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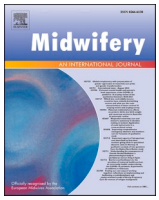

Nutrition education in the midwife consultation room. A cross sectional survey in Spain

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ABSTRACT

Background: Diet during pregnancy is a key factor in the success of pregnancy. However, several studies have found pregnant women have low adherence to dietary recommendations. The midwife is a key health professional to provide nutrition education for pregnant women. Thus, it is important to know in detail her role in this respect. Aim: To explore how Spanish midwives undertake nutrition education in order to assess the need for specific interventions aimed at improving the health of pregnant women. Methods: A cross-sectional descriptive observational study was undertaken using an online questionnaire (466 responses). Findings: Spanish midwives recognise the importance of nutrition in pregnancy and that advising pregnant women in this regard is part of their role. In fact, all community midwives discuss nutrition to pregnant women, although they recognise that they do not feel particularly comfortable in dealing with certain topics, which could be related to a lack of mastery of the subjects. Midwives (56.5 %) rated the nutrition training their received as poor. Conclusion: In order to guarantee the quality in the nutrition education provided by Spanish midwives to promote the health of pregnant women, our results demonstrate the importance of strengthening both the nutrition content of midwives' training programmes and the ongoing support they receive throughout their professional life.

Introduction

A midwife is an individual who has successfully completed a recognised midwifery education programme in the country where it is offered (ICM, 2024; WHO, 1990). There are 143 midwifery associations in 124 countries worldwide (ICM, 2024), however midwifery education is very heterogeneous internationally. The International Confederation of Midwives (ICM) emphasizes the need for specific admission policies to training programmes, as well as the inclusion of both theoretical and practical elements in the curriculum (ICM, 2024). The competencies that midwives must acquire are regulated by law and within these, they must have the knowledge and skills to provide nutrition education to pregnant women (WHO, 1990).

Despite healthcare systems having special guidance for the promotion of healthy habits among pregnant women, several authors point out that pregnant women do not follow food and nutrition recommendations, and micronutrient deficiencies in pregnancy remain widespread worldwide (Gernand et al., 2016). Studies have found that pregnant women do not consume the recommended intake of healthy foods, such as vegetables and fish, they eat more sweets, red meat and processed meats than recommended (Havaš Auguštin et al., 2020; Jardí et al., 2019), and some even consume alcohol (Tomaino et al., 2019). Similarly, many pregnant women have sedentary or inactive lifestyles (Román-Gálvez et al., 2021; Suárez-Martínez et al., 2021).

Given this low adherence of pregnant women to the dietary recommendations, it is important to understand midwives' roles in and attitudes toward nutrition education during pregnancy. In this regard, several authors have observed that nutrition education during pregnancy is not a common practice, despite the growing evidence regarding the importance of dietary advice to reduce the incidence of problems in pregnancy (Arrish et al., 2017; Baron et al., 2017; Lee & Garrod, 2010; McCann et al., 2018). Results of studies from different countries indicate midwives show positive attitudes towards nutrition education during pregnancy and recognise their role as nutrition educators (Arrish et al., 2016, 2017;; McCann et al., 2018; Merkx et al., 2015; Soltani et al., 2017; Willcox et al., 2012). Midwives also lack confidence in providing nutrition education to pregnant women (Macleod et al., 2013; Soltani et al., 2017; Wennberg et al., 2014, 2015) and have poor nutrition knowledge (Elmoneim et al., 2014; Lee & Garrod, 2010; McCann et al., 2018; Merkx et al., 2015;), which they self-report (Basu et al., 2014;

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Bondarianzadeh et al., 2011; Jersey et al., 2018; Wennberg et al., 2015; Willcox et al., 2012).

The evidence in this field is limited to certain geographical areas. There is a lack of studies in Asia or America and the studies carried out in Europe are limited to a few countries (Olloqui-Mundet et al., 2023). In view of the heterogeneity surrounding access to and the structure of midwifery training programmes worldwide, the extrapolation of results between countries is problematic.

At this time in Spain, the midwife is the health professional responsible for providing nutrition advice to pregnant women, as the Dietitian-Nutritionist does not have a prominent role in the Spanish public health system. Thus, the general aim of this study is to explore how midwives undertake nutrition education in Spain. The specific objectives are (i) to explore the attitudes of midwifes towards nutritional education, (ii) to investigate their education in the field of nutrition, and (iii) to explore nutrition-related knowledge among midwifes and influencing factors. No similar study in this country has been undertaken to date. Understanding the midwife's role in nutrition education will enable assessment of the need for specific interventions aimed at improving the health of pregnant Spanish women.

Material and methods

Study design, population, and sample size

A descriptive cross-sectional observational study was carried out. Data were collected via an online questionnaire. The sample size was estimated using the Fisterra calculator taking into account the number of midwives registered in Spain at 31 December 2018 (9214 midwives), a confidence level of 95 %, a precision of 5 % and a proportion of 50 %. The estimated sample size was 434 (considering a loss rate of 15 %).

