

# Lifestyle and Dietary Changes During Pregnancy among Attendees of Antenatal Care Clinics

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## ABSTRACT

**Background:** Women often make dietary changes during pregnancy but little is known of these dietary changes. We aimed to describe the dietary habits, knowledge and use of herbal remedies during pregnancy.

**Methods:** This is a cross sectional study in which 300 pregnant Bahraini women were recruited from primary health care centers in Bahrain.

**Results:** Two hundred and ninety nine responded and half reported good appetite with consumption of three meals daily. Most of the women knew about good dietary practice during pregnancy and believed that the type of food they consume can influence their pregnancy outcome (86.0% and 74.7% respectively). The study found that 62.0% consumed fruits and vegetables daily and 35.0% consumed vegetables and fruits twice/weekly or less. Fish was consumed two times a week by 58%, and once weekly or less by 15.0%. One-third (30.6%) disliked candies during pregnancy and 21% disliked eggs. Cinnamon was avoided by 69.0% of the participants and pineapple by 22.0%. Only 17.2% reported using herbal remedies during pregnancy of which 51% used mint, 39% green tea and 29% ginger. The most common reason for using herbal remedies was to treat nausea and vomiting (70.5%).

**Conclusion:** Pregnant Bahraini women are aware of the importance of maternal diet and its effect on the fetal outcomes. However, their dietary knowledge and practices are limited and not entirely compliant with international recommendations. Herbal remedy use was representative of the Bahraini culture and traditions and was often influenced by family and social media. Detailed nutritional assessment during pregnancy is recommended in future research.

## Introduction

A healthy, balanced diet during pregnancy is essential to support optimal growth and development of the fetus and to meet the rapid and profound physiological changes from conception until birth. During pregnancy, the development of maternal tissues, fetal growth, and breast milk production increase nutritional requirements [1]. Deficiencies in key macronutrient and micronutrient can have a substantial impact on pregnancy outcomes and neonatal health [2]. Examples of micronutrients supplementation to prevent health

outcomes are folic acid to prevent neural tube defects, iodine to prevent cretinism, zinc to reduce of preterm birth, and iron to reduce the risk of low birth weight [3]. Consumption of fast food and soft drinks have been associated with increased risk of gestational diabetes mellitus [4]. The Barker hypothesis proposed that adverse nutrition in early life, including prenatally increases susceptibility to the metabolic syndrome which includes obesity, diabetes, insulin insensitivity, hypertension, and hyperlipidemia and complications

that include coronary heart disease and stroke [5]. Furthermore, a recent systematic review found an inverse association between the healthy dietary pattern and prenatal anxiety and depression scores [6].

Several international organizations advocate dietary recommendations and guidelines for pregnant women [1, 7]. However, the extent to which pregnant women abide with these guidelines is unknown. Changes in lifestyle behaviors around the time of pregnancy have been well described in the literature [8]. Some studies have described the use of herbal medicines during pregnancy, including research from the Middle East [9, 10]. The prevalence of herbal use varied between regions and reached up to 82% in the Middle Eastern countries [10] compared to 26.7% in South West England [11] and 36% in Australia [12]. With few exceptions, the beneficial and harmful effects of these herbal supplements remain inconclusive [13]. Therefore, it is deemed essential to describe the types of herbal remedies used and the reasons for which they are being used. Understanding pregnant women's dietary habits and level of knowledge of the nutrition and dietary requirements during pregnancy is important for guiding the development of effective approaches to support women in maintaining a healthy diet. Further, it is fundamental to promote and to prevent possible unhealthy behaviors during this short time sensitive window. This research aimed to build on existing knowledge and focus on the dietary habits, practices and knowledge of Bahraini women during pregnancy.

## Methods

### Design

This cross-sectional survey was conducted with pregnant Bahraini women at any stage of their conception attending the antenatal clinics of primary health care centers as participants.

### Sample Size

Based on the estimate of 5220 pregnant women attending the antenatal clinics at the health centers during 2018 [14], and with a 95% confidence level and 6% margin of error, 254 participants were needed to represent the population. However, we aimed to survey 300 pregnant women to be certain that we obtained complete data for at least the required 254.

