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Sociodemographic and dietary profile of 4,471 childbearing-age women planning a pregnancy

Marta Cuervo[1,3], Leticia Goni[1], Susana Santiago[1], Itziar Zazpe[1,3], Aquilino García[2] and J. Alfredo Martínez[1,3]

[1]Department of Nutrition, Food Sciences and Physiology. University of Navarra. Pamplona. Spain. [2]Spanish Pharmacists Council. Madrid. Spain. [3]CIBER Fisiopatología Obesidad y Nutrición (CIBERobn). Instituto de Salud Carlos III. Spain.

Abstract

Background: **The maintenance of healthy lifestyles is of great importance to prevent pregnancy-related diseases at early stages. For this reason, the knowledge of the overall wellbeing of women at childbearing-age is necessary to provide appropriate advice to maintain or improve the nutritional status. The aim of this research was to assess the lifestyles of childbearing-age women planning a pregnancy and to examine the difference between primiparae and multiparae women on these lifestyles.**

Methods: **This cross-sectional survey involved 4,471 Spanish women at childbearing-age that were planning a pregnancy. Information was collected through a questionnaire by community health professionals.**

Results: **The profile of childbearing-age recruited women planning a pregnancy were in her early thirties (31.4 ± 4.8 years) and 72.5% were seeking for her first baby. They had a good self-perception of their nutritional and health status and followed a balanced diet. Interestingly, primiparae women had lower risk of health complications but they were greater consumers of tobacco and alcohol ($p < 0.001$), and consumed less fortified milk, iodine and iron supplements than multiparae women. Additionally, the examined population showed a more sedentary pattern in primiparae women as compared to the remaining group concerning hours/day lying, sitting and standing.**

Conclusion: **Differences between both preconceptional conditions (primiparae and multiparae women) bring a great opportunity to promote healthy habits among childbearing-aged women, according to the personal profile, in order to prevent burdens in future pregnancies underlying modifiable or preventable factors.**

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Correspondencia: J. Alfredo Martínez.
Department of Nutrition, Food Sciences and Physiology.
University of Navarra.
irunlarrea, 1.
31008 Pamplona. Navarra. Spain.
E-mail: jalfmtz@unav.es

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PERFIL SOCIODEMOGRÁFICO Y DIETÉTICO DE 4.471 MUJERES EN EDAD FÉRTIL QUE PLANEAN UN EMBARAZO

Resumen

Introducción: **El mantenimiento de unos adecuados estilos de vida, es de gran importancia para la prevención de enfermedades relacionadas con el embarazo durante las primeras etapas. Por ello, es necesario conocer el estado de salud general de las mujeres en edad fértil, y poder proporcionar un asesoramiento adecuado con el objetivo de mantener o mejorar su estado nutricional. El objetivo de este estudio fue evaluar los estilos de vida de las mujeres en edad fértil que planean un embarazo y estudiar las diferencias entre mujeres primíparas y multíparas en dichos estilos de vida.**

Métodos: **Este estudio transversal incluyó un total de 4.471 mujeres españolas en edad fértil que está planeando un embarazo. La información se recogió, a través de un cuestionario, por profesionales de oficinas de farmacia.**

Resultados: **El perfil de las mujeres reclutadas en edad fértil que planean un embarazo fue de poco más de treinta años (31,4 ± 4,8 años) y el 72,5% estaba buscando a su primer bebé. Ellas tenían una buena percepción tanto de su estado nutricional como de salud, y una dieta equilibrada pero con algunos hábitos no saludables. Cabe destacar que las mujeres primíparas presentaban menor riesgo de complicaciones relacionadas con salud pero eran mayores consumidoras de tabaco y alcohol, y menos consumidoras de leche fortificada, yodo y suplementos de hierro ($p < 0,05$), que las mujeres multíparas. Además, la población examinada mostró un patrón más sedentario en las mujeres primíparas en comparación con las mujeres multíparas, relativo a las horas / día tumbada, sentada y de pie.**

Conclusión: **Las diferencias entre ambos grupos (primíparas y multíparas) ofrecen una gran oportunidad para promover hábitos saludables entre las mujeres en edad fértil, de acuerdo con el perfil de paridad, con el objetivo de prevenir estilos de vida no adecuados en embarazos futuros.**

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Introduction

There is a lot of information available about the most suitable type of feeding regarding the stages of pregnancy and lactation[1], but it is not so easy to find feeding advice specifically aimed at women who are planning a pregnancy. However, it is assumed that an adequate nutritional status prior to and around conception period is of great importance for the later stages of pregnancy and birth outcomes[2]. Formation of most organs and important maternal changes occurs between the third and the seventh week after the last menstrual period, when the woman is not yet aware of being pregnant, and several teratogenic effects may happen during this time[3]. In addition, it has been reported that well-nourished women require an extra amount of energy to cope with the new demands at the beginning of a pregnancy[4]. For these reasons, nutritional care from the preconception period seems a good strategy to prevent malnutrition in early pregnancy.