Dissemination of the questionnaire

Non-probabilistic convenience sampling through distribution of the questionnaire using different means (email, websites and social networks) occurred in 2019. The nursing colleges of the 50 Spanish provinces, along with the two autonomous cities, were contacted via email, taking into account that in Spain, nurses must be registered as members of a nursing college. Thirty two colleges decided to collaborate by sending the survey link to their registered nurse-midwives. Different midwifery associations were also contacted to ensure maximum dissemination of the questionnaire.

Questionnaire design

The questionnaire was developed by the researchers of the study on the basis of previous work (Arrish et al., 2016). Once the questionnaire was designed, it was subjected to an expert judgement assessment (Bradette-Laplante et al., 2017). This assessment was carried out by 6 experts with experience in the field of survey validation and/or in nutrition-related issues, thus conforming to the recommended range of assessors for this type of assessment (Bradette-Laplante et al., 2017). Each expert independently rated each question in the questionnaire according to 4 categories: sufficiency, clarity, coherence and relevance (Bradette-Laplante et al., 2017). All categories were defined on a scale of 1 to 4, where 1 and 4 referred to the lowest and highest level of compliance, respectively. There was also a section of comments on each question allowing the experts to provide additional input. The scores by each of experts were combined and the percentage of validity calculated for each item. The acceptable level was set at 80 %, as this is the minimum value considered to be compatible with adequate validity (Bradette-Laplante et al., 2017). Thus, the questionnaire, initially comprising 53 questions, was reduced to a total of 46 items after the expert judgement evaluation. Eight questions were deleted (3 were removed from the questionnaire because they did not reach 80 % acceptance; 5 were removed after discussion with the experts), one was added, and one was modified. One question was also deleted after discussion within the research group. The questionnaire was finally piloted on a sample of 10 midwives.

Structure of the questionnaire

Section 1 (6 questions): Socio-demographic questions.
Section 2 (6 questions): Nutrition training. In this section, information about the training in nutrition received during the midwifery specialization and since completing such studies.
Section 3 (20 questions): Attitudes towards nutrition education during pregnancy. Information concerning the type of nutrition education provided by the midwife was also collected. Respondents were also asked to rate their comfort level in addressing various topics related to nutrition on a 5-point Likert scale.
Section 4 (13 questions): Knowledge of nutrition. Seven single-answer and six multiple-answer questions were included. In all cases a "don't know/no answer" option was included to avoid forcing a response and ensuring that some correct answers were not the result of chance. In order to obtain the total score for the knowledge test, each single-answer question was scored out of 1 point (7 points in total). Within the multiple-choice questions, one point was awarded for each correct answer (even if not all the correct options were marked), so that this block of questions was assessed out of a total of 22 possible points. Taking these assumptions into account, the maximum score for the knowledge test was set at 29 points, although the final score was expressed out of 10.

Data analysis

Statistical analysis was carried out using Statgraphics-Centurion 19. A descriptive analysis of the data was performed using means and standard deviations or frequencies and percentages (depending on the type of variable). The 5-category Likert-type scales were reduced to 3 levels: "low" (scores 1–2), "moderate" (score 3) and "high" (scores 4–5), in order to simplify the analysis. The distribution of variables was checked, and parametric or non-parametric tests were applied where appropriate. A comparison test of independent means was applied to see if the degree of food knowledge was significantly different between groups. Pearson's correlation test was used to test the correlation between variables. $p < 0.05$ was considered statistically significant.

Ethical considerations

The bioethics committee of the University of Burgos (IR4/2019; 14 January 2019) and of the University Hospital of Burgos (CEIC 2184; 24 September 2019) approved the research study. Informed consent was included in the first part of the questionnaire. This provided a brief explanation of the study's objectives, allowing participants to make an informed and voluntary decision regarding their participation. All data were collected in a completely anonymous and confidential manner.

Results

Description of the sample

A total of 466 responses were received. Taking into account the total number of active midwives registered in Spain at 31 December 2018 (*INE Matronas Colegiadas 31/12/2018*, 2019) the response rate obtained was 6.3 %. Although responses were received from all autonomous regions in Spain, most of them came from Castilla y León (25.1 %), Catalonia (11.7 %), Madrid (11,0 %) and the Basque Country (9.7 %).

Most of the midwives surveyed were female (95.9 %) and under 40 years of age (57.5 %). Despite their youth, a significant percentage (43.6 %) reported having more than 10 years of professional experience.

Almost one in five (19.1 %) of the sample reported having a university master's degree in addition to their own speciality of midwifery and only 12 respondents reported having attained a doctorate degree. Half of the participants worked in the maternity ward (51.1 %) and 40.3 % were community midwives (Table 1). If the sample is limited to community midwives, the percentage of midwives over 50 years old increases (from 23.3 % to 38.3 %) and consequently the years of professional experience (58.6 % of the community midwives had more than 10 years of work experience).

