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Despite intention to breastfeed, smoking during pregnancy is associated with shorter breastfeeding duration

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ABSTRACT

While maternal smoking is associated with lower breastfeeding rates, the intention to breastfeed is simultaneously related to higher breastfeeding success. This study aimed to *i)* analyse the association between maternal smoking and breastfeeding success in a cohort of women who intended to breastfeed and *ii)* characterise smokers according to a set of diverse variables in order to define efficient breastfeeding promotion interventions. This prospective observational study involved 401 pregnant women who intended to breastfeed. Breastfeeding success was evaluated in relation to maternal smoking status during pregnancy from birth to the first year, along with physiological and socio-cultural variables. Those who smoked during pregnancy had shorter breastfeeding durations when compared to non-smoking mothers. However, smoking cessation during breastfeeding was associated with longer breastfeeding duration. Mothers who smoked during pregnancy were significantly younger, had a lower level of education, gained more weight during pregnancy, used more oxytocin during labour, used a teat or pacifier more often and exclusively breastfed less during the first week. Knowledge of the characteristics of smoking mothers and their breastfeeding practices should help to improve the effectiveness of breastfeeding promotion strategies.

1. Introduction

Smoking is one of the most preventable health risks in the human population (European Commission, 2004). Serious risks that affect the foetus, newborn, and child are added if smoking occurs during pregnancy (World Health Organization (WHO) 2013). In Europe, the prevalence of smoking during pregnancy ranges from 5 to 22% (European Commission, 2010). In the Basque Country (a region north of Spain), 25% of women aged from 25 to 44 years smoked regularly in 2013 (EUSTAT, 2018). While there are no official data on smoking during pregnancy in Spain, recent articles provide rates ranging from 12.5 to 20.4% (Villar et al., 2018; Lechosa-Muñiz et al., 2019; Sequí-Canet et al., 2022).

However, the harm exerted by smoking during pregnancy is not only related to tobacco use itself. The association between smoking during pregnancy and lower breastfeeding (BF) prevalence has previously been documented and associated with poorer infant health outcomes (Cohen et al., 2018; WHO, 2003). Therefore, to the adverse direct consequences of smoking during pregnancy the harm caused by not engaging in BF or providing a shorter BF duration is also added.

However, while smoking during pregnancy has been associated to lower BF intention (Donath and Amir, 2003), it remains controversial

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whether the effect of smoking on BF is independent or—on the contrary—linked to its relationship with BF intention. It remains unclear if intention to breastfeed might counteract the lower BF prevalence in smoking pregnant women.

Given the negative consequences of smoking during pregnancy it would be of great interest to design a specific smoking cessation program that includes the special characteristics of these women, such as specific ceasing motivations, additional difficulties due to the limited availability of pharmacotherapy allowed for pregnant women, doubts about simultaneous smoking and breastfeeding, and psychological aspects such as anxiety and gilt that may often appear. It is, therefore, necessary to go in depth in the circumstances that surround smoking women in order to implement these strategies.

The present study aimed to *i)* analyse the association between smoking during pregnancy and smoking cessation on BF success in a cohort of women who intend to breastfeed and *ii)* characterise smokers according to a set of diverse variables to better inform the design of smoking cessation and BF promotion interventions.

2. Methods

2.1. Design and participants

This was a prospective observational study that involved the recruitment of 401 pregnant women attending midwife offices of the Basque Public Health Service in the city of Bilbao (Spain) and adheres to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cohort studies (STROBE, 2020).

A cohort of pregnant women expecting to give birth between July 2012 and June 2013 was recruited after their 20th week of pregnancy at the midwife offices of the Basque Public Health Service (Osakidetza) and was followed up until complete weaning or the first year after birth.

To calculate the required sample size, based on the number of pregnant women in the city of Bilbao during the 2 years prior to the beginning of the study, a tool developed by López et al. (2012) was used. Also, a pre-test with 20 women was conducted but data were not used for this study.

The participants of this study included 401 pregnant women between 18 and 48 years of age. The eligibility criteria were: *i)* being attended by a midwife in the Basque Public Health Service in the city of Bilbao, *ii)* certain or probable intention to breastfeed, *iii)* having a singleton pregnancy, *iv)* being older than legal age (>18), *v)* speaking Spanish, and *vi)* having the availability to follow up for one year.

