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**STUDY OF THE RELATION BETWEEN THE  
DURATION OF BREASTFEEDING AND THE  
PRESENCE OF BREASTFEEDING SUPPORT  
GROUPS IN CATALONIA**

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## **ABSTRACT**

Keeping in mind that women after giving birth have a great need to feel supported to breastfeeding, support groups to breastfeeding carry out a fundamental task. Catalonia is one of the autonomous communities with more support groups in Spain, but there is no protocol to evaluate the effect of these support groups. In this study we have examined whether the duration of breastfeeding can be influenced by the presence of support groups in breastfeeding, so that the more support groups are present in a health region, the duration of breastfeeding will also be longer. In addition, we have analyzed the tasks carry through by the support groups and the role of dietitian-nutritionist in them.

This study is a descriptive ecological study. The population studied is non-institutionalized children aged 0 to 14 living in Catalonia. The average duration of breastfeeding has been compiled from the 2016-2017 Health Survey of Catalonia (ESCA) and the number of support groups through the calculation of a population exposure rate called "BSG RATE". Finally, we analyzed the correlation between the variables "duration of lactation" and the "BSG RATE" for each health region.

No statistical correlation was found between the duration of the lactation and the presence of support groups, although we relate it to certain limitations of the study. Support groups deal with very diverse themes, which makes essential the participation of various health professionals among them, nutritionists-dietitians, in order to achieve cross-cutting work.

## **KEY WORDS**

*Breastfeeding, breastfeeding support, Catalonia, dietitians-nutritionists.*

## RESUM

### *“Estudi de la relació entre la duració de la lactància materna i la presència de grups de suport a la lactància materna a Catalunya”*

Tenint en compte que les dones després de donar a llum tenen una gran necessitat de sentir-se recolzades per dur la lactància materna, els grups de suport porten a terme una tasca fonamental. Catalunya és una de les comunitats amb més grups de suport a Espanya, però no hi ha cap protocol per avaluar l'efecte d'aquests grups de suport. En aquest estudi hem analitzat si la durada de la lactància materna pot estar influïda per la presència de grups de suport a la lactància materna, de manera que quants més grups de suport estiguin presents a cada regió sanitària, la durada de la lactància també serà més llarga. A més, hem analitzat les tasques portades a terme per aquests grups de suport i el paper del dietista-nutricionista en ells.

Aquest estudi és un estudi descriptiu ecològic. La població estudiada són infants no institucionalitzats de 0 a 14 anys que viuen a Catalunya. La duració mitjana de la lactància materna s'ha recopilat a partir de l'Enquesta de Salut de Catalunya (ESCA) 2016-2017 i la variable exposició als grups de suport mitjançant el càlcul d'una taxa d'exposició poblacional denominada “BSG RATE”. A continuació, s'ha analitzat la correlació entre les variables "durada de la lactància" i la variable "BSG RATE" per cada regió sanitària.

No s'ha trobat correlació estadística entre la durada de la lactància i la presència de grups de suport, tot i que ho relacionem amb certes limitacions de l'estudi. Els grups de suport tracten temes molt diversos, cosa que fa imprescindible la participació de diversos professionals de la salut entre ells, els dietistes-nutricionistes, amb l'objectiu d'aconseguir un treball transversal.

## PARAULES CLAU

Alletament matern, suport a l'alletament matern, Catalunya, dietistes-nutricionistes.

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## INTRODUCTION

Breastfeeding is one of the most studied issues by the scientific community at the moment. In the last 10 years, the number of scientific articles published each year has increased considerably. Several studies point to breastfeeding as a key point in the prevention of many pathologies; among them many of the chronic diseases that affect a large part of the population in the developed countries at the moment.

