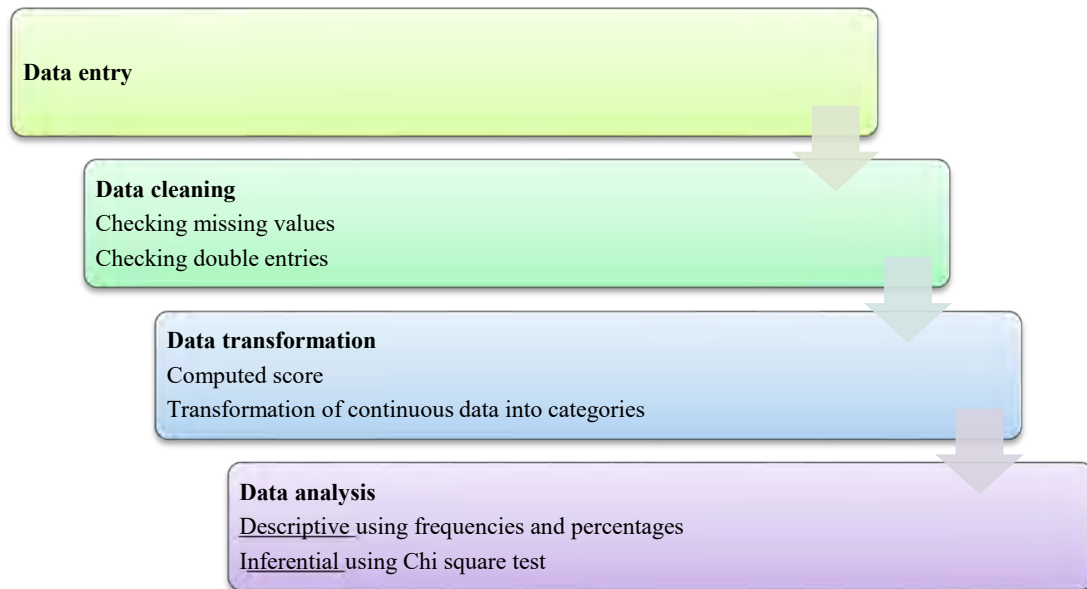


Figure 8: Data Analysis Plan

3.10. Ethical Considerations:

Before starting formal data collection, approval from Institutional Review Board (IRB) of Al-Shifa School of Public Health Rawalpindi, Pakistan has been taken. Permission letter from the Head of Department of Al-Shifa School of Public Health was obtained regarding access to the tertiary health facilities. Various public hospitals of Rawalpindi were approached for data collection. Permission was taken from hospitals for conducting research. Respondents were explained the purpose of the research and oral consent was taken from each participant before collecting the data. Data was collected from only those

respondents who had agreed to participate in the research process voluntarily. Participants were assured for the confidentiality of their data. Data collected from the respondents was kept anonymous and was not shared with anyone. Data was entered in SPSS anonymously. After data entry, hard copies of collected were kept at a safe place.

CHAPTER IV: RESULTS

4.1. Demographic characteristics:

A total of 139 pregnant women, visiting antenatal care facility, were included in this study. It was observed that more than half of the respondents were between 20-30 years of age (n= 89, 64%). Majority of the respondents were in their third trimester (n= 65, 47%) and belong to urban areas (n= 111, 80%). A detail summary of sociodemographic characteristics of the respondents is presented in table 1.

Table 1: Sociodemographic Characteristics of Pregnant women

Sr. No.	Variables	n (%)
1	Age	
	20-30 years	89 (64)
	31-40 years	50 (36)
2	Trimester	
	1 st	34 (25)
	2 nd	40 (29)
	3 rd	65 (46)
3	Residence	
	Urban	111 (80)
	Rural	28 (20)
4	Education of the women	
	Illiterate	21 (15)
	Primary to secondary	24 (17)
	FA/FSC	32 (23)
	Bachelors	38 (27)
	Masters and above	24 (18)
5	Occupation of the women	
	Student	3 (2)
	Housewife	112 (81)
	Government employee	16 (12)
	Private employee	8 (6)
6	Monthly Income	
	<25000	45 (32)
	<50000	49 (35)
	75000	16 (12)
	100000	14 (10)
	>100000	15 (11)

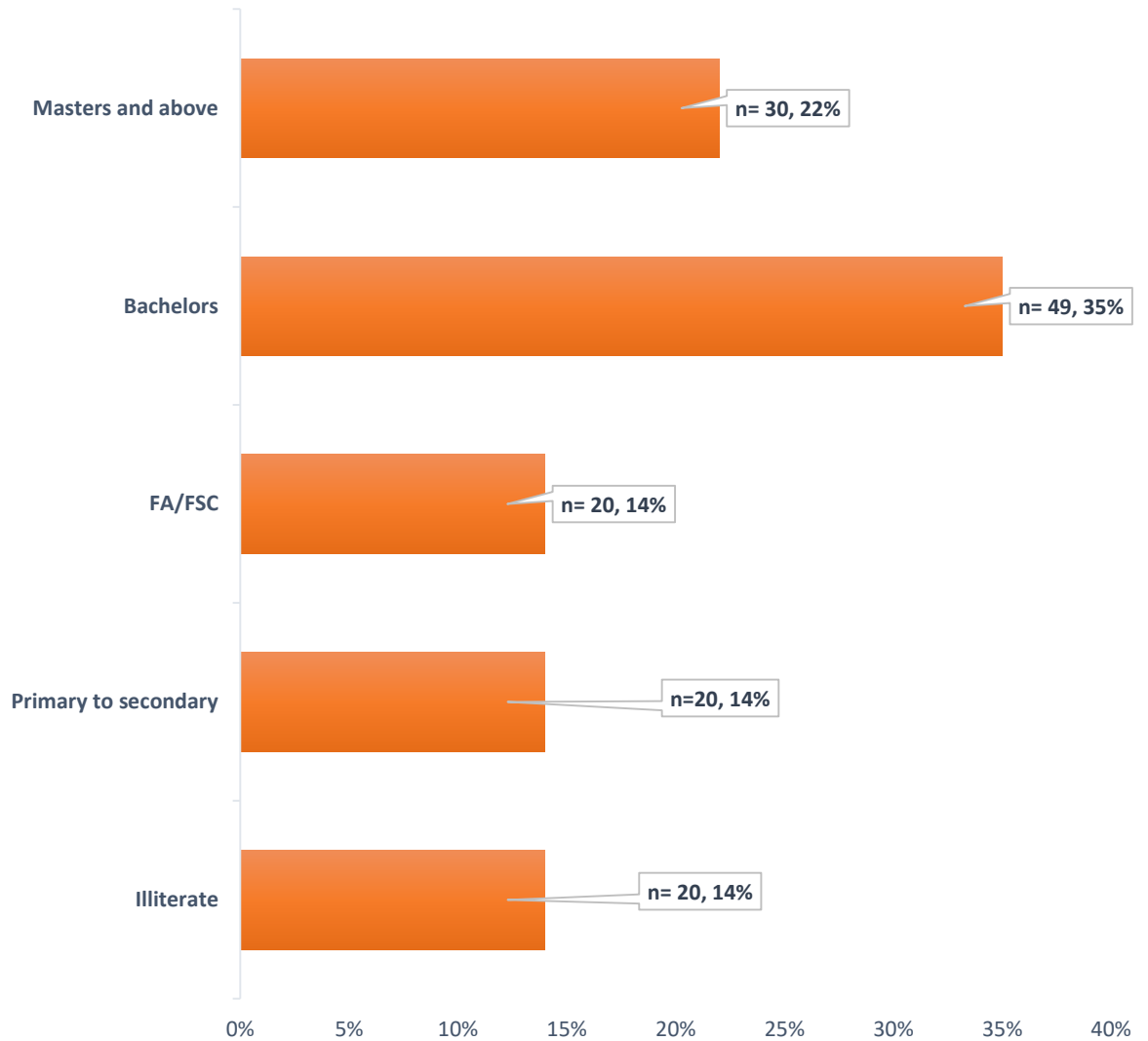


Figure 9: Husband's education level

Results showed that more than the number of women whose husband's education was bachelors was slightly higher than others (n= 49, 35%) as shown in figure 9.