2.2. Variables and data collection

BF-related variables were the main outcomes and were defined as follows: 'BF': exclusive BF or BF with any other food or liquid (including non-human milk and formula); 'BF duration': measured in days until the last moment of any BF; 'Time of formula introduction': measured in months until formula feeding was initiated (hospital supplements excluded).

Smoking-related variables were defined as follows: 'smoking during pregnancy': smoking occurred at any time during pregnancy (excluding those who stopped smoking soon after discovering their pregnancy); 'occasional smokers': those who smoked sporadically (less than one cigarette per day); 'regular smokers': those who smoke one or more cigarettes per day; 'ex-smokers': those who stopped smoking more than 1 year before becoming pregnant; 'cessation before pregnancy': those who stopped smoking within 1 year of becoming pregnant; 'cessation at pregnancy': those who stopped smoking soon after discovering their pregnancy.

Potential confounders and explanatory variables were also evaluated, such as socio-cultural variables (maternal age, partnered, educational level, country of origin and employment status), physiological factors (obesity, physical activity, diet and weight gain during pregnancy, perceived breast enlargement, and anaemia), characteristics of birth and newborns (spontaneous labor onset, eutothic birth, use of oxytocin, skin-to-skin contact, early BF, Apgar score and neonatal weight). Finally, the following attitudes and practices towards BF were also evaluated (attendance at maternal education courses, having BF intention before getting pregnant, comfortable with public BF, use of a teat or a pacifier in the first week, exclusive BF at the hospital and in the first week and bedsharing practices). Detailed description of the variables and data collection method can be found in Gutierrez-de-Teran-Moreno et al. (2022).

2.3. Ethical considerations

Ethical approval was granted by University of the Basque Country CEISH/40/2010/ SANZ ECHEVARRIA and CEISH/236M/2013/ RUIZ LITAGO Human Research Ethics Committee. The project also obtained the authorisation of the Basque Public Health Service.

All pregnant women who were invited to participate were informed about the objectives of the study and what their collaboration involved. They also signed an informed consent form accepting their participation, which was in accordance with the legislation in force. These documents explicitly mentioned the confidentiality of the data and their ability to revoke consent and leave the study at any time.

2.4. Data analysis

Statistical analysis was carried out using IBM SPSS (version 27) software. For the descriptive analysis, the frequency and percentage of women in each category are presented. Findings are also presented as breastfeeding odds ratios (ORs) for non-smoking women with 95% confidence intervals (CIs) and p values after adjusting for potential confounders such as maternal age and educational level.

Kaplan-Meier survival curves were used to compare BF duration and the time of formula introduction according to smoking status during pregnancy. Significance was assessed using log-rank (Mantel-Cox) p values.

Differences between median values of BF duration were calculated according to smoking status and smoking intensity. For comparison, the median in each subgroup was calculated along with Mann-Whitney *U* test p-value. Also, to compare BF duration according to smoking cessation and smoking intensity, the median in each subgroup was calculated along with Kruskal-Wallis p values with Bonferroni correction.

Statistical significance was considered when $p < 0.05$.

3. Results

3.1. Sample description

Although a total of 405 women were initially assessed for eligibility, four were excluded during pregnancy for not meeting the study criteria (one late diagnosed twin pregnancy, one foetus died before birth and two women declined to participate). The study began by following up with 401 women. However, two women were lost after the first month (one moved and the other voluntarily left the study), even though they allowed the researchers to use their data collected up to that date. Ultimately, 399 women were followed up to the 12th month. Descriptive data for the analysed variables are presented in Table 1.

Regarding socio-cultural variables, women who smoked during pregnancy were significantly younger ($p = 0.008$) and had a lower educational level ($p = 0.002$). Moreover, the only physiological parameter found to be significant was weight gain during pregnancy ($p = 0.049$), which was more adequate among non-smoking pregnant women. Regarding birthing and newborn characteristics, smoking mothers used more oxytocin ($p = 0.033$) during labour than non-smokers. Finally, women who smoked during pregnancy used teats or pacifiers more often ($p < 0.001$) and exclusively breastfed less during

Table 1
Characteristics of the total sample and by smoking status during pregnancy.