Midwives' attitudes towards nutrition-related issues

Table 2 shows midwives' opinions on the importance of nutrition during pregnancy, as well as on the role of midwives in providing nutrition education to pregnant women. Nearly all surveyed midwives (98.9 %) considered nutrition to be "very important" during this physiological stage of the women's life. Only one midwife highlighted this issue as "not very important". Similarly, the vast majority (95.9 %) rated their role in nutrition education of pregnant women as "very significant".

Provision of nutrition related advice by Spanish midwives

Table 3 presents the midwives' responses to different questions related to the nutrition education they provide to the pregnant women. Nutrition education tasks are directly associated with follow-up consultations over the gestational period. Thus, the data in Table 3 represent only the responses from community midwives, who carry out this follow-up. Midwives in maternity wards have limited contact with pregnant women, restricted to the moment of childbirth.

All participants confirmed they discussed food and nutrition with pregnant women, and 9 out of 10 provided consultation material in the form of leaflets or brochures. Most midwives (57.1 %) discussed these topics in all follow-up visits, although a notable percentage (39.7 %) did so only during the first consultation. Five midwives commented that they only discussed nutrition-related issues with pregnant women who had conditions requiring specific dietary interventions, such as

Table 1
Characteristics of the participants.

	N	%
Gender		
Female	443	95.9
Male	19	4.1
Age		
<30	116	25.3
31–40	148	32.2
41–50	88	19.2
>50	107	23.3
Education		
Nurse obstetric gynecological specialist	365	78.3
Master	89	19.1
PhD	12	2.6
Years of experience		
<2 years	78	16.8
2–5 years	96	20.7
5–10 years	87	18.8
>10 years	202	43.6
Place of work		
Primary care	186	40.3
Delivery room	236	51.1
Other	40	8.7
Territory of work		
Andalusia	26	5.6
Aragon	12	2.6
Asturias	7	1.5
Balearic Islands	16	3.5
Basque Country	45	9.7
Canary Islands	16	3.5
Cantabria	18	3.9
Castile and Leon	116	25.1
Castilla-La Mancha	13	2.8
Catalonia	54	11.7
Extremadura	2	0.4
Galicia	38	8.2
La Rioja	6	1.3
Madrid	51	11.0
Murcia	2	0.4
Navarre	5	1.1
Valencia	33	7.1
Ceuta	1	0.2
Melilla	2	0.4

The sum of frequencies does not amount to the value of 466 (sample size) when any of the answers have been "don't know/don't answer".

Table 2
Attitudes of Spanish midwives towards nutrition-related issues.

QUESTIONS	N	%
How important do you think is nutrition during pregnancy		
High importance	459	98.9
Moderate importance	4	0.9
Low importance	1	0.2
How would you rate the role of midwives in providing food/ nutrition education to pregnant women?		
High importance	444	95.9
Moderate importance	11	2.4
Low importance	8	1.7

The sum of frequencies does not amount to the value of 466 (sample size) when any of the answers have been "don't know/don't answer".

Table 3
Provision of nutrition related-advice by Spanish midwifes.

QUESTIONS	N	%
Do you provide written information about nutrition to pregnant women (leaflets, brochures. . .)?		
Yes	165	89.2
No	20	10.8
Do you provide oral information about nutrition to pregnant women?		
Yes	185	100.0
No	0	0.0
When do you discuss nutrition-related issues with pregnant women?		
At the first antenatal visit	73	39.7
At every prenatal visits	105	57.1
Only when the pregnnat women ask questions	1	0.5
If pregnant women has a medical condition (diabetes…)	5	2.7
I only rarely discuss about nutrition with pregnant women	0	0.0
What barriers do you encounter in providing nutrition information to pregnant women? *		
Lack of maternal interest	76	43.9
Limited time available at the consultation	124	71.7
My knowledge	49	28.3
Lack of reference nutrition expert	38	22.0
Other	19	11.0
What sources of information do you use as a basis for nutritional advice? *		
My own knowledge	109	60.6
I consult other health professionals, such as nutrition experts	57	31.7
I look for information on official sites	140	77.8
Others	44	24.4
Do you have a reference expert on nutrition to consult?		
Yes	12	6.6
No	171	93.4
Do you ever refer pregnant women to the expert on nutrition?		
Yes	35	19.6
No	144	80.4
Do you recommend pregnant women other supplements than iodine or folic acid?		
Yes	67	36.0
No	119	64.0

Only responses from primary care midwives have been included ($N = 186$). The sum of frequencies does not amount to the value of 186 when any of the answers have been "don't know/don't answer".

* Multiple-answer questions.

gestational diabetes.

Lack of available time during consultations was identified as the main barrier for providing nutrition-related advice to pregnant women, followed by a lack of interest from the pregnant women. The midwife's knowledge about nutrition was also highlighted as a major barrier to be addressed. Despite this, when midwives were asked about the sources of information they used as a basis for providing advice on food and nutrition, 60.6 % of responses confirmed they relied on their own knowledge, although 77.8 % also sought information from official organisations. Most midwives (93.4 %) reported they did not have access to an expert in nutrition to consult and consequently 80.4 % stated they had never referred a pregnant woman to a specialist in this field.