However, there are still no specific and definitive nutritional recommendations for the preconceptional period, so that it is generally assumed that the general references for women of childbearing-age in the different age groups can be used for women seeking a pregnancy. Moreover, even these guidelines, including those specific to the different stages of pregnancy and lactation, differ from country to country and depend on the board/organism/institution that design them[5].

Although human studies are scarce and conclusive evidence is provided solely for periconceptional folate and prevention of Neural Tube Defects (NTDs), the overall data indicate that other micronutrients may affect fertility, embryogenesis and placentation, while the prophylactic use of them may be useful in preventing several adverse pregnancy outcomes[6,7]. All vitamins, minerals and other nutrients can be found in food, but some higher physiological demands at early pregnacy may require supplementation, due to the difficulty in obtaining the extra nutrients needed. In that context, folic acid dietary levels can be increased by consuming folate rich foods, fortified foods or through supplementation. Adequate dietary levels of vitamin A are needed for reproduction and good fetal growth[8]. However, very high doses of vitamin A could be teratogenic, although it is difficult to reach excessive intakes consuming only foods. Vitamin D deficiency may predispose to a multitude of diseases not only related to fetal growth and bone metabolism, but also including diseases of the fetal immune system[9]. During pregnancy, fetal calcium needs are covered by sources from the mother, so maternal calcium levels prior to pregnancy should often be repleted, conjointly with an adequate level of vitamin D to facilitate calcium absorption[10]. Maternal anaemia is associated with premature birth and intrauterine growth restriction[11]. Furthermore, a good iodine status in the preconception period could prevent from cognitive impairment, permanent mental retardation and cretinism[8]. There is an increase in requirements for other nutrients including vitamin B_{12}, B_6 and C, and minerals such as phosphorus, magnesium and zinc, and some essential fatty acids during pregnancy[12]. These nutrients should be monitored in the preconceptional diet by the intake of foods rich or fortified with them[13]. Thus, maternal body stores should be sufficient to meet the beginning of a healthy pregnancy for both the fetus and the mother.

On the other hand, there is controversy whether the use of or exposure to toxic drugs can induce deficiencies in nutritional and fertility status[7,14]. Thus, smoking may increase the turnover of folic acid, vitamin C, vitamin B_6, vitamin B_{12} and beta-carotene, which also decreases bioavailability[7,15]. Moreover, alcohol and some nutrients interact at many levels determining the intake and modifying digestion, absorption and metabolism processes, specially during pregnancy[16]. Also, prenatal alcohol exposure has been associated with fetus impairments and adverse later childhood behavior[17]. Finally, addictive drug use has clear health risks to the health of childbearing-age women and their children with and impact on nutritional status[14].

For all these reasons, it seems clear that efforts to increase awareness of a healthy lifestyle should be strengthened not only throughout pregnancy, but also prior to pregnancy[6]. Therefore, the two main aims of the present study were to assess the lifestyle habits, including dietary intake, sedentary behavior and drug use of childbearing-age women, who are planning a pregnancy in a large Spanish population sample (n = 4,471), and to analyze the influence of having previous offspring on these lifestyles.