		Total (n = 401)	Non-smokers (n = 338)	Smokers (n = 63)	p
		n (%)	n (%)	n (%)	
Socio-cultural factors					
Maternal age	≥30	307 (76.6)	267 (79.0)	40 (63.5)	**0.008**
	<30	94 (23.4)	71 (21.0)	23 (36.5)	
Partnered	Yes	379 (94.5)	321 (95.0)	58 (92.1)	0.353
	No	22 (5.5)	17 (5.0)	5 (7.9)	
Country of origin	Spain	331 (82.4)	274 (81.1)	57 (90.5)	0.071
	Outside Spain	70 (17.5)	64 (18.9)	6 (9.5)	
Years of education	≥12 years	333 (83.0)	289 (85.5)	44 (69.8)	**0.002**
	<12 years	68 (17.0)	49 (14.5)	19 (30.2)	
Working status	Works regularly	307 (76.6)	259 (76.6)	48 (76.2)	0.940
	Does not work	94 (23.4)	79 (23.4)	15 (23.8)	
Physiological factors					
Obesity (BMI ≥30)	No	360 (10.2)	303 (89.6)	57 (90.5)	0.842
	Yes	41 (89.8)	35 (10.4)	6 (9.5)	
Weight gain during P	Adequate	248 (61.8)	216 (63.9)	32 (50.8)	**0.049**
	Inadequate	153 (38.2)	122 (36.1)	31 (49.2)	
Physical activity during P	Adequate	178 (44.4)	151 (44.7)	27 (42.9)	0.790
	Insufficient	223 (55.6)	187 (55.3)	36 (57.1)	
Perceived breast enlargement	Yes	266 (66.3)	221 (65.4)	45 (71.4)	0.353
	No	135 (33.7)	117 (34.6)	18 (28.6)	
Anaemia at 3rd trimester	Yes	69 (17.2)	57 (16.9)	12 (19.0)	0.674
	No	332 (82.8)	281 (83.1)	51 (81.0)	
Anaemia 24 h after birth	Yes	186 (46.4)	154 (49.2)	32 (54.2)	0.479
	No	186 (46.4)	159 (50.8)	27 (45.8)	
Characteristics of birth and newborn					
Spontaneous labour onset	Yes	255 (63.6)	219 (66.4)	36 (59.0)	0.270
	No	136 (33.9)	111 (33.6)	25 (41.0)	
Eutocic birth	Yes	259 (64.6)	219 (64.8)	40 (63.5)	0.843
	No	142 (35.4)	119 (35.2)	23 (36.5)	
Use of oxytocin in labour	Yes	301 (75.1)	247 (73.1)	54 (85.7)	**0.033**
	No	100 (24.9)	91 (26.9)	9 (14.3)	
Use of analgesia in labour	Yes	377 (94.0)	317 (93.8)	60 (95.2)	0.657
	No	24 (6.0)	21 (6.2)	3 (4.8)	
Skin-to-skin contact	≥1h	343 (90.5)	285 (89.3)	58 (96.7)	0.076
	<1h	36 (9.5)	34 (10.7)	2 (3.3)	
Early breastfeeding (2h)	Yes	353 (88.0)	301 (89.1)	52 (82.5)	0.144
	No	48 (12.0)	37 (10.9)	11 (17.5)	
Apgar score 5 min	<9	29 (7.2)	26 (7.7)	3 (4.8)	0.411
	≥9	372 (92.8)	312 (92.3)	60 (95.2)	
Neonatal weight (2500–4000 g)	Yes	365 (91.0)	308 (91.1)	57 (90.5)	0.869
	No	36 (9.0)	30 (8.9)	6 (9.5)	
Attitudes and practices towards breastfeeding					
Attendance to ME courses	Yes	348 (86.8)	297 (87.9)	51 (81.0)	0.137
	No	53 (13.2)	41 (12.1)	12 (19.0)	
Pre-pregnancy BF intention	Yes	332 (82.8)	280 (82.8)	52 (82.5)	0.954
	No	69 (17.2)	58 (17.2)	11 (17.5)	
Comfortable with public BF	Yes	212 (52.9)	179 (53.0)	33 (52.4)	0.933
	No	189 (47.1)	159 (47.0)	30 (47.6)	
Use of a teat or pacifier (1st week)	Yes	172 (42.9)	132 (39.1)	40 (63.5)	**<0.001**
	No	229 (57.1)	206 (60.9)	23 (36.5)	
Exclusive BF at hospital	Yes	197 (49.1)	164 (48.8)	32 (50.8)	0.773
	No	204 (50.9)	172 (51.2)	31 (49.2)	
Exclusive BF at 1st week	Yes	297 (74.1)	257 (76.0)	40 (63.5)	**0.037**
	No	104 (25.9)	81 (24.0)	23 (36.5)	
Bedsharing	Yes	323 (80.5)	273 (81.5)	50 (79.4)	0.693
	No	75 (18.7)	62 (18.5)	13 (20.6)	