### Sampling Method

There are 28 health centers distributed in the five health governorates of Bahrain. We selected two health centers from each health region by simple random sampling. In each selected health center, 60 participants from the antenatal waiting area were invited to participate in the study. We used convenience sampling to identify the eligible participants. During the antenatal visit, women undergo checks of their vital health measures, and weight, and have obstetric examination.

## Measures

We developed a survey instrument based on the tools used in the research we have identified, [15] related to each of the topics in our study. We also collected demographic data from participants. We piloted the survey on 50 participants who were not included in the study. The reliability of the questionnaire was tested and yielded a Cronbach alpha of 0.72.

## Data Analysis

The uni-variate analyses provided information on the prevalence of each lifestyle choice and are reported as frequencies and percentages. Chi square test was used to test the association between selected maternal knowledge items and sociodemographic variables. The selected items are: "I know about good dietary practice, the type of food influence pregnancy outcomes, poor maternal nutrition cause low birth weight". A P-value of  $\leq 0.05$  was considered significant.

## Ethics

We obtained ethical approval from the respective research committees of the Royal College of Surgeons in Ireland-Medical University of Bahrain, the Arabian Gulf University and the Bahrain Ministry of Health. We obtained patient oral consent and provided patient information sheet to all participants. Oral consent was deemed sufficient in light of the low risk nature of this study. The IRB approved this approach for the same reason. Oral consent was documented by data collectors in the survey.

## Results

### Demographic Details

Three hundred questionnaires were distributed and 299 responded yielding a response rate of 99.6%. Mean (SD) age of participants was 30.0 (SD 5.7), median 29 years and range 29 (maximum 48.0 years, minimum 19.0 years). Women, on an average, had 1.45 (SD 1.37) children (Table 1).

### Maternal Dietary Habits and Nutritional Practices

Over half of participants reported good appetite with consumption of three meals daily. The majority (60.0%) consumed fruits and vegetables daily and only 40.6% consumed chicken or meat daily. Fish was consumed twice a week by 61.3% and once a week or less by almost 15.0%. Candy was the most disliked (30.6%) during pregnancy followed by eggs (21.8%). When asked about food item they would avoid during pregnancy, the majority chose cinnamon (69%), pineapple (22%), postpartum stew (made from garden cress seeds) (20%) and saffron (16.9%). All participants denied smoking and drinking alcohol during pregnancy (Table 2).

### Maternal Knowledge of Dietary Habits

The participants identified family (43.3%) and social media (43.7%) as their main sources of information about dietary

recommendations during pregnancy. Most of the women in our study believed that the type of food they consume can influence their pregnancy outcome and can result in low birth weight (74.7%

and 78.6%, respectively). Most women agreed that smoking and drinking alcohol have harmful effects on the fetus (97.7% and 98.3%, respectively) (Table 3).

**Table 1:** Demographic characteristics of participants (n=299).

Variable	Frequency	%
<b>Marital status</b>		
Married	285	95.3
Divorced	8	2.7
Widowed	6	2.0
<b>Level of education</b>		
Illiterate	3	1.0
Elementary	3	1.0
Middle	9	3.0
Secondary/Diploma	145	48.5
Bachelor's degree and above	139	46.5
<b>Employment</b>		
Working outside home	84	28.2
Retired	4	1.3
Housewife	187	62.8
Student	23	7.7

**Table 2:** Maternal dietary habits and nutritional practices.

Variable	Frequency	%
<b>Participant's appetite(n=298)</b>		
Good	162	54.4
Reasonable	118	39.6
Low	18	6.0
<b>No. of meals/day(n=298)</b>		
One meal/day	5	1.7
Two meals/day	57	19.1
Three meals/day	180	60.4
More than three meals/ day	48	16.1
It depends	8	2.7
<b>Fruit/vegetable consumption(n=299)</b>		
Everyday	187	62.5
Three times/week	6	2.0
Twice/week	62	20.7
Once/week	18	6.0
Rare (less than once/week)	26	8.7
<b>Meat/chicken consumption (n=299)</b>		
Everyday	122	40.6
Four times/week	59	19.7
Three times/week	60	20.0
Twice/week	55	18.3
Once/week	2	0.7
Never	2	0.7

