



# Dietary Modifications during Pregnancy through Decades

## *Mudanças na dieta durante a gravidez ao longo de décadas*

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### Abstract

The present study aimed to explore the modifications in diet during pregnancy over three generations in the Garhwal region of Uttarakhand. For the selection of the sample, the respondents were categorized in 3 age groups: 20 to 34 years; 35 to 55 years; and  $\geq 56$  years. Structured diet recall interviews were scheduled for the collection of data. The subjects were asked about their dietary habits during pregnancy and food items that they included and excluded during that period. Most food items mentioned included were milk, fruits, and nutritional supplements. The exclusion of fruits like banana and papaya, of rice, and of leafy green vegetables (LGVs) was mainly observed. Among the age group of  $\geq 56$  years, the respondents with no changes in their diet during pregnancy were more from rural areas (92%) than from urban areas (62.26%), while in the age group of 20 to 34 years, 25% of the respondents with no change in their diet lived in rural areas, and 8.06% lived in urban areas. There has been an increase in the population with dietary modifications through generations; however, the overall changes are still not satisfying. The present study shows that there is a high need for nutritional education during pregnancy, especially in rural areas.

### Keywords

- ▶ pregnancy
- ▶ dietary modifications
- ▶ foods included
- ▶ foods excluded
- ▶ dietary habits
- ▶ diet recall

### Resumo

Este estudo teve por objetivo explorar as mudanças na dieta durante a gravidez ao longo de três gerações na região de Garhwal, em Uttarakhand, Índia. Para a seleção da amostra, as respondentes foram divididas em 3 faixas etárias: de 20 a 34 anos; de 35 a 55 anos; e 56 anos ou mais. Entrevistas estruturadas de rememoração da dieta foram agendadas para a coleta de dados. Perguntou-se às participantes sobre seus hábitos alimentares durante a gravidez, e os alimentos que elas incluíam e excluía da dieta durante esse período. A maioria dos alimentos mencionados incluía leite, frutas, e suplementos alimentares. As exclusões mais observadas foram de frutas, como banana e mamão papaia, arroz e verduras. Entre a faixa etária de 56 anos ou mais, as

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**Palavras-chave**

- ▶ gravidez
- ▶ mudanças na dieta
- ▶ alimentos incluídos
- ▶ alimentos excluídos
- ▶ hábitos alimentares
- ▶ lembrança da dieta

respondentes sem mudanças na dieta durante a gravidez provinham mais de zonas rurais (92%) do que de urbanas (62,26%), ao passo que, na faixa etária de 20 a 34 anos, 25% das respondentes sem mudanças na dieta moravam em zonas rurais, e 8,06% moravam em zonas urbanas. Ao longo das gerações, houve um aumento na população que faz mudanças na dieta; no entanto, em geral, essas mudanças ainda não são satisfatórias. Este estudo mostra que há grande necessidade de educação nutricional, principalmente em zonas rurais.

**Introduction**

Pregnancy is a special period of increased nutritional needs, during which conscious nutritional support is required. Insufficient and imbalanced nutrition in this period of life causes serious conditions that affect both the fetus and the mother.<sup>1</sup> According to the World Health Organization (WHO), a healthy dietary intake contains adequate energy, protein, vitamins and minerals, obtained through the consumption of a variety of foods, including green and orange vegetables, meat, fish, beans, nuts, pasteurized dairy products, and fruit, and is important during pregnancy for the health of the mother and the fetus.<sup>2</sup>

High maternal prenatal adherence to a healthy dietary pattern is also negatively related to symptoms of anxiety and depression in children.<sup>3</sup> Improving the dietary quality of women is essential to reduce all forms of malnutrition. Maternal dietary quality and education, more so than agro-ecological characteristics, are the factors that explain the diet of children. A study by Bonis-Profumo et al.<sup>4</sup> highlighted that addressing the dietary quality of children in Timor-Leste benefitted from improving women's diets through better access to nutritious foods and secondary education. The dietary intake of mothers is a strong predictor of children's dietary quality achievements. The mean food group intake of women and children aged 24 to 59 months were almost identical, suggesting that when foods are consumed by mothers, these are also given to older children.<sup>4</sup> A poor dietary intake is associated with adverse health outcomes for the mother (such as increased risk of preeclampsia and gestational diabetes, and excessive gestational weight gain), adverse birth outcomes (such as premature birth and low birth weight), and adverse health outcomes in childhood and adult life (such as increased risk of developing chronic diseases like diabetes or coronary heart disease).<sup>5-7</sup>