Abbreviations: BF: breastfeeding; BMI: body mass index; ME: maternal education; P: pregnancy.

the first week (p = 0.037) (Table 1). The timing of formula introduction was also compared with survival curves. Mothers who smoked during pregnancy introduced formula significantly (p = 0.005) sooner when compared to non-smokers (Fig. 1B), with a median time of formula introduction of 1 month for mothers that smoked during pregnancy and 5 months for non-smokers.

3.2. Breastfeeding outcomes related to smoking status

3.2.1. Breastfeeding prevalence

BF prevalence was evaluated in the total sample and regarding smoking status at specific time points (hospital, 1st week and 1st, 3rd, 4th, 6th, and 12th month). Table 2 presents the frequency and percentage of mothers who breastfed, breastfeeding ORs for non-smoking women adjusted for mothers' age and educational level, 95% CIs, and p values. Significant differences in BF prevalence between smokers and non-smokers, were observed from the 1st week up to the 6th month (Table 2).

3.2.2. Breastfeeding duration in relation to smoking status, smoking cessation, and smoking intensity

The survival analysis presented in Fig. 1A outlines BF duration differences between women who smoked during pregnancy compared to

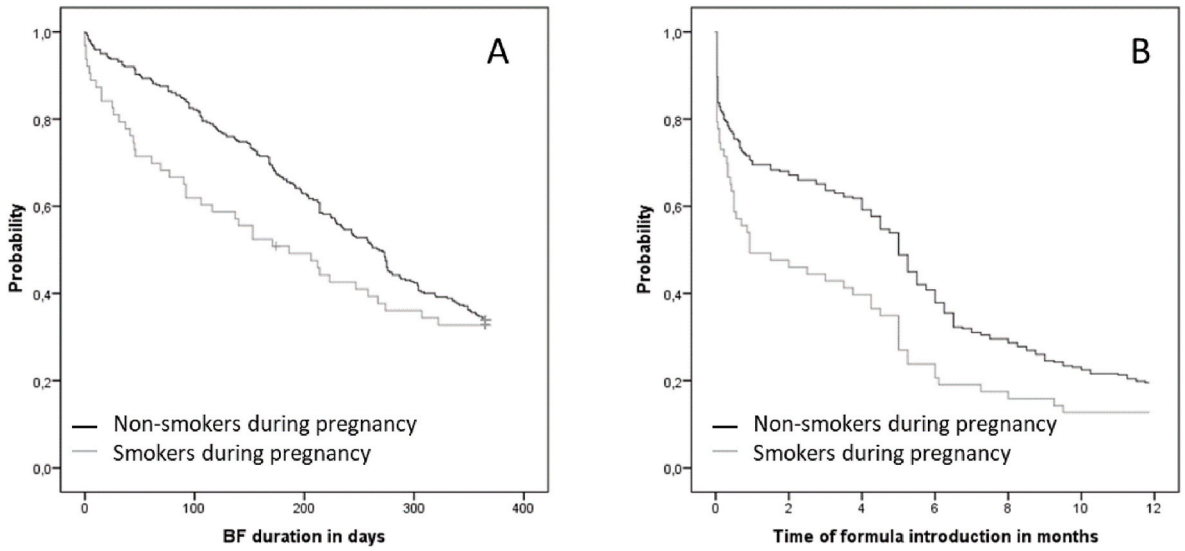

Fig. 1. Kaplan-Meier survival curves according to breastfeeding duration for women who smoked during pregnancy compared to non-smokers (A), as well as the time of formula introduction for women who smoked during pregnancy compared to non-smokers (B).

