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ULTRA-PROCESSED FOOD CONSUMPTION DURING PREGNANCY AND ITS ASSOCIATION WITH SOCIODEMOGRAPHIC AND HEALTH FACTORS

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ABSTRACT

The global dietary landscape has undergone significant transformation in recent decades, largely driven by increased availability, marketing and affordability of ultra-processed foods (UPFs). These food products often rich in calories, sugars, sodium and unhealthy fats are displacing traditional, nutrient-dense diets, particularly in urban centers of low- and middle-income countries. In Pakistan, where maternal malnutrition, anemia and gestational health issues are already major concerns, the rise of UPF consumption during pregnancy poses an urgent threat to public health. This study investigates the association between UPF consumption during pregnancy and various sociodemographic and health factors among pregnant women at Jinnah Hospital in Lahore. Using a cross-sectional design and structured interviews, data were collected from 160 women aged 18 to 45 years.

The findings reveal that UPF consumption is alarmingly prevalent, with over 90% of participants reporting frequent intake of soft drinks, bakery products and other processed items. Notably, 95.63% of the respondents were anemic during pregnancy, a condition strongly associated with high UPF intake and low consumption of iron-rich foods (Silva et al., 2022; Biete et al., 2023). A significant percentage of participants (59.38%) were overweight and 16.25% were obese, with gestational weight gain exceeding recommended guidelines (Zupo et al., 2023). Sociodemographic analysis indicated that lower education levels, unemployment and residence in urban slums were associated with higher UPF intake. These dietary patterns were also linked with adverse health outcomes, including gestational diabetes and hypertension (Nansel et al., 2022). The study highlights the urgent need for public health interventions, including nutrition education, policy reforms and improved access to affordable whole foods to improve maternal and fetal health outcomes in Pakistan.

Keywords: *Ultra-processed foods, maternal health, anemia, gestational weight gain, pregnancy nutrition, Lahore, Pakistan*

Introduction

Over the past few decades, global food consumption patterns have shifted dramatically due to industrialization, urbanization and globalization. One of the most concerning trends is the increasing consumption of ultra-processed foods (UPFs). These products, which fall under Group 4 of the NOVA food classification system, are formulations made primarily from industrial substances and contain little or no whole food. UPFs include items such as soft drinks, packaged snacks, bakery products, instant noodles, sweetened breakfast cereals and ready-to-eat meals (Monteiro et al., 2019). These foods are characterized by high energy density, excessive levels of sugar, sodium and saturated fats, artificial additives and low fiber and micronutrient content. Their widespread appeal is driven by convenience, affordability, shelf stability and aggressive marketing strategies—particularly in urban environments and among socioeconomically disadvantaged populations.

Pregnancy is a critical physiological and developmental phase in which maternal nutrition plays a pivotal role in determining both maternal and neonatal outcomes. Inadequate or imbalanced nutrition during this period can lead to serious health risks including maternal anemia, gestational diabetes mellitus, pre-eclampsia, low birth weight and impaired fetal development (Kazma et al., 2020; WHO, 2016). In Pakistan, the prevalence of maternal anemia and gestational complications is already high due to widespread nutritional deficiencies. The growing trend of UPF consumption poses an added threat to maternal and child health by contributing to excess calorie intake without providing essential nutrients such as iron, calcium and folate.

Despite increasing global awareness of the health consequences associated with UPFs, there is limited empirical data available from Pakistan, especially from public sector hospitals serving low-income and middle-income populations. Previous research conducted in private healthcare settings has identified some patterns of unhealthy dietary behavior among pregnant women (Fatima et al., 2022), but studies in public institutions remain sparse. This study seeks to address this gap by examining the extent of UPF consumption among pregnant women at Jinnah Hospital, Lahore and assessing its associations with key sociodemographic indicators and adverse health outcomes including anemia, obesity and gestational disorders.

2. Literature Review

A growing body of international literature has highlighted the detrimental health impacts of UPF consumption during pregnancy. Rauber et al. (2018) found that high UPF intake is associated with increased risk of obesity, insulin resistance and poor metabolic profiles. These metabolic disruptions during pregnancy elevate the risk of complications such as pre-eclampsia, preterm delivery and stillbirth (Rohatgi et al., 2017; Nansel et al., 2022). Research indicates that UPFs contribute significantly to excessive gestational weight gain and poor fetal outcomes by displacing whole, nutrient-dense foods in the maternal diet (Gomes et al., 2021).