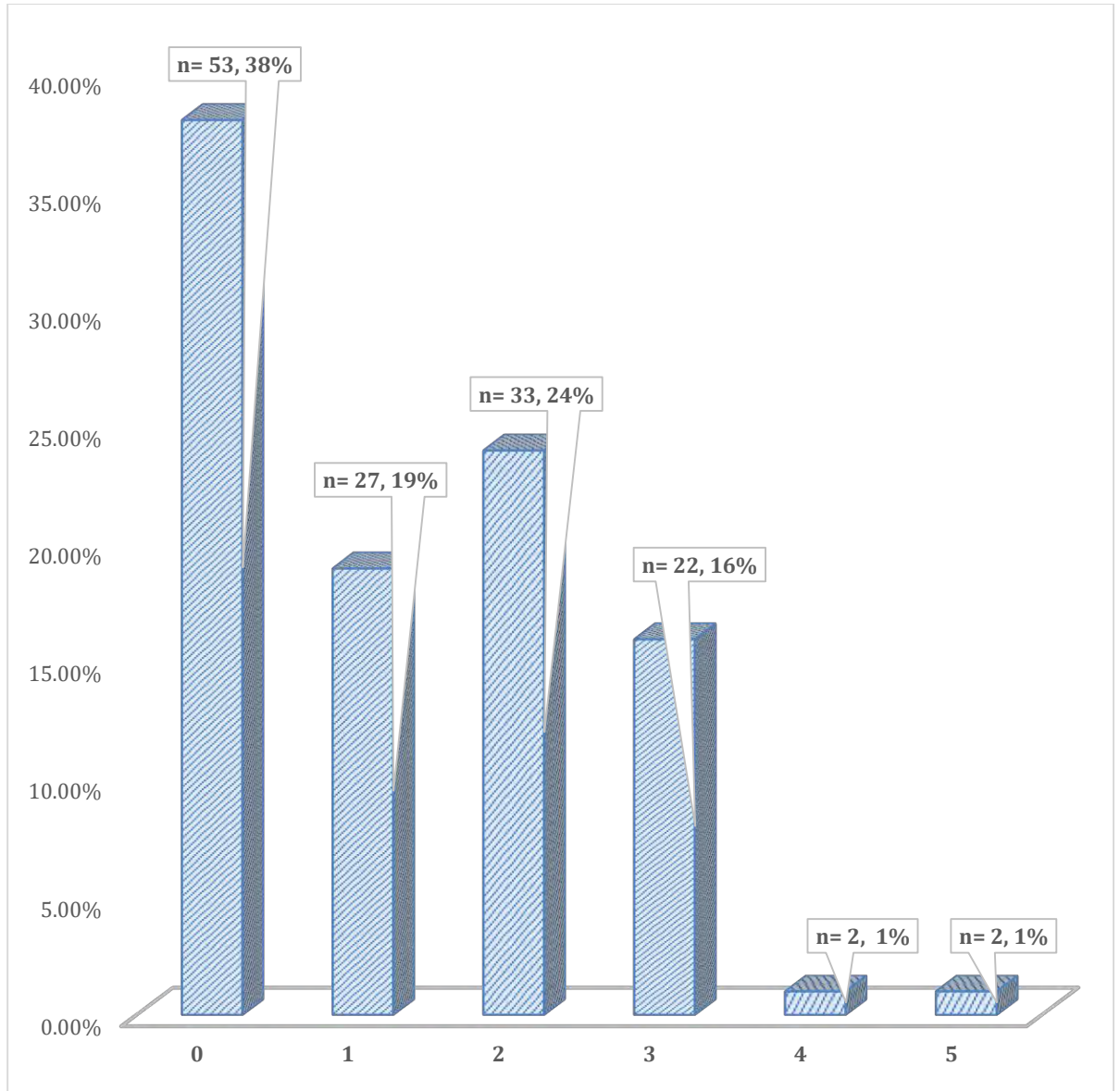


Figure 10: Number of living children

It was found that majority of the respondents have no living children (n= 53, 38%) as shown in figure 10.

4.2. Antenatal information:

Current findings showed that majority of the respondents consult doctor for antenatal care (n= 138, 99%) and doing physical activity (n= 81, 58%). A detailed summary of antenatal care detail of respondents is given in table 2.

Table 2: Antennal care information

Sr. No.	Variables	n (%)
1	Whom do you prefer to consult?	
	Doctor	138 (99.3)
	Consultant	1 (0.7)
2	Are you doing any physical activity?	
	Yes	81 (58)
	No	58 (42)
3	Frequency of physical activity	
	No	58 (42)
	Walk	81 (58)
4	Duration of physical activity	
	15 min	58 (42)
	30 min	22 (16)
	1 hour	43 (31)
	3 hours	15 (12)
5	Physical activity is done	
	No	58 (42)
	daily	75 (54)
	Weekly	6 (4)
6	Did you receive antenatal care during last pregnancy?	
	Yes	85 (61)
	No	54 (39)
7	Reasons for not receiving antenatal care	
	No	90 (65)
	1 st pregnancy	43 (31)
	Long distance from hospital	6 (4)
8	Number of visits/ Services received from the antenatal care	
	1 visit	17 (12)
	2 visits	114 (82)
	3-4 visits	2 (1)
	5-6 visits	3 (2)
	All visits	3 (2)