Table 2
Breastfeeding prevalence and odds ratio for non-smoking women at the studied time points.

	n	%	p	Adjusted OR[a]	95% CI	
BF at hospital	397/401	99.0	0.178	4.03	0.53	30.69
BF 1st week	384/401	95.8	**0.015**	3.61	1.28	10.17
BF 1st month	362/400	90.3	**0.002**	3.25	1.55	6.84
BF 3rd month	324/400	80.8	**0.002**	2.68	1.46	4.92
BF 4th month	298/400	74.3	**0.013**	2.09	1.17	3.73
BF 6th month	256/400	63.8	**0.041**	1.80	1.03	3.17
BF 12th month	135/400	33.7	0.862	0.95	0.53	1.71

Abbreviations: BF: any breastfeeding; CI: confidence interval; OR: odds ratio.
[a] Breastfeeding odds ratio for non-smoking women adjusted for age and educational level.

non-smokers (Fig. 1A) (p = 0.150) in the whole sample.

Among mothers who weaned during the first year (n = 265), mothers who smoked during pregnancy had a median BF duration of 90 days, while non-smoking mothers had a median BF duration of 177 days (p < 0.001) (Fig. 2A).

From a total of 108 women who smoked prior to pregnancy (at least 1 year before), 13 (12%) stopped smoking within 1 year before pregnancy and 32 (34%) stopped smoking upon discovering their pregnancy. When the smoking cessation subgroups were established, median BF durations among mothers who weaned during the first year were as follows: non-smokers: 171 days; ex-smokers: 202 days; stopped smoking before pregnancy: 187 days; stopped smoking upon discovering pregnancy: 266 days; occasional smokers: 176 days; regular smokers: 77 days. Statistical significance was observed between regular smokers and non-smokers (p = 0.011), ex-smokers (p = 0.004), and those who stopped smoking upon discovering their pregnancy (p < 0.001) (Fig. 2B).

Also, regular smokers exhibited shorter BF duration than occasional smokers (77 and 176 days, respectively). No statistical association was observed due to the small number of occasional smokers (n = 8) (Fig. 2B).

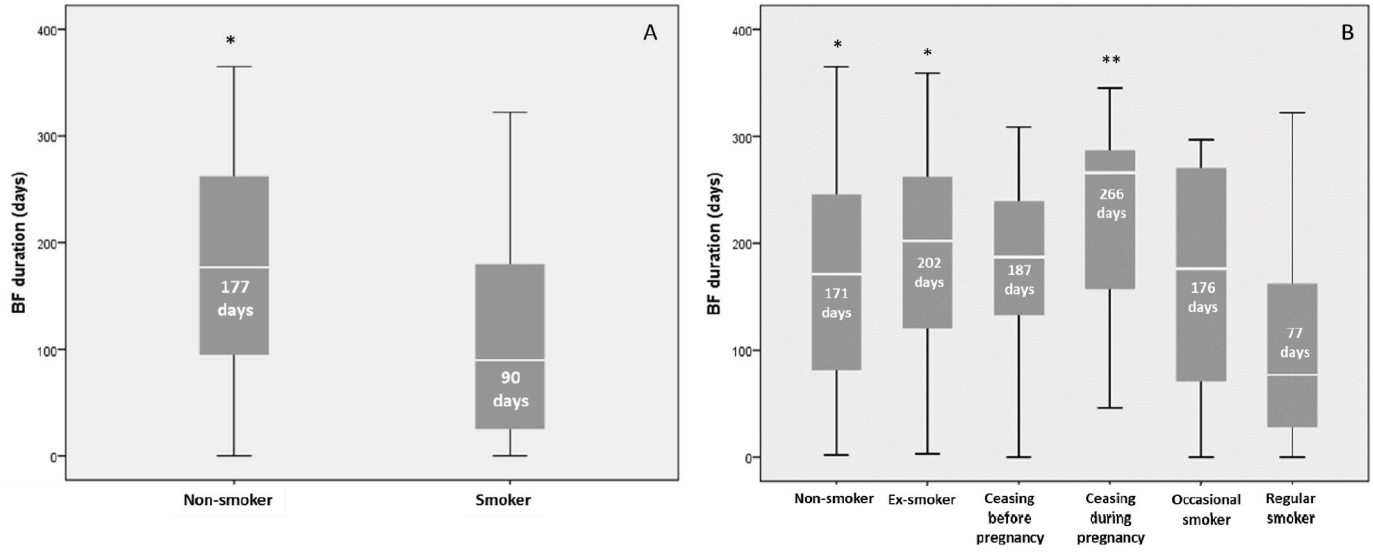

Fig. 2. Breastfeeding duration among women who weaned during the first year. Breastfeeding duration (in days; median and interquartile range) according to smoking status during pregnancy (A), smoking cessation, and smoking intensity (B). *p < 0.05 **p < 0.01, reference regular smoker.