It is noteworthy that 36 % of respondents said they recommend the use of supplements other than those routinely prescribed, iodine and folic acid.

Confidence in providing nutrition-related advice

Table 4 provides information on the confidence midwives have when dealing with different topics related to nutrition. As mentioned in the previous section, the table includes only the responses from community midwives, who actually undertake nutrition education for pregnant women.

The vast majority of Spanish midwives surveyed felt especially comfortable talking about general nutrition and diet (75.8 %), weight gain and obesity (73.5 %), dietary supplements (73.6 %), alcohol, tobacco or caffeine consumption (85.5 %), and specific recommendations to alleviate gastrointestinal problems such as nausea, vomiting or constipation (81.7 %), and food safety issues (i.e. listeriosis, toxoplasmosis) (84.4 %). On the other hand, a notable percentage of midwives (59.1 %) rated as low or moderate their confidence when dealing with vegetarianism during pregnancy, gestational diabetes (36.8 %), dietary management of pregnant women with complications during pregnancy (50 %) or specific advice for pregnant women from different cultures or religions (63.9 %).

Education in the field of nutrition among Spanish midwives

Table 5 presents issues related to midwifery training in nutrition.

Surprisingly, 36.5 % of the respondents stated they had not received any education on nutrition and diet during their midwifery specialisation studies, and of those who confirmed they had received such training, more than half (56.5 %) rated it as low. Virtually all Spanish midwives (97.7 %) considered it important to continue training in this area after completing their specialisation studies and, although the majority (61.2 %) stated that they had done so, 36.6 % indicated they had not received any type of refresher training in this area. In fact, when asked about their current level of training in nutrition and diet, the majority (56.6 %) rated it either as low (17 %) or moderate (39.7 %).

When asked, within a closed list of topics, which content had been covered during their training, "nutrition during pregnancy" was the most highlighted, followed by "general information on nutrients", "gastrointestinal problems such as nausea, vomiting or constipation", "alcohol during pregnancy" or "adequate weight gain during pregnancy". In contrast, "nutrition in cases of gestational diabetes", "food safety issues" or "nutrition in disease prevention" were the least emphasised. Although nutrition experts were important teachers in the training of midwives, it should be noted that midwives themselves play an important role in the training of their own colleagues.

Nutrition knowledge of Spanish midwives

Table 6 shows the distribution of correct and incorrect responses to the questions about nutrition knowledge.

Within the block of single response questions, the one with the lowest percentage of correct answers was the recommended weight gain for women who start gestation with a BMI within the normal weight range (18.5–24.9 kg/m^2). The majority (58.1 %) of midwives erroneously considered 9–12 kg to be the appropriate weight gain. However, the vast majority of midwives (95.3 %) were clear that folic acid supplements should be taken at least one month before conception and

Table 4
Confidence of Spanish midwives in providing general and specific nutrition-related advice.

	Low confidence		Moderate confidence		High confidence	
TOPICS	N	%	N	%	N	%
General nutrition-related advice	7	3.8	38	20.4	141	75.8
Weight gain and obesity	13	7.0	36	19.5	136	73.5
Nutritional supplements	13	7.1	35	19.2	134	73.6
Vegetarian and/or vegan diets	59	33.5	45	25.6	72	40.9
Gestational diabetes	21	11.5	46	25.3	115	63.2
Diets for pregnant women with complex medical conditions	32	18.6	54	31.4	86	50.0
Diets in different cultures or religions	57	33.1	53	30.8	62	36.0
Caffeine, alcohol, tobacco, or other drugs	12	6.5	15	8.1	159	85.5
Gastrointestinal problems (i.e. nausea, constipation or gastric acidity)	7	3.8	27	14.5	152	81.7
Food safety (listeriosis, toxoplasmosis, mercury. . .)	6	3.2	23	12.4	157	84.4

Only responses from primary care midwives have been included ($N = 186$). The sum of frequencies does not amount to the value of 186 when any of the answers have been "don't know/don't answer".

Table 5
Education in the field of nutrition among Spanish midwifes.

QUESTIONS	N	%
How do you currently view your training in nutrition?		
Low	79	17.0
Moderate	185	39.7
High	202	43.3
Did you receive nutrition training during your midwifery studies?		
Yes	255	54.7
No	170	36.5
I don't remember	41	8.8
How would you rate the amount of training you have received?		
Low	261	56.5
Moderate	148	32.0
High	53	11.5
Have you received nutrition training since you completed your midwifery studies?		
Yes, and I consider it necessary	284	61.1
Yes, although I don't consider it necessary	3	0.6
No, although I consider it necessary	170	36.6
No, and I don't consider it necessary	7	1.5
I don't remember	1	0.2
Who provided such nutrition training?		
Nutrition experts	191	42.5
Midwives	150	33.4
Obstetrician or other doctors	27	6.0
Please indicate the contents that were addressed in the training received *		
General information on nutrients	221	55.1
Nutrition in disease prevention	156	38.9
Nutrition during pregnancy	348	86.8
Healthy weight gain range during pregnancy	207	51.6
Nutritional management/control of gestational diabetes	134	33.4
Alcohol and pregnancy	207	51.6
Gastrointestinal problems (nausea, constipation or gastric acidity)	208	51.9
Food safety	139	34.7
Others	48	12.0

The sum of frequencies does not amount to the value of 466 (sample size) when any of the answers have been "don't know/don't answer".
* Multiple-answer questions.