Silva et al. (2022) reported that low-risk pregnant women who consumed more UPFs had significantly reduced intake of iron, folate and other micronutrients essential for fetal development and maternal blood volume expansion. Similarly, Biete et al. (2023)

observed that high UPF consumption independently correlates with lower intake of iron and folate and is associated with higher rates of anemia. These findings are supported by Amorim et al. (2022), who noted that increased dietary share of UPFs was inversely related to vitamin E biomarkers among lactating women.

In the Latin American context, Cediel et al. (2021) and de Barros Gomes et al. (2021) documented how the rising trend in UPF consumption has led to a simultaneous increase in gestational weight gain and obesity-related complications. Gomes et al. (2021) reported that each 1% increase in caloric intake from UPFs was associated with a higher weekly gestational weight gain. Cummings et al. (2022) and Lauria et al. (2021) extended these findings to European populations, confirming that UPFs significantly lower overall diet quality, leading to poor pregnancy outcomes and long-term health risks for both mother and child.

The link between UPF consumption and hypertensive disorders has also been well-documented. Fagherazzi et al. (2021) demonstrated that women consuming high amounts of UPFs had higher blood pressure and poorer glycemic control, especially those with pre-existing diabetes. Wang et al. (2022) highlighted the intergenerational consequences, showing that maternal UPF consumption increased the risk of childhood overweight and obesity, while Puig-Vallverdu et al. (2022) associated UPF consumption with impaired child neuropsychological development.

In South Asia, data remains limited, but some studies reflect similar concerns. Fatima et al. (2022) found that Pakistani women in tertiary care settings frequently consumed soft drinks and processed snacks during pregnancy. These patterns were associated with maternal weight gain and poor micronutrient profiles. However, such studies are rare, particularly in public sector hospitals where most low-income and vulnerable populations seek care. Therefore, this study builds on global evidence and adds crucial local insight into how UPF consumption during pregnancy is influencing maternal health outcomes in Lahore, Pakistan.

3. Research Design and Methodology

This study utilized a quantitative, cross-sectional research design to explore the association between ultra-processed food (UPF) consumption and maternal health indicators. Data were collected through structured face-to-face interviews with 160 pregnant women aged 18 to 45 years attending the Gynecology and Obstetrics Department of Jinnah Hospital, Lahore. A purposive sampling technique was used to select participants who were willing and able to provide informed consent.

A structured questionnaire, developed in both English and Urdu, was used to collect information on dietary intake, health status and sociodemographic factors. Key variables measured included frequency of UPF consumption (e.g., soft drinks, bakery items), number of meals per day, intake of fruits and vegetables, anemia status, BMI and diagnoses of gestational diabetes or hypertension. Anemia status was confirmed using self-reported hemoglobin levels and antenatal records, while BMI was calculated from self-reported pre-pregnancy and current weights.

Data analysis was conducted using SPSS Version 26. Descriptive statistics were used to summarize demographic characteristics and consumption patterns. Chi-square tests

were employed to examine associations between categorical variables such as education level, employment status, area of residence and UPF consumption. A p-value < .05 was considered statistically significant. Ethical approval was obtained from the University of Lahore's Ethics Review Committee and all participants provided verbal informed consent.

4. Results and Discussion

The findings of this study reveal an alarming trend of high ultra-processed food (UPF) consumption among pregnant women in Lahore. A significant majority (69.38%) of participants reported eating three meals per day; however, these meals were often dominated by unhealthy food options. Specifically, 43.75% of women consumed carbonated or soft drinks daily and 53.75% consumed bakery products 3–6 times per week.