Methods

Participants and recruitment

This cross-sectional study was carried out for four months ending in March 2010. The study population included women from all regions of Spain, who self-declare that were attempting conception, being the status of childbearing age the only criteria for inclusion. Pregnancy intention was assessed by response to the following question: "Time looking for pregnancy: less than 6 months, between 6 and 11 months or more or equal to 12 months". Volunteers were recruited by community pharmacists, who had contact with women who went into the pharmacy. All the participants were specifically asked if they would be willing to take part in the study. After ensuring that participants have understood the information, only those who voluntarily accepted were enrolled. Participant's voluntary completion of the questionnaire constituted the informed consent, which is in agreement to Declaration of Helsinki[19]. The survey, which involved an observational questionnaire but not intervention, was conducted with the approval of the Spanish Council of Pharmacist and the Board of the Institute of Food

Sciences and Nutrition of the University of Navarra, according to the guidelines laid down in the Declaration of Helsinki for anonymous surveys[18,19]. This nutritional program has the recognition of Health Interest Activity by the Spanish Ministry of Health and Social Policy[20]. Additionally the follow-up project, in perimenopausal women, has been approved by the Ethics Committee of Research at the University of Navarra (Ref. 90/2013) and confirms the terms that were applied in this survey.

Health professionals were recruited through the Spanish Pharmacists Council to collect data. All of them received a training session and the "application guide", a document with basic information about the survey, instructions to formulate every question and a decision tree to interpret the result of the information in each case[21]. Furthermore, a videoconference explaining the study was directly broadcasted to every provincial pharmacist college. Additionally, a website was available for all pharmacists involved in the study to provide materials that assure harmonization among interviewers. This approach has been succesfully applied in a previous survey concerning the elderly population[22].

The nutritional survey

The nutritional status and food habits study of women who were planning a pregnancy was carried out through a questionnaire that included a total of 45 items, grouped into 6 sections: general information, obstetric data, breastfeeding intention (type and duration), unhealthy lifestyles, pathophysiological state and dietary habits[20]. Weight, height and arm circumference were directly measured by the pharmacists. Arm circumference was measured between the acromion process of the humerus and the olecranon process of the ulna, with the arm relaxed alongside the body. Body mass index (BMI) was calculated from measured weight (kg) and height (m), dividing weight by the square of height. Age and physical activity data were obtained through self-declared questions. Physical activity was measured according to the number of hours spent in lying, sitting and moving activities, paying special attention so that the sum of the hours a day were 24 in total.

Information on educational level, obstetric data, breastfeeding intention, self-perception about health status and diet, and unhealthy lifestyles, was obtained from self-declared information, using categories. Snuff consumption included self-declared active or pasive exposure. Alcohol and drug use were considered from a minimum consumption, even if it was exceptionally. The question related to special diets referred to the consumption of low calorie, low fat, low carbohydrates or low sodium diets, and any type of vegetarian diets.

Concerning the diet, quantitative information was collected classifying all the basic food into twelve food groups. The consumption frequency for each food group was collected through the questionnaire, indicating how often each group was consumed daily, weekly, monthly or never. Daily or weekly frequency of food consumption was calculated to know every group approach to meet the recommendations. Quantitative information on the use of supplements, fortified or functional foods was assessed with the baseline questionnaire.

From this questionnaire, anthropometrical variables and questions about physical activity and food habits have been validated[23]. The validation of anthropometrical measurements was assessed comparing the measurements collected by pharmacists and trained research staff[23]. The validity of the physical activity questionnaire was compared with another validated physical activity questionnaire[23,24]. The food frequency questionnaire had demonstrated validity against the food frequency questionnaire of the SUN project "Seguimiento Universidad de Navarra"[23,25].

Data Collection

The questionnaire was developed online, through a platform located in the website created for the survey (under password), for the pharmacist to enter the information gathered in the face to face interview, and to send the data to the University of Navarra, where data were refined, processed and analyzed in an anonymous and confidential manner. The number of questionnaires received from women planning a pregnancy was 4,666, of which 195 were excluded because of missing values on important variables, so the final sample for the analysis was 4,471.

Data Analysis

Statistical analysis was performed with the Statistical Package for Social Sciences (SPSS) for Windows XP (Chicago, version 15.0). Means and standard deviations were used such as descriptive statistics. Student t tests were performed to compare means for age, weight, height, BMI, arm circumference, physical activity and food habits between childless women and those with one or more children.

Frequencies and χ^2 tests were applied to compare different proportions of global, health, toxic habits and other food variables between both groups. All P values presented are two-tailed and the statistical significance was defined at $P < 0.05$.