Table 6
Nutritional knowledge of Spanish midwives.

SINGLE-ANSWER QUESTIONS	N	%
Are there any difference in the energy requirements during the different trimesters of pregnancy?		
Yes	423	91.2
No	23	5.0
What is the recommended weight gain for a woman who started her pregnancy at a normal weight (BMI = 18.5–24.9 kg/m^2)?		
9,0 - 12,0 kg	270	58.1
11,5 - 16,0 kg	190	40.9
17,0 - 22,5 kg	0	0
23,0 - 28,5 kg	1	0.2
The most important supplement for pregnant vegetarian women is:		
Vitamin B12	370	79.6
Folic acid	54	11.6
Iron	27	5.8
The amount of folic acid supplement recommended during pregnancy is:		
200 µg	69	14.8
400 µg	369	79.2
500 µg	9	1.9
When should be taken the folic acid supplement to prevent neural tube defects?		
During the first trimester of pregnancy	10	2.1
When she firts knows that she is pregnant	5	1.1
During the whole pregnancy	7	1.5
At least one month before pregnancy and during the firt 3 months of pregnancy	444	95.3
What is the recommended daily intake of iodine for a pregnant woman?		
200 µg	387	83.8
300 µg	37	8.0
500 µg	5	1.1
What are the recommended daily servings of dairy to meet calcium requirements during pregnancy?		
1–2	64	13.9
3–4	359	77.9
5 or more	16	3.5
MULTIPLE-ANSWER QUESTIONS		
Among the following foods: which ones do you consider to be rich in iron?		
Red meat	427	91.6
Legumes	395	84.8
Fish	122	26.2
Green leafy vegetables	288	61.8
All correct selected	83	17.8
Among the following foods: which ones do you consider to have the most bioavailable iron?		
Red meat	326	70.6
Legumes	144	31.2
Fish	62	13.4
Green leafy vegetables	89	19.3
All correct selected	50	10.8
Among the following proposals: which can help combat constipation during pregnancy?		
Adequate water intake	457	98.3
Physical activity	455	97.8
Fruit and vegetables	459	98.7
Meat	2	0.4
All correct selected	446	95.9
What advice would you provide to reduce nausea and vomiting during pregnancy?		
Drinking plenty of fluids during meals	5	1.1
Avoid fatty or spicy foods	361	77.8
Reduce the number of meals per day	24	5.2
Minimize odors while cooking	323	69.6
Snacking	110	23.7
Eat something solid before getting up in the morning	438	94.4
All correct selected	187	40.3
Which fish should be avoided during pregnancy because of high mercury levels?		
Swordfish	433	93.5
Anchovies	7	1.5
Tuna	252	54.4
Pike	151	32.6
Bluefin tuna	410	88.6
Shark	411	88.8
Horse mackerel	12	2.6
Salmon	69	14.9
All correct selected	83	17.9
Which foods should be avoided during pregnancy because of listeria/toxoplasma-related risks?		
Salads in a bag	148	31.8
Cured raw meat products (chorizo, sausage, cured ham…)	393	84.5
Refrigerated pate (not sterilised)	411	88.4
Unpasteurised milk and milk products	430	92.5
Smoked fishery products requiring refrigeration	284	61.1
Raw fish or shellfish	310	66.7
All correct selected	95	20.4

Correct answers appear underlined in the table. In “Single-answer questions” the sum of frequencies does not amount to the value of 466 (sample size) when any of the answers have been “don’t know/don’t answer”.

during the first 3 months of pregnancy to prevent neural tube defects in the newborn; and there are differences in the energy requirements of pregnant women during different trimesters of pregnancy (91.2 %). Most respondents (83.8 %) also correctly identified the daily iodine requirements for pregnant women, the recommended folic acid supplementation (79.2 %), and the most important vitamin supplementation for the vegetarian pregnant women (79.6 %). More than three quarters of the respondents were aware of the recommended servings of dairy to meet calcium needs during pregnancy, however, 14 % wrongly considered that pregnant women should consume 1–2 servings daily from this food group.