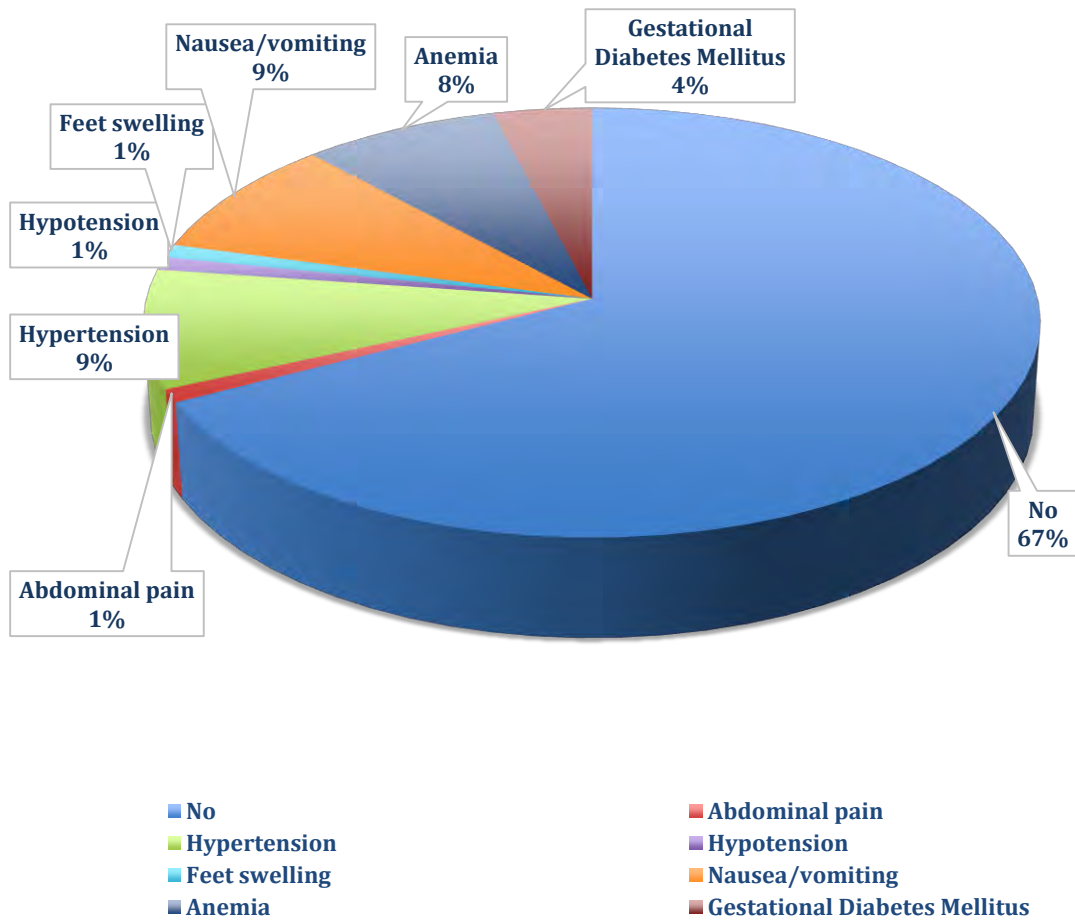


Figure 11: Pregnancy related issues

Results showed that majority of the respondents reported no pregnancy related issues (n= 94, 67%) as given in figure 11.

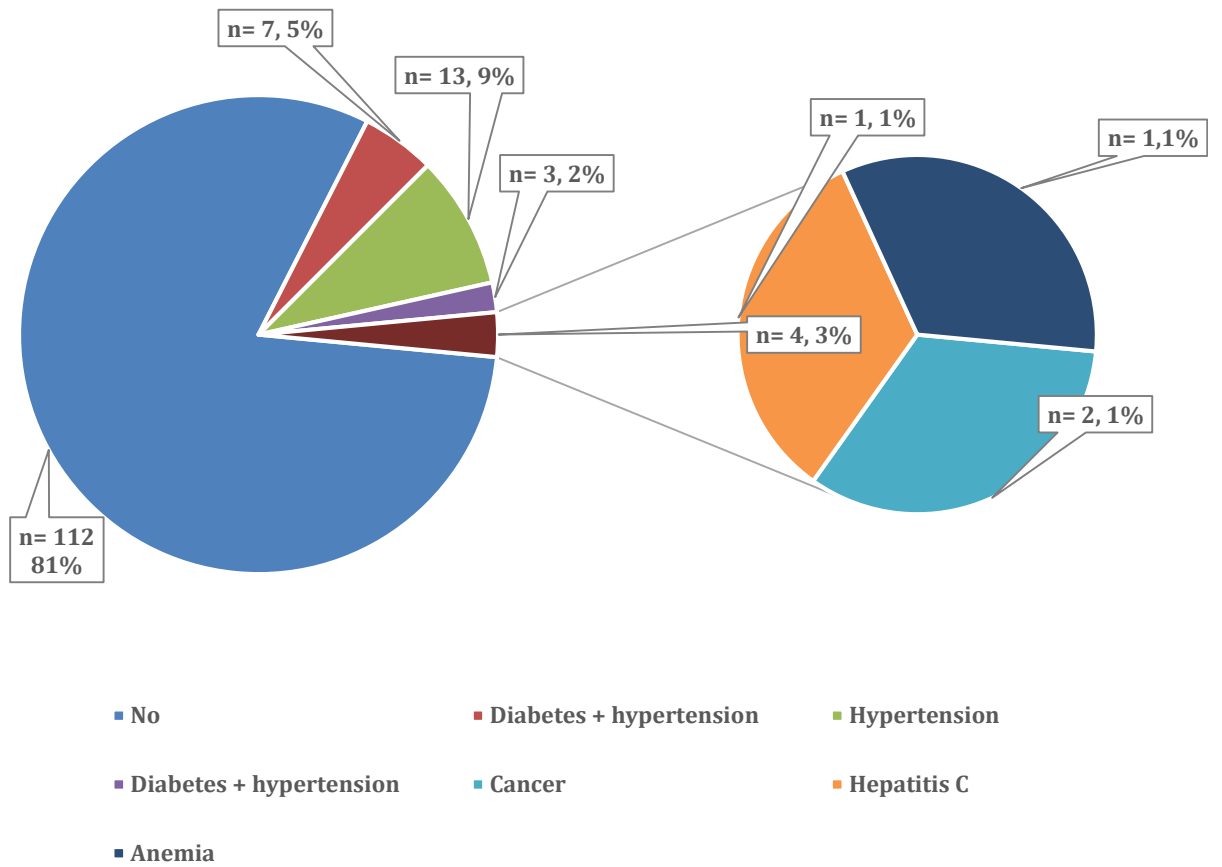


Figure 12: Family history of disease

It was noted that majority of the respondents reported no family history of disease (n= 112, 81%) as given in figure 12.