Results

Of the 4,471 Spanish women seeking a pregnancy in the study sample, 72.5% did not have offspring yet (primiparae women) versus 27.5% who already had at

least one child (multiparae women). Baseline values concerning age and anthropometrical measurements of weight, height and arm circumference are reported (Table I). The average age of women seeking pregnancy was 31.4 ± 4.8 years (30.5 ± 4.7 primiparae, 33.9 ± 4.2 multiparae). Primiparae women showed lower values for weight (61.0 ± 9.5 *vs* 62.4 ± 9.8 kg) and arm circumference (27.4 ± 5.8 *vs* 27.9 ± 6.1 cm).

The collected information about the previous use of contraceptives, health status and other related nutritional issues is also reported (Table I). As expected, previous miscarriage prevalence was lower in primiparae women as compared to multiparae ones. Also, some statistical differences were identified for the period of time seeking to be pregnant, educational level and a good self-perception of the health status in those two groups (Table I).

According to the available information, the analysis of some lifestyle features also revealed that multiparae women smoked less (37.9% *vs* 45.9%), took fewer alcohol beverages and spirits (38.3% *vs* 53.1%), were more likely to follow a special diet (18.2% *vs* 15.5%) and evidenced more active patterns than those with no previous pregnancies (Table II).

Dietary information about food consumption (Table III) found no statistical differences concerning dairy products, salads/vegetables, fresh fruits, bread, rice/pasta/potatoes, nuts, legumes, fish, eggs, meat, sausages and buns/pastries intake between both preconceptional conditions. However, multiparae women took more care about the consumption of enriched or fortified foods such as milk (23.3% *vs* 20.3%), iodine or iodined salt (29.9% *vs* 24.7%) or iron supplements (18.1% *vs* 15.2%) than primiparae women (Table IV).

Discussion

The results obtained in this research from 4,471 women of childbearing-age, who were seeking a pregnancy have allowed us to characterize sociodemographic features, weight status, eating habits and lifestyle of this population group, whose data come from a national survey.

The mean age of the Spanish woman seeking a pregnancy obtained in this observational study was 31.4 years old, which agrees with data from the Spanish National Institute of Statistics (INE) that point out that

Table I
Baseline characteristics of the 4,471 women at childbearing-age depending on the offspring status

	All ***(n = 4,471)*** *Mean ± SD or n (%)*	*Planning 1st pregnancy* ***(n = 3,240)*** *Mean ± SD or n (%)*	*Planning 2nd or more pregnancies* ***(n = 1,231)*** *Mean ± SD or n (%)*	*p*
Age (years)[a]	31.4 ± 4.8	30.5 ± 4.7	33.9 ± 4.2	< 0.001
Weight (kg)[a]	61.4 ± 9.6	61.0 ± 9.5	62.4 ± 9.8	< 0.001
Height (cm)[a]	164.0 ± 6.1	164.0 ± 6.0	164.0 ± 6.4	0.811
Body mass index (kg/m^2)[a]	22.9 ± 3.9	22.8 ± 3.8	23.3 ± 4.0	< 0.001
Arm circumference (cm)[a]	27.5 ± 5.9	27.4 ± 5.8	27.9 ± 6.1	0.13
Previous use of contraceptives[b]	2,918 (65.3%)	2,114 (65.2%)	804 (65.3%)	0.967
>6 months looking for a pregnancy[b]	1,815 (40.6%)	1,279 (39.5%)	536 (43.5%)	0.013
Higher education (university degree)[b]	2,286 (51.1%)	1,712 (52.8%)	574 (46.6%)	< 0.001
Self-perception health status good or very good[b]	3,833 (85.7%)	2,808 (86.7%)	1,025 (83.3%)	0.004
Self-perception nutritional balance good or very good[b]	3,638 (81.4%)	2.656 (82.0%)	982 (79.8%)	0.091
Previous miscarriage[b]	719 (16.1%)	371 (11.5%)	348 (28.3%)	< 0.001

Table II
Lifestyle variables and frequency distribution depending on the offspring status

	All ***(n = 4,471)*** *Mean ± SD or n (%)*	*Planning 1st pregnancy* ***(n = 3,240)*** *Mean ± SD or n (%)*	*Planning 2nd or more pregnancies* ***(n = 1,231)*** *Mean ± SD or n (%)*	*p*
Current smokers[a]	1,953 (43.7%)	1.487 (45.9%)	466 (37.9%)	< 0.001
Frequent alcohol consumption[a]	2,191 (49.0%)	1,719 (53.1%)	472 (38.3%)	< 0.001
Declared illicit drugs consumption[a]	141 (3.2%)	107 (3.3%)	34 (2.8%)	0.356
Special diet[a]	725 (16.2%)	501 (15.5%)	224 (18.2%)	0.027
Hours/day lying[b]	8.52 ± 1.3	8.56 ± 1.3	8.40 ± 1.3	< 0.001
Hours/day sitting[b]	6.34 ± 2.6	6.46 ± 2.6	6.03 ± 2.6	< 0.001
Hours/day standing or moving[b]	9.14 ± 2.8	8.98 ± 2.8	9.57 ± 2.9	< 0.001