<b>Fish consumption (n=287)</b>		
Everyday	7	2.1
Four times/week	21	7.3
Three times/week	37	12.9
Twice/week	176	61.3
Once/Week	11	3.8
Never	36	12.5
<b>Food disliked in pregnancy (n=297)</b>		
Fish	49	16.4
Eggs	65	21.8
Candy	91	30.6
Fruits	15	5.0
Vegetables	12	4.0
others	65	21.8
<b>Food avoided (n=295)<sup>a</sup></b>		
Cinnamon	207	69.0
Tea	12	4.0
Coffee	32	10.7
Post-partum soup <sup>b</sup>	60	20.0
Saffron	50	16.9
Pineapple	65	22.0
Papaya	14	4.7

**Note:** <sup>a</sup>More than one option may be selected

<sup>b</sup>Made from garden cress seeds

**Table 3:** Knowledge of diet and other lifestyle factors in pregnant women attending ANC clinics.

Statement	Frequency	%
<b>I know about good dietary practice during pregnancy (n=299)</b>		
Yes	257	86.0
No	42	14.0
<b>I know about good dietary practices during pregnancy from (n=298)</b>		
Family	130	43.3
Friends	36	12.0
Health care professionals	82	27.5
Media	61	20.3
Social media	131	43.7
<b>Women should eat more during pregnancy (n=297)</b>		
Yes	95	31.7
No	202	67.3
<b>The type of food you eat during pregnancy have influence on pregnancy outcome (n=297)</b>	222	
Yes	75	74.7
No		25.3
<b>Poor Maternal nutrition cause low birth weight baby and still birth? (n=295)</b>		
Yes	232	78.6
No	63	21.4

<b>Smoking during pregnancy have harmful effects on the baby(n=298)</b>		
Yes	293	97.7
No	5	1.3
<b>Drinking alcohol during pregnancy have harmful effects on the baby(n=297)</b>		
Yes	292	98.3
No	5	1.7

Note: aMore than one option maybe selected

### Pattern of Herbal Remedy Use

In (Table 4) we summarize the pattern of using herbs among the participants. Only 17.2% women reported using herbs during pregnancy. About half of them (51.0%) used mint, 39.0% green tea and 29.0% ginger. Aniseed and Arabic gum were used to a lesser extent, 15.6% and 13.7% respectively. Participants who used herbal remedies did so by their own choice (70.6%) or on the recommendation of their family (76.4%). The most common reasons for using herbal remedy were nausea and vomiting (70.5%), no pregnancy-related reason (66.6%) and abdominal pain (31.3%). Among those who used herbs 67% believed that they were effective in relieving the symptoms that they were used for.

**Table 4:** Use of Herbs among participants.

Statements	Frequency	%
<b>I use herbs during pregnancy(n=296)</b>		
Yes	51	17.2
No	245	82.8
<b>Types of herbs used<sup>a</sup>(n=51)</b>		
Ginger	12	29.4
Mint	26	50.9
Fenugreek	5	9.8
Green tea	20	39.2
Garlic	7	13.7
Aniseed	8	15.6
Arabic gum	7	13.7
<b>People who recommended use of herbs*(n=51)</b>		
Myself	36	70.6
Family	39	76.4
Friends	13	25.4
Healthcare workers	10	19.6

Note: aMore than one option maybe selected

**Table 5:** Association between selected maternal knowledge items and sociodemographic data.

Variable	I know about good dietary practice during pregnancy		
	Yes	No	P-value
<b>Marital status</b>			
Married	245 (95.3%)	40 (2.4%)	0.975
Divorced	7 (2.7%)	1 (2.4%)	
Widow	5 (1.9%)	1 (2.4%)	