	OUTCOME	TYPE OF BREASTFEEDING	CONCLUSION
Sankar et al (2015) (1)	Mortality due to infectious diseases	Exclusive vs. predominant	Consistent evidence of major protection
Horta et al (2013) (2)	Diarrhea incidence	Exclusive vs non-exclusive; predominant vs partial; partial vs none; any breastfeeding vs no breastfeeding.	Strong evidence of major protection against diarrhea morbidity and admissions to hospital, particularly in young infants
Horta et al (2013) (2)	Lower respiratory infections (incidence or prevalence)	Exclusive vs non-exclusive; predominant vs partial; partial vs none; any breastfeeding vs no breastfeeding.	Strong evidence of a reduction in severe respiratory infections in breastfed children, based.
Tham et al (2015) (3)	Dental caries Breastfeeding	Breastfeeding >12 months versus ≤12 months	Consistent evidence that breastfeeding >12 months has detrimental effects on deciduous teeth
Horta et al (2015) (4)	Overweight or obesity	Never versus ever breastfed; longer versus shorter duration of exclusive breastfeeding; or longer versus shorter duration of any breastfeeding	Suggestive evidence of protection, including high-quality studies

TABLE 1. Protective effect of breastfeed on children. Adapted from Cesar G Victora et al.(5)

	OUTCOME	TYPE OF BREASTFEEDING	CONCLUSION
Chowdhury et al (2015) (6)	Lactational amenorrhea	Highest versus lowest duration of breastfeeding	Consistent effect on prolonging lactational amenorrhea, especially for exclusive or predominant breastfeeding
Chowdhury et al (2015) (6)	Breast cancer	Highest versus lowest duration of breastfeeding	Consistent protective effect of breastfeeding against breast cancer

TABLE 2. Protective effect of breastfeed on mothers. Adapted from Cesar G Victora et al. (5)

Tables 1 and 2 show the benefits of breastfeeding for both children and mothers, however, the benefits of maternal breastfeeding go well beyond a purely medical aspect but also represent social, economic and environmental benefits (7).

The World Health Organization, together with UNICEF, published the "Innocenti Declaration"(8) in 1990 as the starting point for work on protecting, promoting and supporting maternal breastfeeding worldwide. This statement, and its subsequent updates, have been the basis for implementing other strategies such as the European Strategic Plan for the Protection, Promotion and Support to breastfeeding, known as the "Blueprint for Action" (9) and the "Global Strategy for Infant and young child feeding", (10) adopted by all WHO member states in 2003. In 1991 UNICEF and WHO launched the "Humanitarian Initiative of Birth and Breastfeeding Assistance "(IHAN) in order to motivate hospitals and health centers to adopt practices that protect, promote and support breastfeeding exclusively from birth.

The WHO recommends exclusive breastfeeding at least the first 6 months of age (11). In these same statements, the WHO member countries are urged to establish national policies in support of maternal breastfeeding and data collection periodically to know their evolution (8).

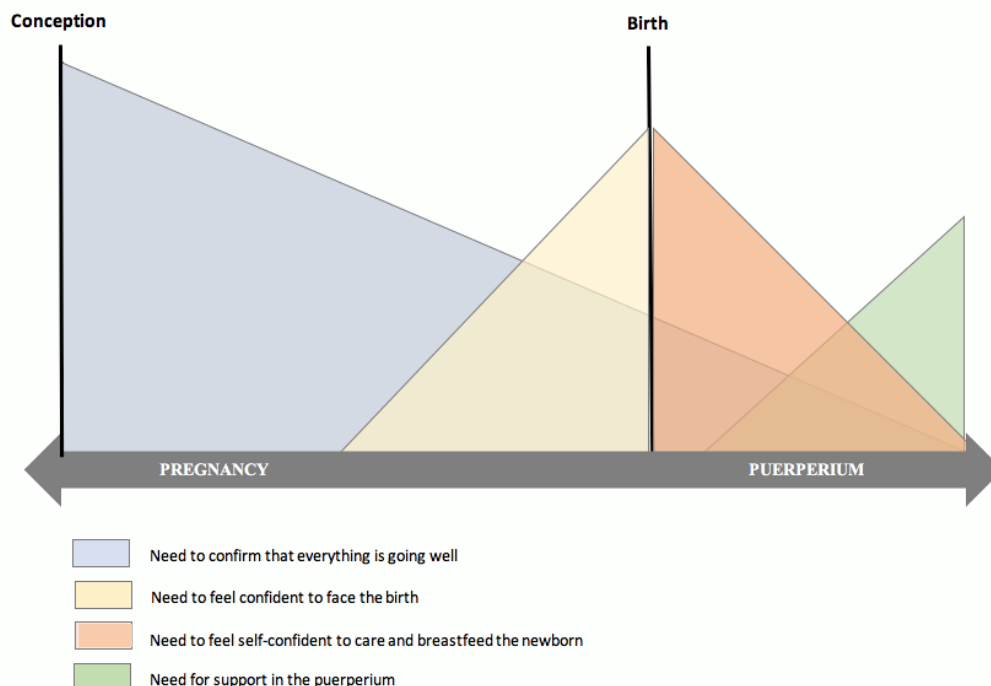
In 1981 the WHO approved the "International Code of Marketing of Breast Milk Substitutes" in which is prohibited breastfeeding substitutes in hospitals, the donation of samples to parents or the advertising of artificial milks (12) . The Spanish government joined this code 12 years later through the Royal Decree 1408/92 (13).