Many dietary factors have been associated with newborns small for gestational age, such as quality and unhealthy patterns,<sup>8-10</sup> high sugar consumption during pregnancy,<sup>11</sup> low consumption of seafood,<sup>12,13</sup> low iodine intake,<sup>14</sup> and caffeine consumption.<sup>15,16</sup> A review<sup>17</sup> of the impact of maternal diet during pregnancy on infant birth weight found that consumption of whole foods, such as fruit, vegetables, low-fat dairy, and lean meats throughout pregnancy may be beneficial for appropriate birth weight in relation to gestational age. The availability and supply of nutrients to the developing fetus depends on maternal nutritional status;

and the nutritional status of mother depends on her nutrient stores, dietary intake and obligatory requirements.<sup>18</sup>

The nutritional status of women just before conception and/or during early pregnancy (< 12 weeks of gestation), when they are typically unaware of their pregnancy status, may influence the outcomes by affecting critical developmental processes that begin early in pregnancy, as well as the availability of nutrients. In rural areas, the food consumption of the pregnant woman, like that of the rest of the family, is mainly determined by seasonal variations and the household's agricultural production.<sup>19</sup>

Misconceptions about diet affect pregnancy, a vital period in the human lifecycle. All people, whether from rural or urban areas, have their own beliefs and practices during different stages of life. Patil et al.<sup>20</sup> observed in their study that pregnant and lactating women in various parts of the world are forced to abstain from nutritious foods as a part of their traditional food habits.<sup>20</sup> Most pregnant women, as well as their husbands and the elderly, disfavor weight gain during pregnancy due to a fear that having big babies can complicate delivery, which can be life-threatening for both the mother and the newborn.<sup>19</sup>

The women from Uttarakhand Himalaya perform agricultural practices as their primary activity, and they contribute to a major share of the family economy in terms of grains, oilseeds, vegetables, fruits, milk, wool, fuel, fodder etc. In this part of the Himalaya, excess workloads coupled with an inadequate intake of nutritious food have led to malnutrition among women. In fact, undercooking, eating cold or leftover food, or even skipping meals have been reported not only in the region but also in several developing countries as fuel-saving strategies. This practice over a longer period can result in lower nutritional levels.<sup>21</sup>

Eysteinsdottir et al.<sup>22</sup> tested the relative validity of a food frequency questionnaire (FFQ) asking older persons about their midlife diet: "Retrospective food intake of 56–72-year-old subjects was estimated using a food frequency questionnaire designed for the AGES-Reykjavik Study (AGES-FFQ), an epidemiological study of older individuals. Results were compared with detailed dietary data gathered from the same individuals 18–19 years previously, i.e., in midlife, as part of a national cohort. (...) The AGES-FFQ on midlife diet was found suitable to rank individuals by their intake of several important food groups".<sup>22</sup>

Several studies<sup>23,24</sup> note the general validity and reproducibility of autobiographical dietary recall 40 to 50 years

later. Chavarro et al.<sup>23</sup> studied the validity of maternal dietary recall using an FFQ after 43 years for children aged 3 to 5 years. They evaluated whether mothers of middle-aged persons could validly recall their children's preschool diets, on average, 43 years later. The validity of the recall of food intake was inadequate, although the recall of the consumption of certain foods (eggs, orange juice, butter, French fries, other fried potatoes, corn, peanut butter, pizza, fish/seafood, and breakfast cereals) and food groups (high-carbohydrate foods, fruits and fruit juices, vegetables, and condiments) was acceptable.<sup>23</sup> Smith et al.<sup>24</sup> examined the reliability of dietary recall, and concluded that when dietary-recall tasks exceed several hours, participants may be basing their reports on generic memory. Schwerin et al.<sup>25</sup> stated that, in contrast to previous data on dietary consumption, the methodology of the focus group may have improved recall through the discussions about lifestyles and practices. Our observations suggest that involving the members of the focus group in a discussion about village life during this period may have aided recall.