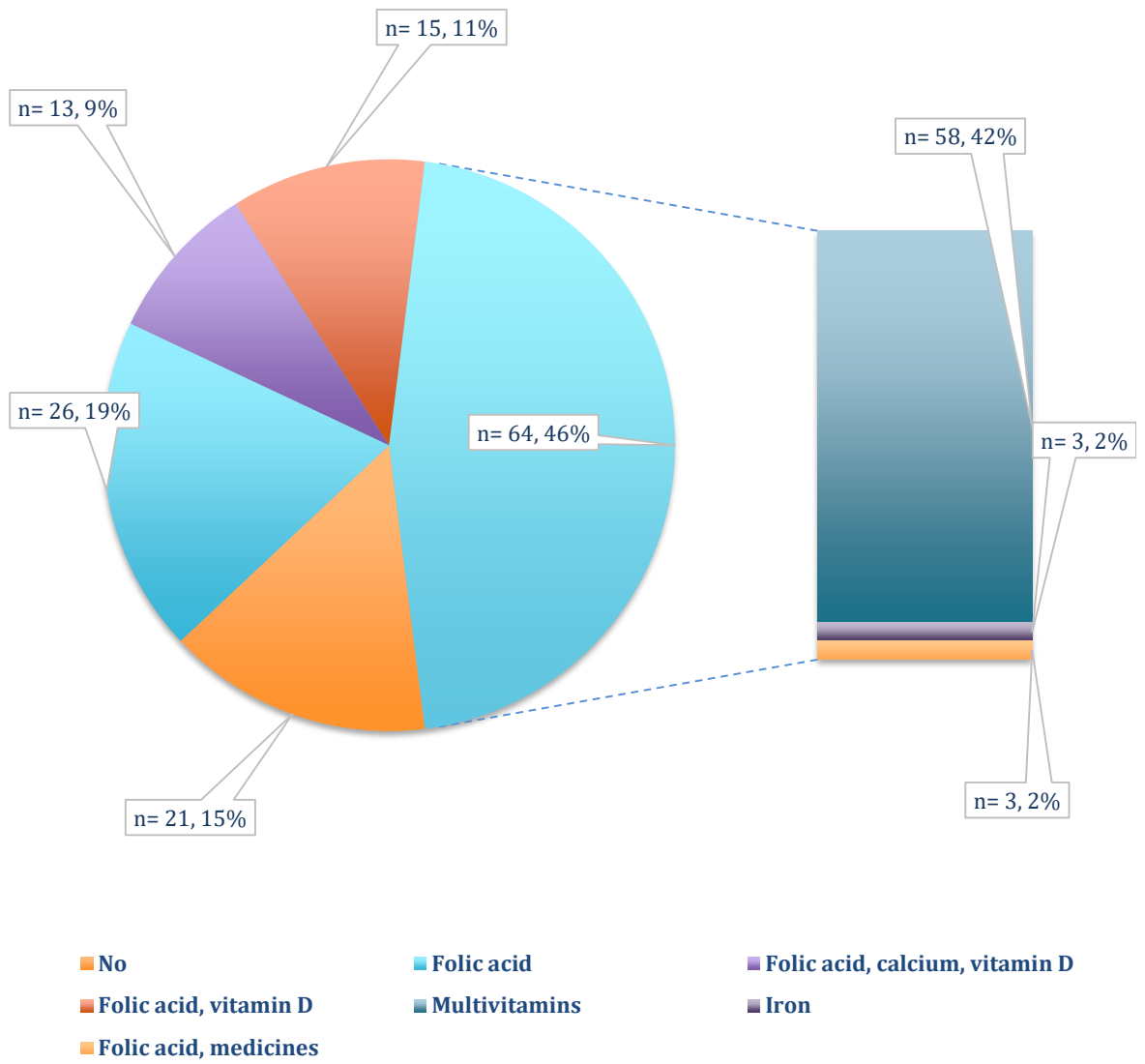


Figure 13: Supplements taken during pregnancy

It was observed that majority of the pregnant women were taking multivitamins (n= 58, 42%) as given in figure 13.

4.3. Food Taboos among pregnant women:

In current study pregnant women were asked several questions to identify different food taboos among them. It was noted that nearly 42% women (n=58) reported to have some food taboos. While more than half of the respondents had no knowledge about food taboos (n=83, 60%). A detailed summary regarding food taboos among pregnant women is given in table 3.

Table 3: Food taboos among pregnant women

Sr. No.	Variables	n (%)
1	Have you heard about food taboos?	
	Yes	58 (42)
	No	81 (58)
3	How do you define food taboos?	
	Not know	83 (60)
	Foods that will lead to miscarriage	56 (40)
4	What was the source of nutrition information?	
	No	78 (56)
	Social media	19 (14)
	Books	1 (1)
	Books and social media	25 (18)
	Mother-in-Law	9 (7)
	Neighbour	7 (5)
5	Is there any food you are avoiding during pregnancy?	
	Yes	56 (40)
	No	83 (60)
6	Reasons for avoiding food during pregnancy	
	Nil	79 (57)
	Nausea/ vomiting	41 (30)
	Allergic	2 (1)
	Fear of effect on foetus	4 (3)
	Fear of miscarriage	2 (1)
	Hypertension	8 (6)
	Stomach pain	3 (2)

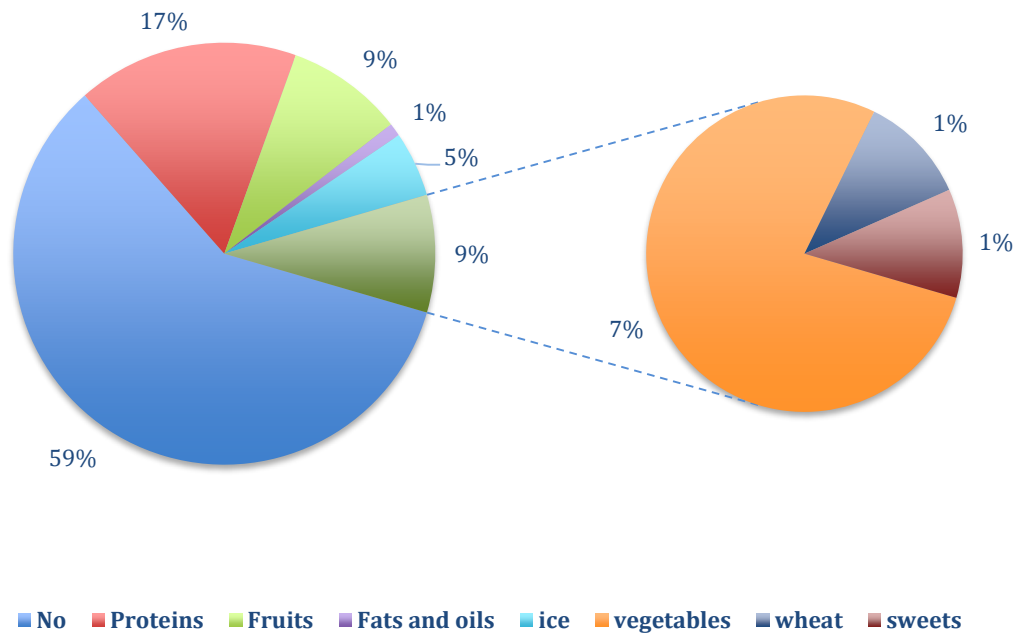


Figure 14: Food items avoided by women during pregnancy

Study revealed that women used to avoid a large number of food items during pregnancy. Out of total respondents, only 59% (n= 82) reported that they did not avoid any food item during pregnancy. A complete list of food items is given in figure 15.

4.4. Pica practices among pregnant women:

Data was collected to determine knowledge and practices of pica among pregnant women. It was found that 49% women (n= 68) did not know about pica. However, 63 women (45%) reported that they used to take non-food items during pregnancy. Majority of the women who used to take non-food items, reported that the consumption of raw rice during pregnancy (n=25, 18%). A detail about pica practices and knowledge about pica is given in table 4.

Table 4: Knowledge and practices about pica among pregnant women

Sr. No.	Variables	n (%)
1	Have you heard about PICA?	
	Yes	71 (51)
	No	68 (49)
2	What do you understand about PICA?	
	Not know	68 (49)
	Eating food items with no nutritional value	71 (51)
3	Have you ever experienced to non-food items (PICA) during pregnancy?	
	Yes	63 (45)
	No	76 (55)
4	Which pica items are you taking during pregnancy?	
	Nil	75 (54)
	Raw rice	25 (18)
	Mud	13 (9)
	Coal	2 (1)
	Chalk	6 (4)
	Ice	3 (2)
	Sweets	9 (7)
	Achaar	5 (4)
	Cement	1 (1)

4.5. Dietary practices among pregnant women:

Dietary practices of pregnant women were assessed using FFQ. Information regarding intake of cereals, meat and other protein sources, fats and oils, dairy products, fruits and vegetables, dry fruits and drinks was collected.