Table III
Descriptive of food consumption depending on the offspring status

	All ***(n = 4,471)*** *Mean ± SD*	*Planning 1st pregnancy* ***(n = 3,240)*** *Mean ± SD*	*Planning 2nd or more pregnancies* ***(n = 1,231)*** *Mean ± SD*	*p*
Dairy products[a]	2.0 ± 1.2	2.0 ± 1.2	2.0 ± 1.2	0.375
Salads/ vegetables[a]	1.2 ± 1.0	1.2 ± 1.0	1.2 ± 1.1	0.250
Fresh fruit[a]	1.8 ± 1.3	1.8 ± 1.3	1.8 ± 1.3	0.988
Bread[a]	1.7 ± 1.2	1.7 ± 1.2	1.7 ± 1.2	0.861
Rice/ pasta/ potatoes[a]	0.7 ± 0.7	0.7 ± 0.7	0.7 ± 0.7	0.387
Nuts[b]	2.0 ± 3.9	2.1 ± 4.0	2.0 ± 3.5	0.593
Legumes[b]	2.4 ± 3.5	2.4 ± 3.6	2.5 ± 3.2	0.260
Fish[b]	3.1 ± 3.5	3.1 ± 3.5	3.2 ± 3.6	0.623
Eggs[b]	2.7 ± 2.2	2.7 ± 2.3	2.7 ± 1.9	0.990
Meat[b]	4.2 ± 4.0	4.2 ± 4.0	4.4 ± 4.2	0.215
Sausage[b]	3.4 ± 4.0	3.4 ± 4.3	3.3 ± 3.4	0.537
Buns/ pastries[b]	3.1 ± 6.1	3.1 ± 6.4	3.1 ± 5.2	0.998

[a]Daily consumption. [b]Weekly consumption.

Table IV
Percentage of participants who consume fortified foods, nutritional supplements and condiments depending on the offspring status

	All ***(n = 4,471)*** *n (%)*	*Planning 1st pregnancy* ***(n = 3,240)*** *n (%)*	*Planning 2nd or more pregnancies* ***(n = 1,231)*** *n (%)*	*p*
Fortified milk	945 (21.1%)	2,582 (20.3%)	287 (23.3%)	0.028
Fiber / prebiotics	574 (12.8%)	426 (13.1%)	148 (12.0%)	0.315
Probiotics	272 (6.1%)	203 (6.3%)	69 (5.6%)	0.409
Iodine / iodized salt	1,167 (26,0%)	799 (24.7%)	368 (29.9%)	< 0.001
Folic acid / vitamin B_{12}	2,185 (48.9%)	1,558 (48.1%)	627 (50.9%)	0.089
Iron suppements	715 (16.0%)	492 (15.2%)	223 (18.1%)	0.017
Polivitam / mineral	630 (14.1%)	446 (13.8%)	184 (14.9%)	0.310
Olive oil	4,079 (91.2%)	2,945 (90.9%)	1,134 (92.1%)	0.196
Sugar, honey or fructose	3,287 (74.0%)	2,399 (74.0%)	888 (72.1%)	0.197

the average age of motherhood has been rising in recent decades to a current age of 31.1 years[26], which give support to the representativeness of the recruited sample. According to these results, the profile of Spanish women trying to get pregnant is a woman of normal BMI, with a weight and arm circumference in the 60th percentile and a height between the 70th and 80th percentiles, following the criteria established by Ricart et al. for the Spanish population[27].

Based on the screened profiles of Spanish women who were planning a pregnancy, some interesting differences were found in anthropometric, global, health and lifestyles variables in women, who were looking for their first baby versus those who already had offspring. This information has a great value for the care of preconcepcional women and for specific advice depending on the number of gestations. Although BMI and arm circumference variables were in the normal range in both groups[27], primiparae women had lower figures than the other group. Taking into account that women, who are overweight or obese at the start of pregnancy is an increased risk for maternal and fetal complications and longer length of hospital stay[28], it could be hypothesized that in our sample, primiparae women present a minor risk of complications in a possible pregnancy compared with multiparae women, from a nutritional status point of view.