The present study aims to explore the modifications in food consumption during pregnancy in the Garhwal region of Uttarakhand over three generations.

### Materials and Methods

Being descriptive in nature, the present study was conducted in the Garhwal region of Uttarakhand using the field survey method. Three districts, Dehradun, Haridwar and Tehri Garhwal, were selected by purposive sampling methods.

For the selection of the sample, the state was divided into different strata, that is, districts, then, blocks, rural and urban areas, and then, families. Three districts were selected from the Garhwal region. From each district, two blocks, and from each block, two rural and two urban areas were randomly selected for the study. Nearly 20 families were taken from each area, totaling 482 families representing different socio-economic strata. The districts were selected for the study on the basis of food insecurity status. This food insecurity status of various districts in Uttarakhand has been determined by Chopra and Passi<sup>26</sup> in the "Food Insecurity Atlas of Rural India". According to the food insecurity status, Dehradun is moderately food secure, while Tehri Garhwal is moderately food insecure, and Haridwar is food insecure.

The present study was composed of female subjects aged ≥ 20 years who voluntarily agreed to participate. The selection of respondents was made using the snowball sampling method, also known as network, chain, or reputational sampling, in which, at first, the sample has few people, and then gradually increases in size as the first participants indicate other potential participants that they know. The respondents were divided into three age groups: 20 to 34 years, 35 to 55 years, and ≥ 56 years.

A structured interview schedule was prepared for the collection of data. The subjects were asked about the food items that they included and excluded from their diet during pregnancy. A pilot study was conducted on 30 non-sampled respondents, before the actual administration of the tools, to

make the necessary changes in the interview schedule. The questionnaire was pretested for accuracy, and the necessary corrections were made.

The structured interviews contained both close-ended and open-ended questions to find out about the women's previous and current food practices during pregnancy. Small focused group discussions were organized with participants to gather information about their beliefs, attitudes and opinions toward diet during pregnancy. The collected data were tabulated, analyzed statistically with the help of approved statistical techniques, and expressed as frequencies, percentages, and means (or averages).

### Results

#### Foods Included during Pregnancy

Among the subjects of the oldest age group (≥ 56 years), very few respondents included new food items during pregnancy; the respondents with no new additions to their diet were more from rural (92%) than urban (62.26%) areas. The most commonly-included foods were fruits (rural: 6%; urban: 18.87%), milk (rural: 8%; urban: 15.09%), dried fruits (rural: 2%; urban: 9.43%), and nutritional supplements (rural: 3%; Urban: 3.77%) (► Fig. 1).

Among the age group of 35 to 55 years, there were fewer respondents with no new inclusion of food in their diet compared with the older age group (rural: 50.70%; urban: 54.28%). The most commonly-included foods were nutritional supplements (rural: 29.58%; urban: 31.43%), fruits (rural: 28.17%; urban: 31.43%), milk (rural: 23.94%; urban: 24.29%), pulses (rural: 8.45%; urban: 5.71%), leafy green vegetables (LGVs; rural: 7.04%; urban: 1.43%), ghee (rural: 7.04%; urban: 2.86%), and dried fruits (rural: 2.82%; urban: 1.43%) (► Fig. 2).

In the age group between 20 and 34 years, the percentage of respondents with no new inclusion of food during pregnancy was much lower than that of the other age groups (rural: 25%; urban: 8.06%). The most commonly included foods were fruits

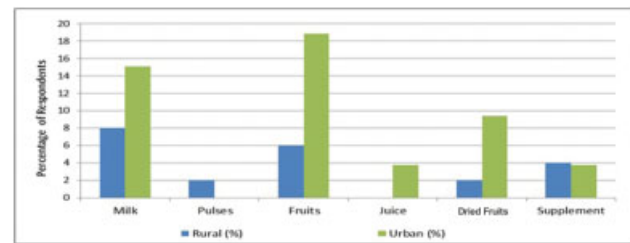


Fig. 1 Trends in foods included during pregnancy (≥ 56 years).