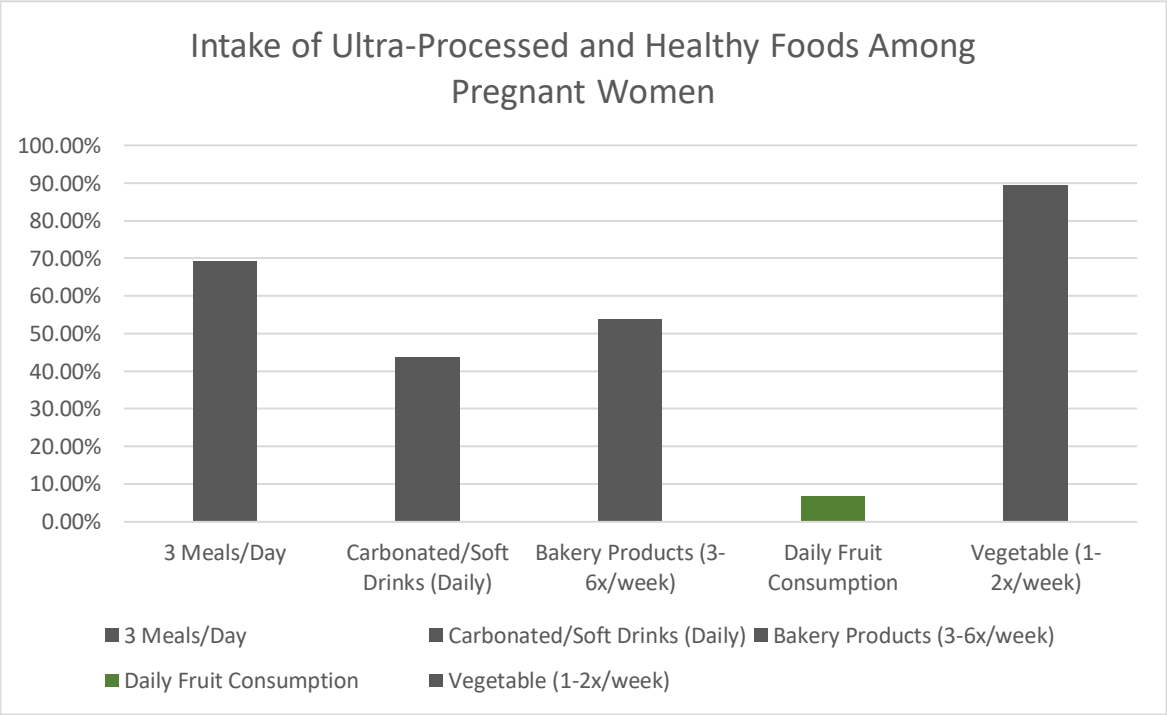

Fig 1. Ultra-Processed and Healthy Foods

Only 6.88% of respondents reported daily fruit consumption and 89.38% consumed vegetables just once or twice a week.

Anemia emerged as a major concern, with 95.63% of the participants reporting anemia during pregnancy—up from 57.50% before pregnancy.