When it comes to the facilitation of knowledge about breastfeeding, the services of the Spanish National Health System have been updated including maternal education in primary health centers, and the promotion of breastfeeding in companies such as "The first 1000 days" (14) promoted by AECOSAN, within the NAOS strategy, where breastfeeding is promoted during the first 6 months of life. Regarding Catalonia, breastfeeding during the first 6 months of life is part of the recommendations of different health guides developed by the Department of Health such as the "Pregnancy

Protocol in Catalonia” (15) or, the guide "Recommendations for the feeding in early childhood (0-3 years)” (16).

Over the last few decades, the development of strategies and resources aimed at increasing breastfeeding rates has been becoming very important. Unfortunately, many times many obstacles arise that prevent women from breastfeeding the recommended time. According to the study of *N Marta Díaz-Gómez et al* (17), mothers' main motive for choosing artificial feeding is the immediate incorporation to work, followed by the lack of recommendations and support from health professionals. Spanish legislation allows four months as maternity leave therefore, it is expected that from the fourth month it is much more complicated to maintain breastfeeding. This leads us to ask something else, what mothers need during this period to facilitate breastfeeding?

According to the study of *Carmen Paz Pascual et al* (18) from childbirth, women feel a great need to feel safe to care and breastfeed the newborn. As time passes after birth, women feel the need support in the puerperium.



*FIGURE 1. Needs perceived by mothers during pregnancy and the postpartum period. Adapted from Carmen Pascual et al. (18)*



Information about the benefits of breastfeeding seems to reach mothers and fathers, this fact can be observed by analyzing the high rates of breastfeeding in the first month of life. In Catalonia, the prevalence of breastfeeding is 80.22% during the first month of life, 76.01% up to 3 months and 53.77% up to 6 months, according to the data published by the Public Health Agency of Catalonia (19). In Spain, according to National Health Surveys, 71% of the newborns are breastfed at least the 6 first weeks of life, 46.9% of newborns have exclusive maternal lactation during the first 6 months (20). These rates appear to be higher in Catalonia than in the rest of Spain, although there is no universal system for monitoring breastfeed data, so it is complicated to compare data from different origins.

Initially, parents make the decision to breastfeed however, as the months pass, the rates of breastfeeding decrease markedly. According to the study entitled "*Reasons for abandoning breastfeeding in mothers with children under 2 years*" 82% of mothers surveyed knew the importance of breastfeeding the first 6 months of life (21). These mothers knew the information but this does not mean that they put it into practice. With all this framework, the main problem seems not to be little availability of knowledge by parents but the lack of facilitating attractive environments for breastfeeding.

Considering that women after giving birth have a great need to feel supported to carry out breastfeeding, support groups play an essential role. According to the *NICE clinical practice guide*, the participation of pregnant women in support groups, where breastfeeding is practiced, is highly recommended with the aim of maintaining breastfeeding for longer (22). Furthermore, the *World Health Organization* recommends that breastfeeding counselling should be provided as a continuum of care, by appropriately trained health-care professionals and peer breastfeeding counsellors with a moderate-quality evidence in his guideline entitled "*Guideline: Counselling of women to improve breastfeeding practices*"(23).

Breastfeeding support groups are not-hierarchical groups that adapt to the needs of each participant helping in any problem that may arise during the pre-natal and post-

natal period as well as providing emotional support (24). Breastfeeding requires a strong physiological and instinctive component but it is also a learning process. Precisely in this learning process, support groups play a fundamental role.

The first support group emerged in 1956 in the United States with the foundation of the "*International Milk League*." The seven founders of this support group observed the difficulty women had in their vicinity to carry out a successful maternal breastfeeding and decided to join in to help them (25).