4. Discussion

The present study supports existing evidence of the negative relationships between the smoking status of women during pregnancy and BF outcomes, which are maintained even if the women have intention to breastfeed.

It was observed that not all time points analysed were equally affected and that the effect was more pronounced between the first week and the 6th month. Indeed, BF in the 12th month, was not affected by smoking during pregnancy. A previous study in the same cohort (Gutierrez-de-Teran-Moreno et al., 2022), showed that another health-related variable such as anaemia (along with smoking during pregnancy) seemed to affect BF rates only in the middle and short-term and had no effect in the long term, which points that both can have a physiological effect in the initiation and setting of the breastfeeding process.

Smoking has been thoroughly studied in terms of the effects it has on BF initiation and duration. In addition to other factors, smoking consistently and negatively affects BF (Cohen et al., 2018). Smoking during pregnancy is usually linked to lower socio-economic status and younger mothers, which are parameters that also influence BF (Sequí-Canet et al., 2022). Therefore, it is difficult to address whether the association between smoking and BF prevalence is socio-cultural and/or physiological. Notably, evidence has been published from both perspectives (Amir and Donath, 2012; Napierala et al., 2016). However, no consensus has been reached regarding this relationship to date. Arguments towards a physiological effect suggest a link between smoking and the levels of various hormones (e.g., prolactin and oxytocin), which could affect milk production and secretion (Bahadori et al., 2013; Kobayashi et al., 2020). On the other hand, the social theory emphasises the lower BF intention among women who smoke and the relationship of smoking status with other (often health-related) socio-cultural variables also being linked to lower BF rates (Donath and Amir, 2004).

To explain possible associations between lower BF rates among smoking women with other variables, the present study also analysed multiple variables and related them to the smoking status of women during pregnancy. Based on our results, we can highlight data relevant to both aforementioned approaches. Surprisingly, the only parameter related to newborn and birth characteristics that was significantly different among smokers and non-smokers was the higher use of oxytocin during labour by women that smoked during pregnancy. To date, no consensus has been reached regarding the effect of nicotine on oxytocin levels, receptor expression or sensitivity and how this could affect the lactation process. Further research should be performed in this area, particularly, given the widespread use of oxytocin during labour in the present study (75%) and regular clinical practice (Freeman and Nageotte, 2007).

However, our data simultaneously reveal that women who smoked during pregnancy were significantly younger and had a lower educational level. Notably, both of these factors are well-established independent socio-cultural parameters associated with BF prevalence (Sequí-Canet et al., 2022). Smoking is frequently associated with other negative health-related lifestyle habits (e.g., obesity, lack of exercise, and alcohol consumption), which could reflect a lower overall level of health-related self-care—including the lower perceived importance of BF. Despite this, only women who previously intended to breastfeed participated in the present study. Therefore, a weaker intention to breastfeed among smoking women does not explain the BF differences shown among both groups. Furthermore, when the ORs of BF prevalence were adjusted for age and educational level, they remained significantly different at various time points for women smoking during pregnancy despite being lower. The most plausible scenario is that smoking has a mixed effect on BF, which could involve a combination of physiological and social influences.

Bedsharing is a well-known independent factor that influences BF success (Ball et al., 2016; Bovbjerg et al., 2018). Even if smoking is one of the few situations in which bedsharing is not recommended due to the potential risks for newborns (Blair et al., 2020), we have not observed any differences in bedsharing practices between smokers and non-smokers. Therefore, based on the results of the present study alone, we cannot explain the influence of smoking on BF rates using bedsharing practices, as it could be suspected.

On the contrary, we observed differences in BF-related practices in certain parameters that independently influenced BF across all time points (Gutierrez-de-Teran-Moreno et al., 2022). One of these is the use of a teat or pacifier in the first week. The results show that those who smoked during pregnancy used a teat or pacifier significantly more often than non-smokers during the first week. Although this is a non-recommended practice known to affect BF success (Lozano de la Torre et al., 2011), it was highly prevalent (43%) in our study. Also, mothers who smoked during pregnancy introduced formula significantly sooner and differences were observed as soon as the first week. Furthermore, a comparison of the timing of formula introduction using Kaplan-Meier survival curves resulted in significant median differences (1 month for smokers during pregnancy and 5 months for non-smokers). Early formula introduction decreases BF success due to breaking the physiological cycle of suckling, nipple stimulation, prolactin secretion, and milk production (Tay et al., 1996). By the first month, nearly half of women who smoked during pregnancy had already introduced formula; therefore, the reasons for these decisive practices by smoking mothers should be studied in greater detail.