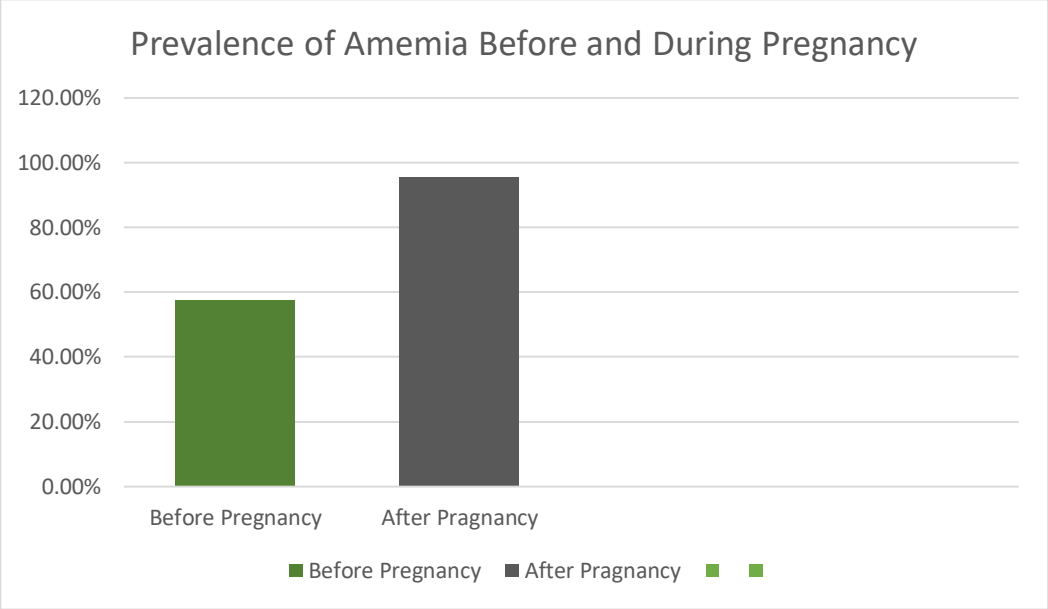

Fig 2. Anemia before and after pregnancy

This is substantially higher than national and global averages and aligns with research by Silva et al. (2022) and Biete et al. (2023), who found that increased UPF consumption is linked with reduced intake of iron and folate. The low intake of iron-rich foods and reliance on UPFs such as soft drinks and fried items likely contributed to these rates.

Another critical finding was the participants' weight status: 59.38% were overweight and 16.25% were obese.

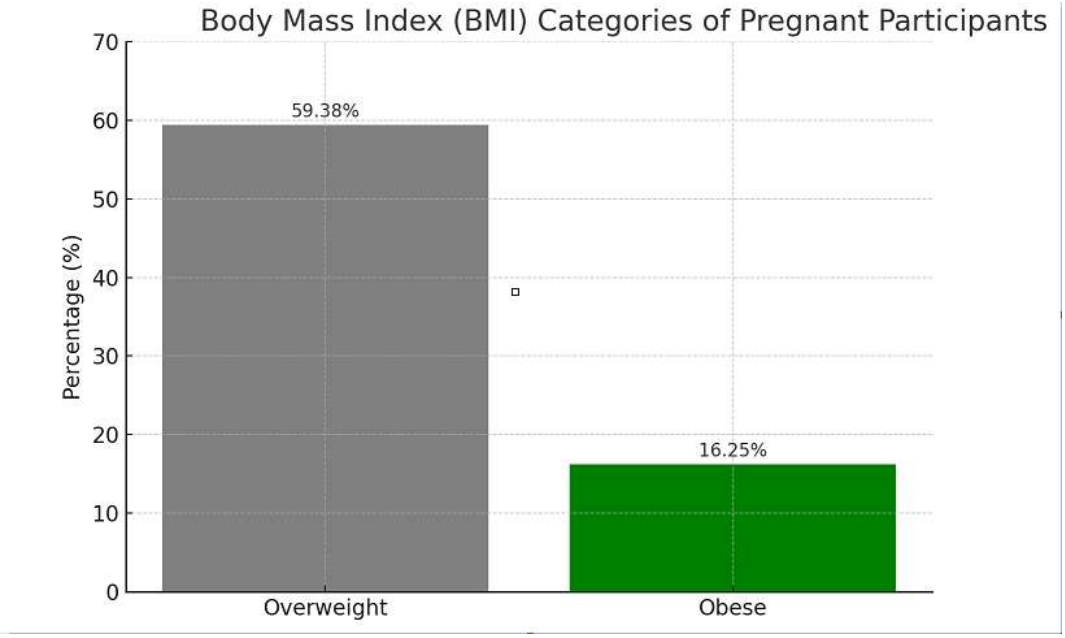

Fig 3. BMI of respondents

High UPF consumption was significantly correlated with gestational weight gain, a result consistent with Zupo et al. (2023) and Gomes et al. (2021), who noted a direct relationship between UPF intake and weekly gestational weight increase.

In terms of comorbidities, gestational diabetes and hypertension were prevalent among participants consuming UPFs regularly.