In relation to the multiple-choice questions (Table 6), the question corresponding to the recommended guidelines to alleviate constipation received the highest percentage of correct answers; 95.9 % of midwives identified the three correct guidelines (adequate intake of water, physical activity, fruit and vegetables) within the proposed list. The remainder of the multiple-choice questions received correct answer percentages below 50 %. Specifically, only 40.3 % of the respondents identified the three guidelines to be followed to avoid nausea and vomiting during pregnancy, although these guidelines, individually, were correctly identified by more than 69 % of the midwives. Only 20.4 % of the midwives identified all foods to be avoided due to risk of listeriosis or toxoplasmosis, however, all of them were individually identified by more than 60 % of the respondents. Unfortunately, almost 70 % of the midwives were unaware “ready-to-eat bagged salads" are potential vehicles for *Listeria monocytogenes* contamination. Only 17.9 % of the midwives identified the four fish that should be avoided during pregnancy because of their high mercury content. While the majority of respondents identified swordfish (93.5 %), shark (88.8 %) and bluefin tuna (88.6 %), only 32.6 % recognised pike as a potential source of heavy metals. Notably, 54.4 % of the midwives erroneously included tuna in the group of fish to avoid. Concerning iron-rich foods, only 17.8 % of the respondents were able to recognise the four iron-rich foods in the proposed list. Red meat was the main food identified in this respect (91.6 %), followed by legumes (84.8 %), and green leafy vegetables (61.8 %). Only 26.2 % of the midwives included fish in this food group. Finally, the worst results were observed when asked about iron bioavailability in different foods. A large majority (89.2 %) of the midwives were unable to identify red meat and fish as foods with higher iron bioavailability than plant-based foods. Although 70.6 % of the participants identified red meat as having high iron bioavailability, legumes were the second most misidentified choice (31.2 %), well above fish (13.4 %).

The mean knowledge score obtained by Spanish midwives was 7.43 (SD 1.24) out of 10, with a minimum score of 3.10 and a maximum score of 10. Significantly ($p < 0.05$) higher scores were observed for: community midwives (7.68±1.04) compared to those working in the

maternity ward (7.28±1.27); those with less than 10 years of experience (<2 years: 7.72±1.02; 2–5 years: 7.74±1.03; 6–10 years: 7.62±0.87) compared to those with more than 10 years of experience (7.08±1.46); those under 30 years of age (7.8 ± 0.98) versus those older (31–40 years: 7.63±0.95; 41–50 years: 7.34±1.19; >50 years: 6.87±1.66); those who were very comfortable (7.66±1.11) or moderately comfortable (7.51 ±1.23) in discussing weight gain and obesity during pregnancy versus those who felt uncomfortable (6.80±1.60); those who felt very comfortable discussing alcohol, caffeine and smoking in pregnancy (7.61±1.16) versus those who felt uncomfortable (7.11±1.69); those who were very comfortable talking about food safety (7.64±1.19) versus those who were moderately (7.31±1.05) or not very (6.84±1.80) comfortable doing so; those who felt they were currently well educated in nutrition (7.59±1.22) versus those who felt moderately educated (7.25±1.23).

Significant ($p < 0.05$) correlations were found between the variable "nutrition knowledge" and the variables "age", "comfort in giving general nutrition advice", "comfort in discussing recommended weight gain range in pregnancy and obesity", "comfort in discussing alcohol, caffeine and tobacco in pregnancy", "comfort in discussing gastrointestinal problems in pregnancy" and "comfort in discussing food safety".

Discussion

Understanding the current scenario of nutrition education in midwifery practice is essential to identify potential deficiencies and, if necessary, propose improvement interventions.

Spanish midwives consider nutrition during pregnancy to be a very important issue and highlight the relevance of their role in providing nutrition education to pregnant women. In line with our results, in a sample of New Zealand midwives, 98 % of respondents considered nutrition in pregnancy important or very important and 94 % considered their role in this respect significant or very significant (Elias & Green, 2007). Similar results have been observed in other studies with Australian (Arrish et al., 2016) Dutch (Merkx et al., 2015) and English midwives (Lee & Garrod, 2010; McCann et al., 2018; Soltani et al., 2017).

Our results indicate that all the Spanish midwives surveyed reported they discuss food and nutrition with pregnant women, as recommended by World Health Organization (WHO, 2007) and they do so, mostly, at each visit. However, 39,7 % of the midwives do so only at the first visit and some midwives even seem to discuss these issues only in the case of pregnancies with complications, in line with a recent Lebanese study (Rizk et al., 2023) including 200 healthcare professionals responsible for pregnancy follow-up, 19 of them midwives. This could be related to the limited time available to the midwife for each follow-up visit. This barrier was mentioned by 7 out of 10 Spanish midwives, consistent with the results observed in previous work with midwives from different backgrounds (Australian (Arrish et al., 2016; Willcox et al., 2012), English (Lee & Garrod, 2010; Macleod et al., 2013; McCann et al., 2018; Soltani et al., 2017), Cyprus (Middleton et al., 2022), or Swedish (Wennberg, Hamberg, & Hörnsten, 2014)), which forces them to cover many topics in a short time and to prioritise some over others. Another barrier mentioned by Spanish midwives is the lack of maternal interest. Different authors have also noted a lack of motivation on the part of pregnant women to make changes; pregnant women seem to be much more interested in hearing the foetal heartbeat or seeing their image on an ultrasound scan (Wennberg et al., 2015). Some midwives even consider that the first visit is too late in pregnancy to address the topic of nutrition, or that they lack the resources (Arrish et al., 2017; Willcox et al., 2012) or clear guidelines for providing nutrition advice (Soltani et al., 2017). Spanish midwives in this study highlight as a limitation when dealing with nutrition education for pregnant women their lack of knowledge on the subject. Similar findings have also been found by others, including their Australian (Arrish et al., 2016, 2017), English (Macleod et al., 2013) or Swedish counterparts (Wennberg et al., 2015).