Finally, we also compared the mean BF duration between women that smoked during pregnancy and non-smokers among those women who weaned during the first year (90 days and 177 days, respectively). When subgroups of smoking women were established, the influence of smoking cessation was reflected in BF duration. When taken as a whole, the group of women who did not smoke during pregnancy had a median BF duration of 177 days. However, when this group was subdivided into those who never smoked and those who had stopped smoking at different times, those who never smoked had the lowest BF duration (171 days) when compared to ex-smokers (202 days), those who stopped smoking before pregnancy (187 days) and those who ceased smoking during pregnancy (266 days). Although the number of women in each subgroup was too small to perform accurate statistical analyses, the results suggest that women who stopped smoking during pregnancy had longer BF durations, which is likely due to additional motivation related to newborn health. Remarkably, all the women that stopped smoking upon discovering their pregnancy breastfed for at least 46 days, thereby showing strong motivation for BF. The bidirectional relationship between smoking cessation and BF rates has already been noted by other authors. That is, smoking could negatively influence BF while, inversely, BF could also promote smoking cessation (Lauria et al., 2012; Moore et al., 2016; Joseph et al., 2017). Qualitative studies that detailed women's feelings towards smoking and BF simultaneously support this idea (Goldade et al., 2008; Nichter et al., 2008). Many smoking mothers believe that their milk—which contains nicotine and other toxic substances from tobacco—could be more harmful to their newborn than formula, which could be an additional motivation for smoking cessation in some cases. However, in other cases, smoking could represent a reason for BF cessation when smoking cessation is too difficult to achieve (Goldade et al., 2008; Nichter et al., 2008), even if BF can counteract the harmful effects of second-hand smoking to some extent (Dorea, 2007).

4.1. Limitations

Smoking habits were recorded by self-reported data obtained from women that participated in the present study. Since this reporting method underestimates smoking status, a more precise data set would include biochemical urinary biomarker analysis for substances such as cotinine (the metabolite of nicotine) (Dietz et al., 2011). To date, most published data on smoking during pregnancy have been collected via

self-reported methods. Moreover, given the number of women who smoked during pregnancy (n = 63) that participated in this study, some of the analysis using subgroups of smokers was not as robust as it should be.

5. Conclusion

In conclusion, smoking during pregnancy was related to shorter BF duration—even if women had the intention to breastfeed. This effect was noted only in the short and middle term (up to the 6th month) and not in the longer term (12th month). Notably, women who smoked during pregnancy tended to be younger and less educated. Moreover, they also engaged in certain practices that are negatively linked with BF success, such as the earlier introduction of formula and use of a teat or a pacifier during the first week. Smoking cessation before pregnancy, and especially during pregnancy, seems to be related to longer BF duration—even longer than among women that had never smoked—which highlights the high BF motivation among women that stop smoking upon discovering their pregnancy. All of this information should be used to define efficient smoking cessation and BF promotion strategies.

Implications for practice and/or policy

Due to the health risk that smoking during pregnancy entails, as well as its relationship with lower BF success, it is essential to implement health policies that promote smoking cessation and BF promotion while considering the special circumstances of these women. Our results highlight the need to:

- Implement smoking cessation strategies directed at women of reproductive age during preconception counselling, especially for young women from lower socio-cultural environments.
- Design a specific protocol related to the initiation of BF for mothers that smoke to emphasise the avoidance of practices associated with early weaning (i.e., use of a teat or pacifier and early formula introduction).
- Support women who are unable to stop smoking during pregnancy by advising them on the benefits of maintaining BF even if smoking.

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Ethical statement

Ethical approval was granted by the University of the Basque Country CEISH/40/2010 SANZ ECHEVARRIA and CEISH/236M/2013/RUIZ LITAGO Human Research Ethics Committee. The project also obtained the authorisation of the Basque Public Health Service.

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Declaration of interest

None.

Data availability

The data underlying this article are available in the Dataset collection of ADDI repository of the University of the Basque Country UPV/EHU and can be accessed at http://hdl.handle.net/10810/56598.

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