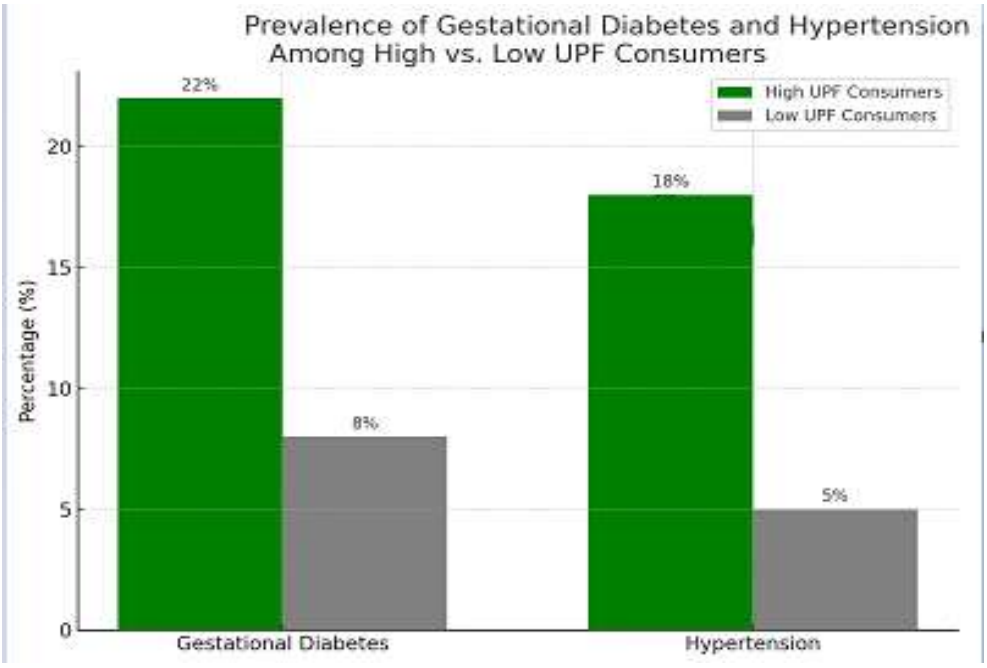

Fig 4. Prevalence of Gestational Diabetes and Hypertension

The data also showed that women with higher intake of ultra-processed foods were more likely to report gestational complications such as diabetes and hypertension. Research by Nansel et al. (2022) and Fagherazzi et al. (2021) supports this, suggesting that high UPF consumption increases risk for such conditions due to poor glycemic control and elevated sodium intake.

Sociodemographic analysis revealed that women with lower educational attainment and those living in urban slum areas were more likely to consume UPFs. This may be due to factors like affordability, accessibility, lack of nutritional awareness and targeted marketing of processed foods to low-income populations. These findings are consistent with Fatima et al. (2022) and Adams & White (2015), who found that low-income and less-educated populations consume more processed foods.

In summary, the excessive consumption of UPFs among pregnant women in Lahore is associated with poor nutritional outcomes, excessive gestational weight gain, anemia and comorbidities such as hypertension and diabetes. These results mirror global patterns and reinforce the urgent need for targeted public health interventions, particularly nutrition education and improved access to healthy food options in urban and low-income areas.

5. Conclusion

This study concludes that ultra-processed food (UPF) consumption is alarmingly high among pregnant women in Lahore and is significantly associated with adverse maternal health outcomes. Despite 69.38% of the respondents consuming three meals daily, the quality of those meals was compromised by a heavy reliance on UPFs such as soft drinks, bakery products, fried snacks and other convenience foods. Specifically, 43.75% of women reported consuming carbonated or soft drinks daily, while 53.75% consumed bakery items 3–6 times per week. Additionally, fruit and vegetable intake was critically low, with only 6.88% consuming fruits daily and 89.38% eating vegetables just once or twice weekly.

These dietary behaviors reflect not only poor nutritional choices but also a broader lack of awareness and food literacy regarding the health implications of high-UPF diets. A significant proportion of women (59.38%) were overweight and 16.25% were obese, indicating a widespread trend of gestational weight gain beyond recommended levels. Furthermore, the prevalence of anemia rose from 57.50% before pregnancy to 95.63% during pregnancy, reinforcing the association between UPF consumption and micronutrient deficiencies, particularly iron and folate.

The study also highlights the influence of sociodemographic factors such as education, employment status and residential area on dietary patterns. Women with lower educational attainment and those residing in urban slums were more likely to exhibit high UPF consumption and poor diet diversity. These findings are consistent with global literature that links UPF intake with reduced diet quality and increased risks of gestational complications like anemia, hypertension and diabetes.

In light of these findings, urgent public health interventions are needed to promote healthier dietary practices during pregnancy. Targeted nutrition education campaigns, antenatal dietary counseling and policies to improve the affordability and accessibility of whole foods are critical steps toward reducing UPF dependency. Strengthening food literacy among women of reproductive age and integrating culturally appropriate nutrition programs into maternal healthcare services can significantly improve both maternal and fetal health outcomes in Pakistan.

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