AUTOR	TYPE OF STUDY	CONCLUSION
Whitford HM et al. 2017 (26)	Systematic review	No evidence from randomized controlled trials about the effectiveness of breastfeeding education for women with twins or higher order multiples.
McFadden A et al. 2017 (27)	Systematic review	Breastfeeding support offered to women increases both duration and exclusivity of breastfeeding before four or six weeks and before six months of age.
Fox R et al. 2015 (28)	Descriptive study	Effective social support, combined with reassurance and guidance from skilled practitioners, can help women to overcome difficulties and find confidence in their own abilities to achieve their feeding goals.
Niela-Vilén H et al. 2016 (29)	Randomized controlled trial	Although the Internet-based peer-support intervention had no effect, the importance of breastfeeding attitude in previous children for the duration of breastfeeding in mothers of preterm infants was shown. In future, interventions in social media should be studied more and attitude-focused interventions be developed.
Grant A et al. 2018 (30)	Cross-sectional study	The provision of training and ongoing supervision, and peer-supporter roles, varied significantly between groups in the UK. Peer support was not accessed by mothers from poorer social backgrounds.

Meedya S et al. 2017 (31)	Systematic review and meta-analysis	It was not possible to identify any specific effective intervention. It appears that a combination of antenatal and postnatal education interventions may be useful in increasing breastfeeding rates at six months.
Vural F et al. 2017 (32)	Intervention study	The provision of antenatal small group sessions in the third trimester, combined with individual problem-oriented support two and six weeks after the delivery, increased exclusive breastfeeding rates at six months compared to only antenatal education.
Balogum OO et al. 2016 (33)	Systematic Review	Interventions such as health education and counseling given by trained health professionals and peer support were demonstrated to have some efficacy in increasing breastfeeding starting rates, especially in ethnic and social groups with low baseline rates.

TABLE 3. Summary table of bibliographic review in Pubmed and Cochrane. Keywords used: Breastfeeding support groups.

At this point we consider analyzing the role of breastfeeding support groups in Catalonia. In Catalonia we can find mainly two types of breastfeeding support groups:

- **Breastfeeding support groups that are not linked to the Catalan Health Service (CatSalut):** groups of volunteers who come together to support breastfeeding women. These women can be guided by a health professional or by more mothers who have gone through the same experience. Periodic meetings are held where different topics related to motherhood are discussed, although the main theme is breastfeeding. They complement the assistance offered by health services, covering aspects related to breastfeeding.
- **Breastfeeding support groups that are linked to the Catalan Health Service (CatSalut):** to analyze what is the role of these support groups it is important to know the structure of the Catalan public health system. The Catalan Health Service (CatSalut) is the institution that is in charge of the system of public health services in the Autonomous Community of Catalonia. Its mission is to guarantee the social and health care of the citizens of Catalonia by contracting health services with health centers and institutions, called "CatSalut provider centers". Within these providers we find the Catalan Health Institute (ICS), which is the

largest public health service company in Catalonia and manages different public health centers, including the ASSIR (Sexual and Reproductive Care Service). They are health centers specialized in sexual health formed by midwives, gynecologists, obstetrics, nurses, psychologists and administrators. In the ASSIR service portfolio we find maternal and child education with interventions, guided by health professionals, to promote breastfeeding including information and group activities from birth to weaning (34).

In the literature we find several studies that relate breastfeeding support groups with the duration of breastfeeding; however, no study has been found to analyze the relationship between exposure to these support groups and the duration of breastfeeding by geographical zones. Neither is there a scientific bibliography on what specific tasks are carried out by these support groups.

Given that there is no monitoring process for standardized breastfeeding data, nor a protocol to evaluate the effect of these support groups, with this research we will expand and update the statistical knowledge with more data on the prevalence of breastfeeding in Catalonia, never before studied from the point of view of the health regions. In addition, from the point of view of dietitians-nutritionists, as health professionals, we are going to study how the dietitian-nutritionists can participate in these support groups.

It is important to emphasize that we are studying a vulnerable group since they are children from a very early age in which nutrition plays a fundamental role because it can condition their future health. See *TABLE 1*.