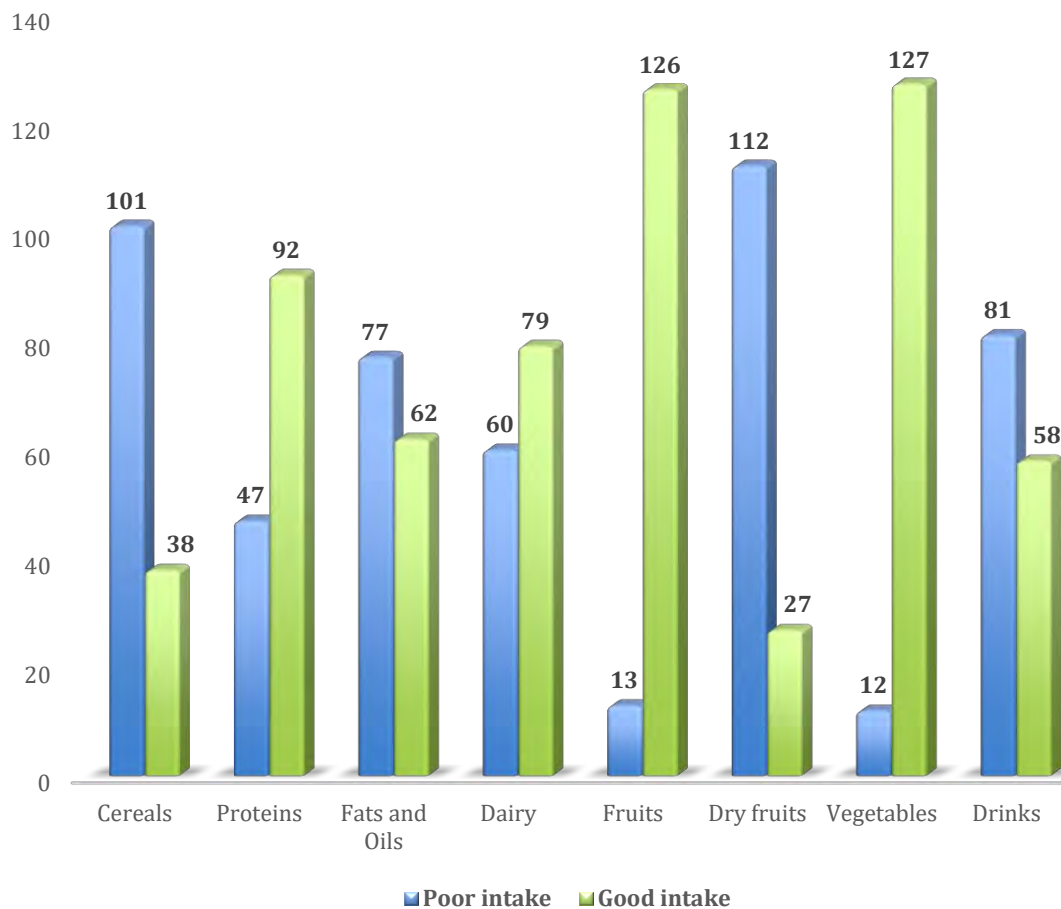


Figure 15: Dietary intake of different food items among pregnant women

Results revealed that majority of the respondents reported good intake of proteins (n=92, 66%), milk and other dairy products (n= 79, 57%), fruits (n= 126, 91%) and vegetables (n= 127, 91%) as given in figure 15.

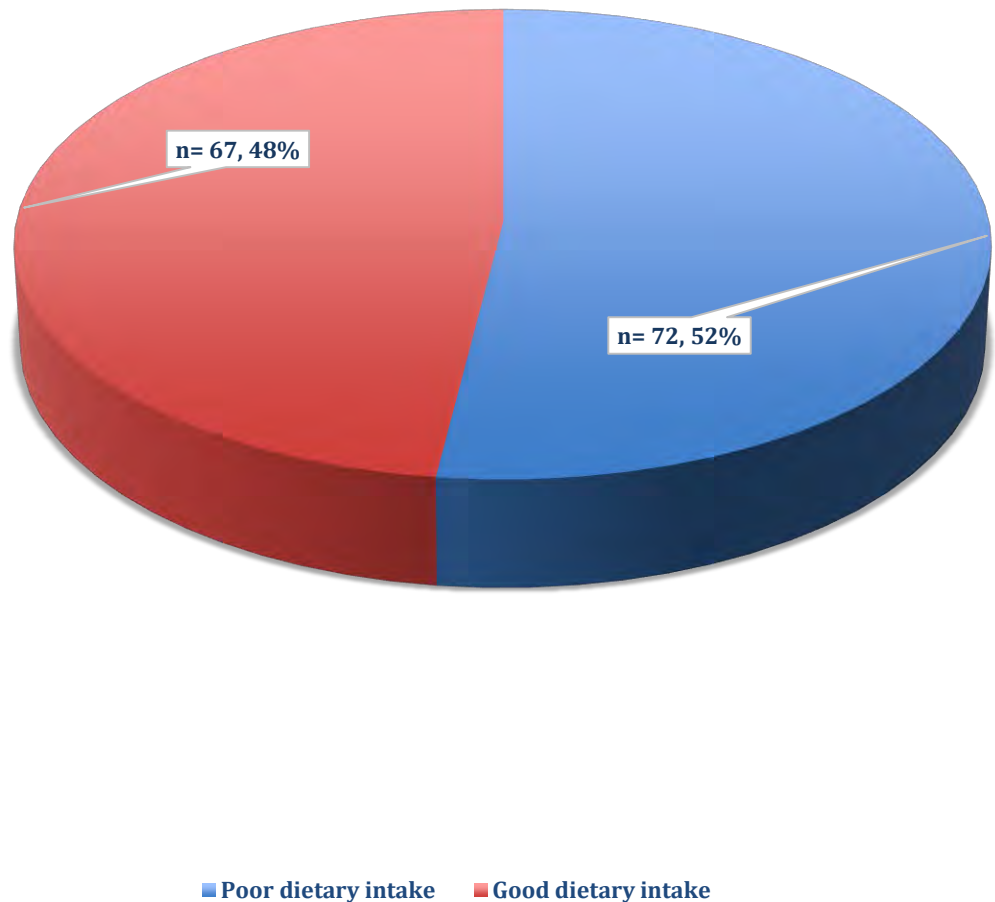


Figure 16: Dietary intake among pregnant women

Overall dietary intake of pregnant women was determined and it was noted that women with poor dietary practices were slightly more in number (n= 72, 58%) as compared to those with good dietary practices (n= 67, 48%) as given in figure 16.

4.6. Association of Sociodemographic characters with Dietary practices among pregnant women:

Association of dietary practices with sociodemographic characteristics of the pregnant women was determined using Pearson Chi Square Test of Independence after confirming the assumptions of the test. All p-values below 0.05 were considered statistically significant. It was revealed by the results of current study that respondents living in urban area had relatively good dietary practices (n= 60, 54%) as compared to those living in rural areas. Similarly, respondents with higher education level reported good dietary practices as compared to those with no or low education level; respondents with bachelors and masters level education reported good dietary practices (n=24, 63% and n= 13, 54% respectively). Moreover, husband's education level is also found to be an influencing factor that affects the dietary practices of the women. It was noted that women whose husbands had a master's degree or above reported maximum good dietary practices (n= 18, 60%) as compared to those whose husbands were illiterate or had low education level. Furthermore, income level was also found to affect the dietary practices of the pregnant women. Women whose monthly income was above one lac reported mainly good dietary practices (n= 10, 67%) as compared to other groups. All these factors were significantly associated with dietary practices ($p < 0.05$). A summary of these results is given in table 5.