<b>Level of education</b>			
Illiterate	2 (0.8%)	1 (2.4%)	0.067
Elementary	1 (0.4%)	2 (4.8%)	
Middle	8 (3.1%)	1 (2.4%)	
Secondary/Diploma	123 (47.9%)	22 (52.4%)	
Bachelor's degree	123 (47.9%)	16(38.1%)	
<b>Employment</b>			
Working outside home	77 (30.1%)	7 (16.7%)	0.141
Retired	4 (1.6%)	0 (0.0%)	
Housewife	154 (60.2%)	33 (78.6%)	
Student	21 (8.2%)	2 (4.8%)	
<b>Women should eat more during pregnancy</b>			
<b>Marital status</b>			
Married	90 (94.7%)	194 (96.0%)	0.624
Divorced	2 (2.1%)	5 (2.5%)	
Widow	3 (3.2%)	3 (1.5%)	
<b>Level of education</b>			
Illiterate	1 (1.1%)	2 (1.0%)	0.033
Elementary	2 (2.1%)	1 (0.5%)	
Middle Secondary/Diploma	6 (6.3%)	3 (1.5%)	
Bachelor's degree	51(53.7%)	92 (45.5%)	
	35 (36.8%)	104 (51.5%)	
<b>Employment</b>			
Working outside home	16 (17.0%)	68 (33.7%)	0.008
Retired	0 (0.0%)	4 (2.0%)	
Housewife	68 (72.3%)	117 (57.9%)	
Student	10 (10.6%)	13 (6.4%)	
<b>Type of food influence pregnancy outcomes</b>			
<b>Marital status</b>			
Married	213 (95.9%)	69 (93.2%)	0.718
Divorced	6 (2.7%)	2 (2.7%)	
Widow	3 (1.4%)	3 (4.1%)	
<b>Level of education</b>			
Illiterate	1 (0.5%)	2 (2.7%)	0.000
Elementary	0 (0.00 %)	3 (4.1%)	
Middle Secondary/Diploma	5 (2.3%)	4 (5.4%)	
Bachelor's degree	95 (42.8%)	47 (63.5%)	
	121 (54.5%)	18 (24.3%)	
<b>Employment</b>			
Working outside home	76 (34.4%)	8 (10.8%)	0.004
Retired	4 (1.8%)	0 (0.0%)	
Housewife	123 (55.7%)	61 (82.4%)	
Student	18 (8.1%)	5 (6.8%)	
<b>Poor maternal nutrition cause low birth weight</b>			
<b>Marital status</b>			
Married	90 (94.7%)	194 (96.0%)	0.818
Divorced	2 (2.1%)	5 (2.5%)	
Widow	3 (3.2%)	3 (1.5%)	

<b>Level of education</b>	1 (0.4%)	2 (3.3%)	0.615
Illiterate	1 (0.4%)	1 (1.6%)	
Elementary	7 (3.0%)	2 (3.3%)	
Middle Secondary/Diploma	109 (47.0%)	32 (52.5%)	
Bachelor's degree	114 (49.1%)	24 (39.3%)	
<b>Employment</b>	66 (28.6%)	17 (27.9%)	0.953
Working outside home	3 (1.3%)	1 (1.6%)	
Retired	142 (61.5%)	40 (65.6%)	
Housewife	20 (8.7%)	3 (4.9%)	
Student			

## Discussion

To our knowledge, this is the first study describing Bahraini women's pregnancy-specific dietary habits and beliefs. This study shows that pregnant women are poorly adherent to the international dietary guidelines. Notably, their intake of protein, fruits and vegetables were below the recommended daily requirement which is estimated to be 60g/day of protein and 3 to 4 portions/day of fruits and vegetables [1]. About 16% disliked fish and 70% reported consuming fish twice weekly or less, thereby missing out its nutritional benefit for the fetus. Similar results were reported in international studies [16]. Fish is rich in Vitamin D and omega-3 fatty acids that are important for the development of a fetus's brain, eyes, and nervous system [17]. The recommendation is to eat 2 to 3 servings per week [18]. Although fish such as shark, tuna and swordfish are not advised because of their high mercury content, [18] we did not inquire about types of fish in our study but about eating fish in general.