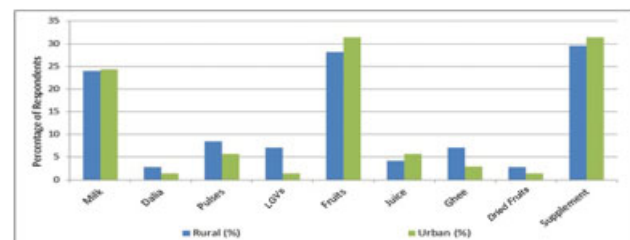
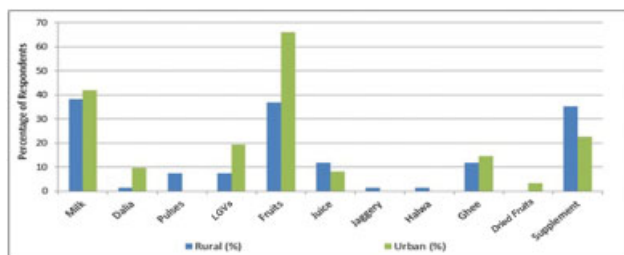


Fig. 2 Trends in foods included during pregnancy (35 to 55 years).



**Fig. 3** Trends in foods included during pregnancy (20 to 34 years).

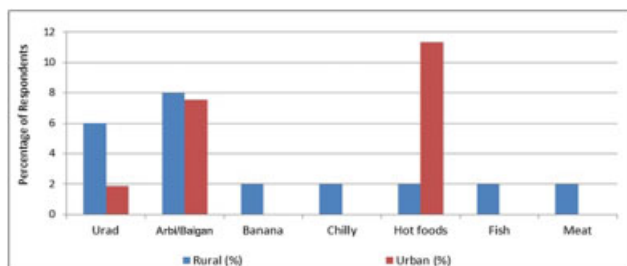
(rural: 36.76%; urban: 66.13%), milk (rural: 38.24%; urban: 41.94%), nutritional supplements (rural: 35.29%; urban: 36%), LGVs (rural: 7.35%; urban: 19.35%), ghee (rural: 11.76%; urban: 14.52%), juice (rural: 11.76%; urban: 8.06%), and dalia (rural: 1.47%; urban: 9.68%) (►Fig. 3).

**Foods Excluded during Pregnancy**

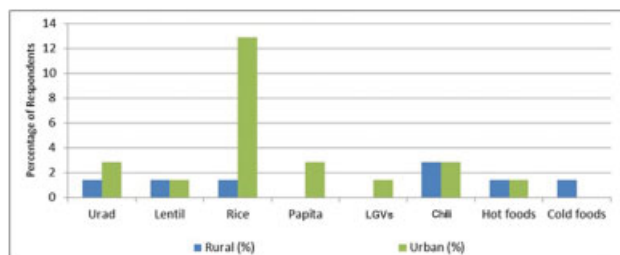
We observed a lower rate of exclusion or avoidance of particular food items from the diet during pregnancy among the respondents of all the age groups. As shown in ►Fig. 4, in the age group of ≥ 56 years, the rates of respondents not avoiding any food items during pregnancy were rural: 88%; and urban: 75.47%. The most commonly-avoided foods during pregnancy included arbi/baigan (rural: 8%; urban: 7.55%), black gram dal (rural: 6%; urban: 1.89%), foods considered to have a hot attribute (rural: 2%; urban: 11.32%), and banana among fruits (rural: 2%; urban: 0%).

Among the age group between 35 and 55 years, the percentage of respondents avoiding foods was lower as compared with the older age group (rural: 91.54%; urban: 80%). The foods mainly avoided were rice (rural: 1.41%; urban: 12.86%), hot foods (rural: 1.41%; urban: 1.43%), and papaya regarding fruits among the urban population (2.86%) (►Fig. 5).