Table 5: Association between Socio-demographic characters and Dietary practices

Sr. No.	Sociodemographic Characteristics	Dietary practices		X ² (df)	P value
		Poor n (%)	Good n (%)		
1	Age			1.05 (1)	0.305
	20-30 years	49 (55)	40 (45)		
	31-40 years	23 (46)	27 (54)		
2	Trimester			1.82 (2)	0.402
	1 st	21 (62)	13 (38)		
	2 nd	19 (48)	21 (52)		
	3 rd	32 (49)	33 (51)		
3	Residence			7.56 (1)	0.006**
	Urban	51 (46)	60 (54)		
	Rural	21 (75)	7 (25)		
4	Education of women			12.30 (4)	0.015*
	Illiterate	17 (81)	4 (19)		
	Primary to Secondary	15 (63)	9 (78)		
	FA/FSC	15 (47)	17 (53)		
	Bachelors	14 (37)	24 (63)		
	Masters and above	11 (46)	13 (54)		
5	Occupation of women			4.19 (3)	0.241
	Student	2 (67)	1 (33)		
	Housewife	62 (55)	50 (45)		
	Government employee	5 (31)	11 (69)		
	Private employee	3 (38)	5 (62)		
6	Husband's education			21.26 (4)	0.0001**
	Illiterate	17 (85)	3 (15)		
	Primary to Secondary	14 (70)	6 (30)		
	FA/FSC	4 (20)	16 (80)		
	Bachelors	25 (51)	24 (49)		
	Masters and above	12 (40)	18 (60)		
7	Monthly income			20.53 (4)	0.0001**
	>25000	35 (78)	10 (22)		
	>50000	17 (35)	32 (65)		
	75000	9 (56)	7 (44)		
	100000	6 (43)	8 (57)		
	>100000	5 (33)	10 (67)		

Significant at *p value<0.05, **p value<0.01, C.I. 95%

4.7. Association of Food taboos with Dietary patterns of pregnant women:

Association of dietary practices with food taboos among pregnant women was determined using Pearson Chi Square Test of Independence after confirming the assumptions of the test. All p-values below 0.05 were considered statistically significant. It was found that women who had no source of dietary information, mainly reported poor dietary intake (n=41, 53%) while those getting nutritional information through social media also reported mainly poor dietary practices (n=15, 79%). Furthermore, women who used to avoid certain food items during pregnancy, had reported poor dietary intake (n= 35, 63%) as compared to those who did not avoid any food item (n= 37, 45%). It was also noted that women avoiding proteins (n=12, 52%), fruits (n=10, 77%), vegetables (n=9, 90%) and wheat (n=2, 100%) during pregnancy, reported poor dietary intake as compared to others. All these factors were significantly associated with dietary practices during pregnancy ($P<0.05$). A summary of these results is given in table 6.

Table 6: Association of dietary practices with food taboos

Sr. No.	Food taboos	Dietary practices		X ² (df)	P value
		Poor n (%)	Good n (%)		
1	Have you heard about food taboos?			0.82 (1)	0.364
	Yes	26 (46)	30 (54)		
	No	44 (54)	37 (46)		
2	How do you define food taboos			1.08 (1)	0.298
	Not know	46 (55)	37 (45)		
	Foods that will lead to miscarriage	26 (46)	30 (54)		
3	Source of nutritional information			14.53 (5)	0.013*
	Nil	41 (53)	37 (47)		
	Social media	15 (79)	4 (21)		
	Book	1 (100)	0 (0)		
	Social media and book	7 (28)	18 (72)		
	Mother-in-Law	3 (33)	6 (67)		
	Neighbour	5 (71)	2 (29)		
4	Is there any food you are avoiding during pregnancy?			4.30 (1)	0.038*
	Yes	35 (63)	21 (37)		
	No	37 (45)	46 (55)		
5	Food avoided during pregnancy			16.56 (7)	0.007**
	Nil	36 (44)	46 (56)		
	Proteins	12 (52)	11 (48)		
	Fats and oils	0 (0)	1 (100)		
	Fruits	10 (77)	3 (23)		
	Vegetables	9 (90)	1 (10)		
	Ice	2 (29)	5 (71)		
	Sweets	1 (100)	0 (0)		
6	Reasons to avoid food			11.68 (7)	0.06
	Nil	35 (44)	44 (56)		
	Nausea/vomiting	28 (68)	13 (32)		
	Allergic reaction	0 (0)	2 (100)		
	Fear of effecting fetus	1 (25)	3 (75)		
	Fear of miscarriage	4 (50)	4 (50)		
	Hypertension	2 (67)	1 (33)		
	Stomach pain	1 (100)	0 (0)		

Significant at *p value<0.05, **p value<0.01, C.I. 95%

4.8. Association of Food taboos with Dietary patterns of pregnant women:

Association of dietary practices with pica practices among pregnant women was determined using Pearson Chi Square Test of Independence after confirming the assumptions of the test. All p-values below 0.05 were considered statistically significant. No factor related to pica practices was found significantly associated with dietary practices among pregnant women ($p>0.05$). However, it was found that women who had knowledge about pica reported good dietary practices (n= 36, 51%) as compared to those who did not have any knowledge about pica (n= 31, 46%) but the difference was not statistically significant ($p>0.05$). A summary of these results is given in table 7.

Table 7: Association of Pica practices and dietary patterns among pregnant women

Sr. No.	Pica practices	Dietary practices		X ² (df)	P value
		Poor n (%)	Good n (%)		
1	Have you heard about Pica?			0.360 (1)	0.54
	Yes	35 (49)	36 (51)		
	No	37 (54)	31 (46)		
2	What do you understand about Pica?			0.364 (1)	0.55
	Not know	37 (54)	31 (46)		
	Foods that will lead to miscarriage	35 (49)	36 (51)		
3	Have you ever experienced to non-food items during pregnancy?			0.047 (1)	0.289
	Yes	32 (51)	31 (49)		
	No	40 (53)	36 (47)		
4	Which non-food items are you taking during pregnancy?			2.98 (8)	0.935
	Nil	39 (52)	36 (48)		
	Raw rice	13 (52)	12 (48)		
	Mud	8 (62)	5 (38)		
	Coal	1 (50)	1 (50)		
	Chalk	2 (33)	4 (67)		
	Ice	2 (67)	1 (33)		
	Sweets	5 (56)	4 (44)		
	Achaar	2 (40)	3 (60)		
	Cement	0 (0)	1 (1)		

Significant at *p value<0.05, **p value<0.01, C.I. 95%

CHAPTER V: DISCUSSION

Current study was carried out to determine the association of dietary practices among pregnant women and food taboos, pica and sociodemographic characters. The study included total 139 pregnant women attending antenatal care in public hospitals of Rawalpindi.

Results of the study revealed that more than half of the respondents did not know about food taboos (n= 81, 58%). In a previously conducted study by Amare et al. it was reported that 52% women were aware of pregnancy related food taboos (Amare et al., 2022). Similarly, another study conducted in Ethiopia revealed that nearly 28% pregnant women know about food taboos and avoid different food items during pregnancy (Abere & Azene, 2023).