In contrast, a study of Kenyan midwives found 76.4 % felt they had up-to-date knowledge (Tallam, Kaura, & Mash, 2022). The level of nutrition knowledge of Spanish midwives was observed to be in line with the results obtained by Arrish et al., Rizk et al. and Lee et al., (Arrish et al., 2016; Lee et al., 2016; Rizk et al., 2023). More than half did not correctly identify the range of healthy weight gain when pregnancy begins within the normal weight range, despite the known relationship between inadequate weight gain and health problems for mother and foetus, or complications during childbirth (Chen et al., 2016; Kibret et al., 2019). The same difficulties in recognising the healthy weight gain range during pregnancy were found in midwives from Ghana (Christiana & Evelyn, 2017), New Zealand (Elias & Green, 2007), UK (Lee & Garrod, 2010; McCann et al., 2018), and Netherlands (Merkx et al., 2015). Nine out of 10 Spanish midwives were aware that energy requirements vary throughout the different trimesters of pregnancy and were mostly aware of the need for iodine and folic acid supplementation for all pregnant women and vitamin B12 for vegetarian pregnant women. Familiarity with these topics may reflect the presence of this information in the pregnancy monitoring and pregnancy nutrition guides available to Spanish midwives. Requirements also known by the English midwives in the study by McCann et al. (McCann et al., 2018) and by the Lebanese midwives (Rizk et al., 2023) and with different results among Australian midwives, as those in the study by Arrish et al. (Arrish et al., 2016) were aware of their folic but not their iodine requirements, and those in the study by Othman et al. (Othman et al., 2020) failed to identify iodine and folic acid and vitamin B12 requirements for vegetarian pregnant women. The majority of Spanish midwives were aware of the dairy consumption recommendations (3–4 servings per day), compared to the poor result obtained in Australian (27 % correct) (Arrish et al., 2016) or Lebanese midwives (Rizk et al., 2023). The results were worse for the multiple-choice questions in the knowledge test, where most of the midwives recognised individual items, but were unable to get all the items correct for each question. The four iron-rich foods were only identified by 17.8 % of Spanish midwives, who broadly recognised red meat and legumes, but not fish or green leafy vegetables, compared to 9 % for Australian midwives; and only 1 in 10 Spanish midwives identified the foods with the most bioavailable iron. Nor do midwives in the African study by Elmoneim et al. (Elmoneim et al., 2014) nor did Lebanese midwives, with only 9.2 % accuracy (Rizk et al., 2023). Smoked foods, raw fish, seafood and ready-to-eat bagged salads were not widely identified as foods to avoid due to risk of listeria or toxoplasma. Neither was pike as a fish to avoid due to high mercury content (32.6 %), while tuna was erroneously included by more than half of the midwives, thus confusing it with bluefin tuna. Almost all midwives have basic guidelines for the management of constipation, as well as nausea and vomiting associated with pregnancy. Previous studies have already detected poor nutritional knowledge in English midwives (Lee & Garrod, 2010; Mulliner et al., 1995) Australian (de Jersey et al., 2018; Othman et al., 2020; Schmied et al., 2011) and Sudanese (Elmoneim et al., 2014) as well as in Ghanaian midwives-in-training (Christiana & Evelyn, 2017). It is also worth noting that one third of the respondents admitted recommending supplements other than folic acid and iodine; contrary to the guidelines set by WHO and SEGO (Spanish Society of Gynaecology and Obstetrics), which in developed countries recommend exclusively folic acid and iodine supplements, and in certain cases and trimesters, iron. This also demonstrates a lack of knowledge at this respect.

In summary, the Spanish midwives showed the basic knowledge that is included in the pregnancy monitoring guidelines but have difficulties in identifying more specific issues. Several factors influence the nutritional knowledge of Spanish midwives. On the one hand, the place where they provide their care, with better results among midwives working in primary healthcare centres. In these centres, pregnancy is monitored from the time it is diagnosed until 40 days after childbirth, something that could be related to a high sense of responsibility from the part of the midwife when advising on nutrition, and may them to actively seek knowledge in this area, compared to midwives working in

maternity wards, who are probably less used to dealing with health education in pregnancy, as they only accompany pregnant women on the day of childbirth. The training in nutrition that midwifes receive during their speciality does not influence their knowledge, which confirms their own feeling of being insufficient, although better results among those midwives who consider their nutrition training to be very good at the present time were observed. The years of professional experience are inversely proportional to the nutrition knowledge shown by Spanish midwives. Despite the fact that experience is valuable, newer generations, trained more recently, may have benefited from educational programs where nutrition has gained more importance, and they would have fresher theoretical knowledge, emphasizing the need for ongoing education and updates for midwives. This result reinforces the need for continuous education and updating of midwives. It is also worth noting that midwives who feel more comfortable discussing topics related to nutrition in pregnancy, recommended weight gain, consumption of substances such as caffeine, alcohol or tobacco, or food safety obtained better results in the knowledge test; it is logical to think that one feels comfortable when discussing a topic that one controls, lack of knowledge generates discomfort and insecurity. In line with our results, the English midwives stated that they only offered nutritional advice when they were confident with their knowledge of the topic (Lee & Garrod, 2010).