For all these reasons, in this research we will respond to the problems previously raised by studying the relationship between the presence of support groups and the duration of breastfeeding in the different health regions of Catalonia, we will analyze the tasks carried out by these support groups and we will also give data on the prevalence of breastfeeding in Catalonia during the years 2016-2017. Finally, we will study in what way the dietitian-nutritionist can contribute their knowledge in these support groups.

## **OBJECTIVES**

The general objective of the research is to study the relationship between the duration of breastfeeding in the different health regions of Catalonia and the presence of support groups in these same regions.

The specific objectives of the investigation are the following:

- Analyze the current rates of breastfeeding in Catalonia during the years 2016-2017.
- Investigate what are the main tasks carried out by breastfeeding support groups in Catalonia
- Study the role of the dietitian-nutritionist in these breastfeeding support groups.

## **HYPOTHESIS**

The duration of breastfeeding can be influenced by the presence of support groups for breastfeeding so that how many more support groups are present in the health region, the duration of breastfeeding will also be longer.

## **MATERIAL AND METHOD**

This study is an ecological descriptive study. The population studied are non-institutionalized children from 0 to 14 years living in Catalonia and the study condition is the duration of breastfeeding in these children, which was obtained through the information collected in the Health Survey of Catalonia (ESCA) for the years 2016-2017.

The Health Survey of Catalonia (ESCA) is one of the main sources of information for the Health Department of Catalonia, essential for health planning and evaluation. It is a questionnaire that assesses the sociodemographic characteristics, the state of health, health habits and the use of health services of the Catalan population without age limit. The sample unit is the individual person and the population reference framework of the ESCA is the municipal census of inhabitants of the Catalan Institute of Statistics (IDESCAT).

Each year there are two waves of questionnaires, one every six months (one wave from January 1 to June 30 and another from July 1 to December 31) that are representative for all of Catalonia. The waves that we will use in this study are 12,13,14 and 15 corresponding to 2016-2017 years. The two-year accumulation provides representativeness for all health regions. As it is a non-proportional design, it is necessary to use weighting coefficients for each wave that are estimated from the closest cutoff at the beginning of the fieldwork.

The sample of the ESCA is designed to be randomized and stratified sample in multiple stages, that allows to obtain representativeness for sexes, age groups and municipal strata for each of the territorial units of the questionnaire.

The criteria for inclusion in the sample of ESCA surveys are:

- Be recorded in the Catalan Population Register
- Reside in a family home.

On the other hand, the exclusion criteria of ESCA surveys are:

- Being a resident in a public establishment such as hospitals, convents, or prisons.
- Not be included in the population register of Catalonia.

Although the minimum geographical sampling unit is the AGA (Area of welfare management), the design allows the construction of new supra-municipal territorial variables (counties, healthcare sectors, etc.) based on the addition of municipalities and the appropriate weights. There are 43 AGA in Catalonia (*see Table 4*).

For the selection of AGAs, the method is deterministic and some AGAs have a probability of inclusion equal to 1. For the selection of the municipalities, the method is randomized without replacement and stratified according to the size of the municipality, with probability of inclusion proportional to the size, and for the selection of the people, the method of selection is randomized without replacement and stratified by age groups and sexes.

Health Region	AGA
<b>ALT PIRINEU</b>	Alt Urgell
	Alta Ribagorça
	Aran
	Cerdanya
	Pallars
<b>BARCELONA</b>	Alt Penedés
	Baix Llobregat Centre and Font Santa - L'H N
	Baix Llobregat Litoral and Sant Boi
	Baix Llobregat Litoral and Viladecans
	Baix Llobregat Nord
	Baix Montseny
	Baix Vallès
	Barcelona Dreta
	Barcelona Esquerra
	Barcelona Litoral Mar
	Barcelona Nord
	Barcelonès Nord and Baix Maresme
	Garraf
	L'Hospitalet Sud and el Prat de Llobregat
	Maresme Central
	Vallès Occidental Est
Vallès Occidental Oest	
Vallès Oriental Central	
<b>CAMP DE TARRAGONA</b>	Alt Camp and Conca de Barberá
	Baix Camp and Priorat
	Baix Penedés
	Tarragonés
<b>CATALUNYA CENTRAL</b>	Anoia
	Bages and Solsonés
	Berguedá
	Osona
<b>GIRONA</b>	Alt Empordà
	Alt Maresme