Findings of the study also showed that nearly 49% (n=68) pregnant women were not aware of pica practices while 45% (n= 63) reported the intake of non-food items during pregnancy. A previous study conducted by Konlan et al. reported that 82% pregnant women were aware of pica in their study population while 6% considered it as harmless for health (Konlan et al., 2020). The high percentage of pregnant women regarding unawareness of pica in current study is probably lack of authentic dietary information among them.

In current study, it was noted that women with poor dietary habits were slightly more in number as compared to those with good dietary practices. Out of total, 52% pregnant women reported poor dietary habits. A previous study also confirmed the poor dietary

practices among pregnant women (Galali et al., 2021). This could be due to various cultural, social and economic strains.

This study also found some factors that significantly influenced the dietary patterns of pregnant women. Results revealed a significant association between dietary patterns and residence of the respondents (p -value=0.006). Women who were living in rural areas reported poor dietary practices as compared of those living in urban areas. These findings are consistent with the literature previously available. A study that was conducted in Ghana in 2020 found that nutrient deficiency was more prevalent among rural residents than urban (p -value=0.022) (Jessica et al., 2020). It could be explained by the fact that in urban areas, diverse sources of dietary information are readily available. Moreover, education level and income level of urban inhabitants is relatively better than those living in rural areas. More importantly, women are more empowered in urban areas that also improve their dietary intake.

In the current study, it was also observed that education of women was significantly associated with dietary practices (p -value=0.015). Illiterate women have poor dietary intake and dietary practices had shown an improving trend with increasing education level. These findings can be supported by the previous literature. A study conducted in 2016 in Bangladesh found that diet diversity score was significantly high among pregnant women who have higher educational achievement (p -value=0.009) (Shamim et al., 2016). Similarly, another study also confirmed that women with higher education level exhibit good dietary practices (p <0.0001) (Akhtar, Jamil & Tariq, 2020). This is due to the reason that educated women are become more empowered about their choices

and their nutritional knowledge is better than uneducated women or those with less education.

It was also observed that education of husband was also significantly associated with dietary practices of pregnant women (p -value=0.0001). Pregnant women whose husbands were illiterate were more likely to have poor dietary practices as compared to those whose husbands were educated and the trend improves with increasing education of the husband. A previous study conducted in Karachi also confirmed that education of husband has significant association with dietary intake of women ($p < 0.0001$) (Akhtar, Jamil & Tariq, 2020). It is because of the fact that an educated husband is well aware of the nutritional needs of his wife and good education also ensures good income sources.

In the present study it was also found that monthly income was statistically significant with the dietary practices of pregnant women (p -value=0.0001). Women who had monthly household income more than 25,000 were practicing poor dietary practices while women having 100,000 monthly income were practicing good dietary practices. Results of the previous studies also support these findings. A study conducted in Northwest Ethiopia in 2021 showed that dietary practices were significantly associated with household income and improve with improving income level (Belay et al., 2021). Moreover, study conducted in Karachi, Pakistan also confirmed the association between income level and dietary intake ($p < 0.0001$) (Akhtar, Jamil & Tariq, 2020). It can be explained by the fact that with good monthly income, pregnant women can manage healthy dietary options including fruits, vitamins, dairy products with their daily food intake.

It was revealed by the results of present study that source of nutritional information was directly associated with dietary practices of pregnant women (p -value=0.013). Those

participants who did not have any source of nutritional information, were practicing poor dietary patterns while who were gaining nutritional information from multiple sources, were practicing good dietary patterns. Multiple sources of dietary information were mentioned by the pregnant women including social media, books, mother-in-law and neighbours. Previous studies also confirm these nutritional sources among pregnant women. Study conducted in eastern Ethiopia also found that pregnant ladies can get required nutritional knowledge from neighbours, family members including mother-in-law, social media platforms and healthcare personals. This in turn significantly affects the nutritional status of the women (Amare et al., 2022). This can be explained by the fact that without nutritional knowledge, it is not possible to adopt good dietary practices and acquiring knowledge through authentic means can lead to positive impact on dietary intake and vice versa.

In the present study it was also noted that women who used to avoid certain food items during pregnancy were exhibiting relatively poor dietary practices as compared to those who were not avoiding any food based on taboos (p value= 0.038). Moreover, type of foods that was avoided during pregnancy was also significantly associated with dietary practices (p -value=0.007). Commonly avoided food items were protein sources, fruits, ice, and vegetables. Some women also reported to avoid wheat, sweets and fats and oils during pregnancy based on food taboos. These findings are similar with the previous study. A study carried out in 2020 in Tigray showed that approximately 12% of pregnant women choose to avoid certain foods during their current pregnancy for various reasons. These foods included yogurt, banana, legumes, honey, and "kollo" (roasted barley and wheat). Findings of the study confirmed the association of food taboos and dietary

practices ($p < 0.001$) (Galali et al., 2021). Similarly, another study conducted in eastern Ethiopia also confirmed the association between dietary intake and food taboos among pregnant women. The commonly tabooed food items mentioned in the study were fruits, protein sources, coffee, oils, vegetables, sugarcane, salt and yougart (Amare et al., 2022). This could be due to the reason that cultural beliefs can effect the dietary practices of pregnant women which in turn affects their health. Moreover, fear of miscarriage and fetal abnormalities also lead to avoid certain foods.

No significant association was found among pica practices and dietary patterns of pregnant women. However, it was noted that women who were taking non-food items (pica) such as ice, mud, achar etc. during pregnancy were practicing poor dietary pattern as compared to those who were not taking these non-food items. But these findings were not statistically significant ($p\text{-value}=0.935$),

5.1. Strengths:

- This study highlighted the association between dietary practices of pregnant women and food taboos and pica practices. Little is known in Pakistan regarding the relation of food taboos and pica with dietary patterns so the findings of the current study will add value to the existing literature.
- A validated tool food frequency questionnaire (FFQ) was used for assessment of food practices among pregnant women.
- The study included a diverse sample including respondents from a variety of educational background, place of residence and income level.

5.2. Limitations:

- It was a cross-sectional study, which limits the establishment of causal relationship.
- Recall bias may be another limitation which can affect the results of the study.
- The study was conducted only on those women visiting public hospitals so further investigation is needed before generalization of the results
- Time constraint was also considered as a limitation in this study.

CHAPTER VI: CONCLUSION

Dietary practices of pregnant women were affected by various factors including social, economic and cultural. Food taboos can significantly affect the dietary intake among pregnant women. It was found in the study that women practicing poor dietary practices were slightly more in number as compared to those who were practicing good dietary patterns. Consumption of proteins, dairy products, fruits and vegetables by pregnant women was good as compared to cereals, dry fruits, oils and fats and drinks. Nearly half of the study population was aware of food taboos and pica. Residence, income level, education of women, and education of husband were significantly associated with dietary practices. Moreover, food taboos were also found to be significantly associated with dietary practices while pica has no association with dietary intake.

CHAPTER VII: RECOMMENDATIONS

Based on the current findings, following recommendations are put forward.

7.1. Policy level:

- A comprehensive nutrition policy should be developed specifically targeting pregnant women that should be implemented properly in order to improve the nutritional status of pregnant women.
- Media should be involved in order to spread accurate nutritional information while curbing unauthentic informational sources on social media.