This lack of solid, in-depth knowledge could explain the lack of comfort that Spanish midwives feel when dealing with certain topics such as vegetarianism and veganism, the diets of pregnant women from other religions and/or cultures, or when they must deal with pregnant women with complex medical problems. Several studies from other countries have shown similar discomfort experienced by midwives when dealing with pregnant from other cultures, religions or from disadvantaged socio-economic backgrounds (Mulliner et al., 1995; Wennberg et al., 2014, 2015); vegetarian women (only a minority of English midwives (Macleod et al., 2013; Soltani et al., 2017) were comfortable providing nutritional advice and less than half of Sudanese (Elmoneim et al., 2014) or Lebanese midwives (Rizk et al., 2023) claimed to be comfortable discussing vegetarian diets); recommended weight gain range(Haakstad et al., 2020; Merkx et al., 2015; Schmied et al., 2011); or obese women (Swedish midwives found it particularly challenging to advise pregnant women with obesity (Wennberg et al., 2014, 2015), since it was a particularly uncomfortable topic (Macleod et al., 2013).

Nutrition education is one of the competencies included in the duties of midwives and training in this area should have a solid foundation. However, almost half of the Spanish midwives surveyed stated they had received no training in nutrition, or could not recall it, during their specialisation and 56 % of those who did receive training rated it as poor. In fact, 60 % of Spanish midwives continue their training after completing the specialisation, consistent with Lebanese midwives (Rizk et al., 2023), and they consider it necessary, as also reported by English midwives in previous studies (Lee & Garrod, 2010; Soltani et al., 2017). In contrast, Ugandan midwives do not obtain specific training in nutrition while in practice (Nankumbi et al., 2018). Research conducted by Basu et al. (Basu et al., 2014) in the UK and by Othman et al. (Othman et al., 2020) and by Jersey et al. (Jersey et al., 2013) in Australia, have found that interventions related to nutrition, providing training to midwives, improve both their knowledge and comfort in approaching nutrition education with pregnant women. These types of interventions are not known for Spanish midwives.

Faced with the scenario of a lack of training, knowledge and confidence concerning the nutrition education task in midwifery practice, the question arises about the important role of the dietician-nutritionist in the Spanish National Health System. They are the only health professionals specifically trained to deal with issues related to nutrition. Either as trainers or as educators, they have an important role in the multidisciplinary team in charge of the important task of guaranteeing the health of mother and child. However, our results show that a large majority of the surveyed midwives do not have a nutrition expert to consult when needed. Consequently, few midwives refer their patients to the nutrition expert. In contrast, in a Lebanese study, 70 % of those responsible for prenatal care reported having a nutritionist whom they could consult (Rizk et al., 2023).

Limitations of the study

One of the limitations identified in the present study is related to the questionnaire used to measure nutrition knowledge, which only included general questions on nutrition during pregnancy, making it difficult to assess the actual level of knowledge of midwives. Validated tools for this purpose were not found, which could be the basis for future studies. Similarly, the type of sampling may have biased the characteristics of the participants, perhaps favouring the participation of those with a greater interest in nutrition related issues. The quantitative design used in this study limits the information that can be obtained from the results. A mixed approach, including structured interviews with Spanish midwives and consequent qualitative analysis of the data, could maximise the information on Spanish midwives. Therefore, some of the results obtained in this study should be interpreted with some caution.

Conclusions

Spanish midwives are aware of the importance of nutrition in pregnancy and their role in the nutrition education of pregnant women. However, despite being the best positioned health professionals to carry out such education in the Spanish public health system, they do not feel particularly comfortable when addressing certain topics related to food and nutrition. Unfortunately, a majority of Spanish midwives in this survey considered the nutrition training they received as insufficient, which likely resulted in their poor level of knowledge and lack of confidence to undertake this role. It would be interesting to review the training programmes of Spanish midwives to assess how, when and in what depth nutrition-related topics are addressed and, if necessary, to give them the importance they deserve. Likewise, designing continuous training activities for midwives, with updated content based on the available evidence and tailored to needs, would be a key starting point to ensuring good nutritional status among Spanish pregnant women.

Ethical approval

The bioethics committee of the University of Burgos (IR4/2019; 14 January 2019) and of the University Hospital of Burgos (CEIC 2184; 24 September 2019) approved the research study.

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CRediT authorship contribution statement

Mª Josefa Olloqui-Mundet: Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation. **María del Mar Cavia:** Writing – review & editing, Methodology. **Sara R. Alonso-Torre:** Writing – review & editing, Methodology. **Celia Carrillo:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

None.

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