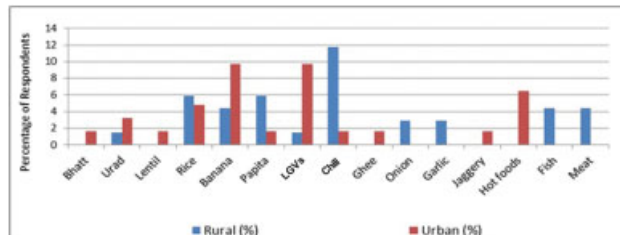
The highest rate of avoidance of food items was observed among the age group of 20 to 34 years (rural: 64.70%; Urban: 61.29%), and the list of food items avoided by this age group was longer (►Fig. 6). The most commonly-avoided foods were black gram dal/urad (rural: 1.47%; urban: 3.23%), rice (rural: 5.88%; urban: 4.84%), hot foods (rural: 0%; urban: 6.45%), LGVs (rural: 1.47%; urban: 9.68%), banana (rural: 4.41%; urban: 9.68%), and papaya (rural: 5.88%; Urban: 1.61%).



**Fig. 4** Trends in foods excluded during pregnancy (≥56 years).



**Fig. 5** Trends in foods excluded during pregnancy (35 to 55 years).



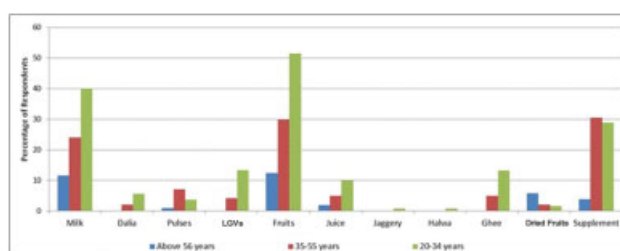
**Fig. 6** Trends in foods excluded during pregnancy (20 to 34 years).

**Comparing the Three Age Groups**

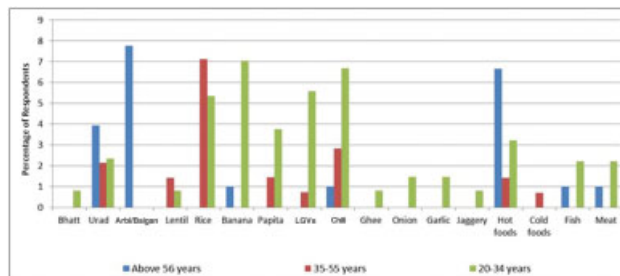
Taking both rural and urban areas together, the highest rate of changes made were observed among the youngest age group (20 to 34 years). Most of them included milk, fruits and nutritional supplements (►Fig. 7), and the exclusion of fruits like banana and papaya, along with rice, LGVs, and chili was mainly observed (►Fig. 8).

**Discussion**

Very few respondents changed their dietary habits during pregnancy; in the age group of ≥ 56 years, there were more rural subjects (92%) with no changes in the diet than urban



**Fig. 7** Foods included during pregnancy.



**Fig. 8** Foods excluded during pregnancy.

subjects (62.26%) (56 years and above). The percentage of respondents with no change in their diet during pregnancy in the age group of 20 to 34 years was much lower than that of other age groups (rural: 25%; urban: 8.06%). Avoidance of particular food items from the diet during pregnancy was less common. The highest rates of changes were observed among the youngest age group and in urban areas. Though the inclusion of healthy food is a good indicator, the avoidance of certain foods like fruits or LGVs indicates the prevalence of myths related to diet during pregnancy. The changes in dietary patterns during pregnancy could be attributed to the rate and level of urbanization.

During the interview schedule, we observed that group discussions improved the recall regarding traditional food practices. Involving more female members aided recall more efficiently as compared with the individual interview (especially in the older age group).

Dietary intake before and during pregnancy has significant health outcomes for both the mother and the fetus, including a healthy gestational weight gain. To ensure the effectiveness of interventions to improving dietary intake during pregnancy, it is important to understand what dietary changes pregnant women make without intervention. Professionals in antenatal care should engage in pregnant women's empowerment processes to make healthy modifications to their dietary intake, especially in rural areas. The dissemination of messages about the importance of a healthy diet and lifestyle before and during pregnancy, along with messages about family planning that address timing and spacing of pregnancies should be practiced to encourage healthy outcomes for both the mother and the fetus.

#### Ethics Approval

The present study was survey-based, and included no intervention. Questionnaire-related home remedies were used to interview respondents who voluntarily participated. To the best of our knowledge, there is no need for ethical approval in survey-based studies.

#### Conflict of Interests

The authors have no conflict of interests to declare.

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