7.2. Healthcare level:

- Nutritionists should be assigned at each health facility to counsel the pregnant women.
- Effective interventions that target health behaviors are also needed to improve a woman's nutritional status.
- Nutritional information should also be provided to the attendant of the women.

7.3. Healthcare professional level:

- Women should be encouraged by their doctor or healthcare provider to take healthy food items.
- Knowledge about pica should be dispersed and its health hazards should be communicated with pregnant women.
- Lady health workers can play an important role in effectively counselling the women and her family members regarding healthy diet.

7.4. Individual level:

- Pregnant women should discuss their dietary habits with their healthcare provider in order to find out the correct dietary options.
- Excessive dependence on the information acquired from social media sources or other unauthentic sources should be discouraged.

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Appendix A – Questionnaire

Association of Food Taboos and Pica with Dietary Patterns among Pregnant Women in Public Hospitals in Rawalpindi

Please read all questions carefully and tick the most appropriate answer. You are requested to fill all information accurately so that appropriate results can be derived.

All information will be kept confidential.

(Section-A)

Socio-demographics

1. Name of participant/CNIC(optional).....
2. Age
 - a)20-30
 - b)31-40
3. Trimester
 - a. First
 - b. Second
 - c. Third
4. Place of residence
 - a) Urban
 - b) Rural
5. Educational level?
 - a) illiterate
 - b) primary to secondary
 - c) FA/FSc
 - d) Bachelor
 - e) Masters and above
6. Current occupational status?
 - a) Student
 - b) Government employee
 - c) private employee
 - d) House wife
 - e) Other(specify)___

- 7.Total family members
- 8.No. of living children.....
- 9.Husband's education?
 - a) illiterate
 - b) primary to secondary education
 - c) FA/FSc
 - d) Bachelor
 - e) Masters
- 10. Monthly household income[PKR]a) >25000
 - b) >50000
 - c)75000
 - d)100000
 - e) >100000

Section B: Antenatal information

1.Do you have any pregnancy related issues?

.....

2.Whom do you prefer to consult?

- a) Doctor
- b) Consultant
- c) Homeopathic
- d) Hakeem
- e) Spiritual healer
- f) Any other(specify).....

3. Family history(disease)?

- a) Diabetes
- b) Hypertension
- c) Any other (specify).....

3. Are you doing any physical activity?

- a) Yes
- b) No

If yes then,

What is its frequency and how long?

.....
.....

4. Did you receive antenatal care during last pregnancy?

- a) Yes
- b) No

If No, specify the reason.....

If Yes, then

5. Tell the number of visits and detail about services you receive?

.....
.....

6. Were any complications related to pregnancy detected by the doctor?

- a) Yes
 - b) No
- If Yes(specify).....

What specific supplement are you using? (in detail)

.....

Section D: Knowledge regarding food taboos

1. Have you heard about food taboos?

- a) Yes
- b) No

If yes, how do you define food taboos (food related health beliefs)?

.....

2. What was the source of nutrition information?

.....

3. Is there any food you are avoiding (food taboo) during pregnancy?

- a) Yes
- b) No

If No, skip question no 4 and 5

4. What food you are avoiding during pregnancy?

.....

.

5. What are the reasons?

.....

Section E: Knowledge regarding PICA

1. Have you heard about PICA?

- a) Yes
- b) No

If yes, what do you understand about PICA (eating non-food items), please explain in your ownwords?

.....

2. Have you ever experienced to nonfood items(PICA) during pregnancy?

- a) Yes
- b) No

If no, then skip question 3

3. What are those (nonfood items)?

.....

.Specify the reasons in detail?

.....

(Section F)
Outcome Variable

Food item	Frequency of Consumption					
	Once a week	Twice a week	3Times a week	4Times a week	5-6 Times a week	Daily
Cereal						
Wheat						
Rice						
Oats						
Maize						
Meat						

Beef						
Mutton						
Chicken						
Fish						
Liver						
Other Protein						
Sources						
Pulses						
Beans						
Fats and oils						
Ghee						
Desi Ghee						
Oils						
Dairy						
Milk						
Milk products						
(Yogurt, cheese)						
Fruits						
Yellow , Greens						
Orange						
Other fruits						

Dry fruits						
Mixed fruits						
Almonds						
Raisins						
Peanut						
Vegetables						
GLV						
Other vegetables						
Drinks						
Water						
Tea						
Kehwa						
Juices						
Carbonated drinks						

Thank you for your participation!

Appendix B – Consent Form

I am Muneeba Tahir, student of MSPH- Final Semester, Alshifa School of Public Health, Alshifa Eye Hospital, Rawalpindi. I am doing research on “Association of Food Taboos and Pica with Dietary Patterns among Pregnant Women in Public Hospitals, Rawalpindi”.

PURPOSE OF THE RESEARCH

The purpose of this study is to find out the association of food taboos and pica with dietary patterns among pregnant women in public hospitals, Rawalpindi.

PARTICIPATION

I do not anticipate that taking this study will contain any risk or inconvenience to you. Your participation is strictly voluntary and you may withdraw your participation at any time without penalty. I request you to answer the questions as honestly as possible. It will take no longer than 15 minutes to complete a questionnaire. All information collected will be used only for research purpose and will be kept highly confidential. Your identity and your responses will not be identifiable; all data will be stored anonymously. As this is solely a student project no incentive will be provided. Once study is completed, I would be happy to share the results with you if you desire.

Thank you for agreeing to participate in this study. Your feedback is important.

Consent

I have read and understand the information sheet and agree to take part in the study.

Signature _____ **Date** _____

Appendix C – IRB Letter



**AL-SHIFA SCHOOL OF PUBLIC HEALTH
PAKISTAN INSTITUTE OF OPHTHALMOLOGY
AL-SHIFA TRUST, RAWALPINDI**

MSPH-IRB/15-07
27th Mar, 2023

TO WHOM IT MAY CONCERN

This is to certify that **Muneeba Tahir** D/O **Abdul Wahid Tahir** is a student of Master of Science in Public Health (MSPH) final semester at Al-Shifa School of Public Health, PIO, Al-Shifa Trust Rawalpindi. He/she has to conduct a research project as part of curriculum & compulsory requirement for the award of degree by the Quaid-i-Azam University, Islamabad. His/her research topic, which has already been approved by the Institutional Review Board (IRB), is “**Association of food taboos & PICA with dietary patterns among pregnant women attending antenatal care at public hospital Rawalpindi**”.

Please provide his/her necessary help and support in completion of the research project. Thank you.

Sincerely,

Dr. Ayesha Babar Kawish
Head
Al-Shifa School of Public Health, PIO
Al-Shifa Trust, Rawalpindi

Appendix D – Budget

Budget item	Transport	Stationery and internet	Printing	Publishing
Pilot testing	500 Rs/-	6000 Rs/-	3000 Rs/-	-
Data collection	8,000 Rs/-	8,000 Rs/-	-	-
Thesis write-up	1,000 Rs/-	9,000 Rs/-	6,000 Rs/-	20,000 Rs/-
Total expenditure	10,500 Rs/-	23,000 Rs/-	9,000 Rs/-	20,000 Rs/-
Grand total	61,500 Rs/-			

Appendix E – Gantt Chart

Activities	March 2023	April 2023	May 2023	June 2023	July 2023	August 2023	September 2023
Literature search							
Synopsis writing and IRB approval							
Pilot testing							
Data collection and entry							
Data analysis							
Write-up							
Thesis submission							