When they were asked about food they would avoid during pregnancy, our participants were mostly focused on food that might increase their risk of miscarriage. It is concerning that women did not include food that is a rich source of vitamin A (such as liver) or raw uncooked food as food to avoid during pregnancy despite their well-documented harmful effect on the fetus [19, 20]. Instead, they mentioned cinnamon and pineapple as two main avoided items because they were perceived as risk factors for miscarriage. Similar results of avoiding cinnamon and pineapple were reported in a study from Saudi Arabia [21]. Scientific evidence regarding the benefits and harms of cinnamon and pineapple is either lacking, inconclusive [22] or negligible [23]. Further, the uterine stimulant theory of these products and the belief that they induce abortion or labor does not specify the amount that should be consumed to see the harmful or beneficial effect [23]. This is an area that needs definitive research to support or refute widespread beliefs in Bahrain. In concordance with the published literature, [16] pregnant women recognize that a healthy, balanced diet and healthy life style are "important" to fetal health and are more likely during their pregnancy to be mindful of nutrition and life style habits. This was reflected in that the majority agreed that maternal diet affects fetal outcomes and that almost all participants refrained from

smoking and drinking alcohol and agreed on their harmful effect on the fetus.

Often, family and social media were the sources of information our participants used. The same has been documented in other Middle Eastern studies [10]. This reflects the influence of social media, which contains many articles advertising and promoting non-evidence-based dietary practices [10]. It also implies the importance of including the family in any dietary and lifestyle interventions in this part of the world. The most popular herbs used in our study were mint, green tea, ginger, aniseed and Arabic gum, which is very similar to what has been reported in studies from this region [10]. In agreement with other studies, the herbs were mostly used to treat the bothersome symptoms of nausea and vomiting [10]. However, only 17.0% of the study participants admitted using herbal remedies during pregnancy. This percentage is reversed in the Saudi study where about two thirds of women used herbal products [21]. One should be cautious interpreting this finding because women might not consider some products they habitually use as herbal remedies. In general, herbal supplementation is complex, vaguely defined in the literature and there is confusion on what it constitutes [25]. Ginger is the only well-established herbal product as an effective treatment for nausea and vomiting [26]. However, ginger was used by only one third of participants who admitted to using herbal remedies.

Factors influencing maternal knowledge in this study were education and employment. This is in agreement with other international studies [27, 28]. One should note that majority of these studies were conducted in underdeveloped parts of the world with limited resources which makes the comparison rather unfair. Other well document influential factors reported in these studies were family income and husband support. Both of which were not among the variables studied in this research. This study exploring the dietary habits and use of herbal remedies among pregnant women in Bahrain, sets the foundation for establishing national dietary guidelines during pregnancy and will drive future research. This will set the foundation for establishing dietary guidelines during pregnancy and will drive future research. Although this is an important study of the diets of pregnant Bahraini women and was designed with attention to sample size so that it can be generalized



to all Bahraini women, only about half of the country's residents are Bahraini. We make no claim to represent the diets and health beliefs of pregnant women of other cultures who live in Bahrain. Also, although the study clinics were randomly selected, we used convenience sampling to enroll participants from within the sampled clinics and this may have biased the study in the direction of including women who attend more carefully to their health. Our survey lacked detailed nutritional questions relating to number of servings, standard serving size and nutrient content of certain food. Further, the survey did not allow for an overall knowledge score to be calculated and hence used for analysis. This limited our ability in conducting further bivariate and multivariate analyses.

We recommend that health care providers play a greater role in educating pregnant women regarding the recommended dietary habits and screening women for non-prescribed supplements and herbal remedy use. Further research is needed to explore the detailed nutritional content of maternal diet and prescribed and non-prescribed supplements.

## Conclusion

Women are aware of the importance of their diet during pregnancy and its effect on fetal outcomes. However, their knowledge and dietary practices are limited and not entirely compliant with international recommendations. Herbal remedies use was representative of the culture and traditions and was often influenced by family and social media.

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## Disclosure of Interest

The authors report no conflict of interest.

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