According to the educational level, more than half of the women who were attempting conception had higher education. Thus, women who sought their first baby were also who had the greatest proportion of university studies, despite being younger. This information is consistent to some recent findings in The Netherlands, which suggest that women who have a higher educated have a shorter duration time to pregnancy than those women of lower education[29]. However, other studies suggest a positive association between educational level and nutritional quality of

young women's diet[30], although this association was not found in our study.

Furthermore, women planning their first pregnancy seemed to show better self-perception of their global health status than those women seeking their second or subsequent pregnancy. However, no statistical differences were found in self-perception of their food habits between groups. This finding is in accordance with the results obtained later concerning the analysis of food habits, where there were no differences between groups in the frequency of consumption of any food groups analyzed. A greater adherence to certain dietary patterns, such as the Mediterranean diet, may improve the fertility of women of childbearing-age compared with a greater adherence to a western-type dietary pattern[31], but we did not find differences in the dietary intake between the screened groups. Moreover, multiparae women, with a poorer self-perception of their global health status, tried to improve it through a higher intake of fortified milk, iodized salt and iron supplements in comparison with nulliparae women. This dietary strategy was proven effective[13]. This outcome may be due to a positive association between the intake of certain dietary supplements, such as iron suplements, and improving global health parameters, such as tiredness, weakness, headache, breathlessness, dizziness, irritability even fertility in women of childbearing-age[6,32]. Additionally, iodine deficiency has been associated with a decreased fertility rate[33]. Fortified milk is mainly enriched in vitamins A, D, E, B_6, B_9 (folic acid) or B_{12}, minerals such as calcium, magnesium or iron, and in other dietary compounds such as dietary fiber or omega 3 fatty acids. Thus, it was found that daily consumption of 375 µg of folic acid through fortified milk intake increases blood folate and lowers homocysteine concentrations over 12 weeks in women of childbearing-age[34]. Another possible explanation for the higher dietary supplementation among multiparae women than among primiparae ones, may be that the first group are more aware of the importance of good nutrition to reduce the risk of maternal and fetal complications, due to the recommendations received during a previous pregnancy[35].

On the other hand, the use of drug-toxicant substances was very different between the two groups of women analyzed. The primiparae group had greater consumption of tobacco and alcoholic drinks, two factors that have been related to adverse outcomes in offspring[36]. The use of tobacco has been clearly associated with delay in conception, lower fecundity rate and both primary and secondary infertility[37], suggesting that perhaps the group of women planning their first pregnancy are less aware on the harms associated to smoking.

Regarding alcohol and addictive drugs consumption, there is no clear evidence that moderate consumption of any of them delayed conception or predisposed to lower rates of fertility[38]. However, this consumption does not appear to be suitable for this population group because they have detrimental effects on fetal development and it is unclear from when and in what quantities in the case of alcohol[39].

Due to the large number of examiners, a possible inter-observer variation was assumed. However, an effort was made to minimize such limitation, providing training to all interviewers on how to administer the survey to participants. Another potential limitation is that the voluntary participation may have resulted in a sample not fully representative due to the origin of the recruitment (pharmacies), although in Spain all population groups have access to the national health system and to free (partial or total) drugs issued in the pharmacy. However, in support of the validity of the investigation, it was carried out in a relatively high number of volunteers. Another limitation is the self-reporting bias of cigarette and illicit drugs consumption. The strength of this study is that the delivered anthropometrical variables and the physical activity and food frequency questionnaires have been validated[23]. Moreover, it provides interesting information to be considered in the design of national nutritional programs to promote health among women of childbearing-age.

Conclusion

In summary, the present study revealed that the profile of Spanish childbearing-age female planning a pregnancy is a woman in her early thirties, who is seeking her first baby. They have a good self-perception of her nutritional and health status, a balanced diet, and importantly, a consumption of tobacco and alcohol. The results according to have a previous offspring suggest that primiparae women have more toxic habits than multiparae women, and although the results reveal no differences in the food consumption, they consumed less fortified food and dietary supplements (iron / iodine) than the group of women seeking their second or subsequent pregnancy.

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