	Baix Empordà
	Garrtxoa
	Gironès Nord and Pla de l'Estany
	Gironès Sud and Selva Interior
	Ripollès
	Selva Maritima
<b>LLEIDA</b>	Lleida
<b>TERRES DE L'EBRE</b>	Altebrat
	Baix Ebre
	Montsià

TABLE 4. Relationship between the seven health regions in Catalonia and the AGA. (35)

For each person to interview, up to ten substitutes are selected, coinciding with the owner in their geographical characteristics (same census section or, alternatively, census sections bordering on the same municipality, or municipality), sex, age and place of birth (foreign or Spanish). With respect to this last variable, the substitutes of headlines born abroad are selected among those born abroad in the same municipality, sex and age group, and only if there is no possible substitute with the same characteristics is passed to extract a substitute from the same municipality, sex and age group born in Spain.

At each wave, the sample extraction is random without replacement and the waves are independent of each other, so there is the likelihood that a person will be chosen and interviewed on more than one occasion.

The ESCA works with three different types of face-to-face questionnaires; depending on the situation of the interviewee. We worked with one of the three questionnaires, specifically addressed to the population under 15 years of age. This type of questionnaire is adapted to specific health aspects of children under 15 years of age and is designed to be answered by an indirect informant who is usually the child's parents. Of all the questions asked in the questionnaire, we worked with the data collected from question M32, which reports whether the child has received breastfeeding and, if so, when was the last time he received it, expressed in days.



The total number of ESCA questionnaires for the years 2016-2017 was 9648, of which 1800 were children under 14 years of age, distributed in the seven health regions of Catalonia; *“Barcelona”, “Central Catalonia”, “Camp de Tarragona”, “Girona”, “Lleida”, “Pirineus i Aran” and “Terres de l’Ebre”*.

All the data were analyzed statistically with the IBM SPSS program version 17.0. First, a descriptive analysis of the data was carried out. Afterwards, the fulfillment of the univariate normality assumption was verified by analyzing the asymmetry, kurtosis and the histogram, both of variable M32 (days of breastfeeding) and variable BSG Rate. Finally, the correlation between the two variables was analyzed using the Spearman test.

In order to carry out the descriptive analysis of the data, we filtered the questionnaires that were aimed at children from 0 to 14 years of age because only in minor questionnaires there is a question related to the days of breastfeeding (question M32). The data we had was not proportional for all of Catalonia therefore, we then weighted the variable M32 by the variable PES\_2016\_2017. Next, we filter and code the cases of question M32 with the aim of eliminating lost cases. In the cases that variable M32 was coded as "8888" it was understood that the child was still breastfeeding, therefore it was considered that the child had been breastfed until the date of the interview.

The number of support groups for breastfeeding, they were divided into two groups:

- Breastfeeding support groups that are not linked to the Catalan Health Service (CatSalut)
- Breastfeeding support groups that are linked to the Catalan Health Service (CatSalut)

To take into account the number of support groups that are not linked to the Catalan Health Service (CatSalut), we based our research in two lists where support groups are registered; a list of the IHAN (Initiative for the Humanization of Birth Assistance and Breastfeeding) (36) and a list of the Catalan Federation of Support Groups for

Breastfeeding (FEDECATA) (37). To ensure that we do not introduce bias, we contacted all the listed support groups, to find out if they were active during the years 2016-2017. We tried to contact them for two months by email and telephone. Those support groups that could not be contacted during the two months were considered not active.

A total of 70 support groups not linked to the Catalan public health system were found. Of these 70 groups, 20 of them were not active in the years 2016-2017, so they were discarded from the list. In *Table 5* we can see the support groups that were considered for the study and the number of women of childbearing age for each health region. With these two data the BSG rate was calculated

The variable exposure to support groups for breastfeeding has been calculated as a rate (BSG RATE) dividing the total number of support groups in each health region by the total number of fertile women (25-49 years) in the same health region.

The information on the total number of women of childbearing age during the years 2016-2017 has been extracted from the databases provided by the *Catalan Institute of Health (ICS)*, in particular from the *Central Register of Aggregates of the Catalan Health Institute*, which has information, by sex and age, of the entire population that has access to Catalan public health and, therefore, is domiciled in Catalonia.

$$BSG\ RATE = \frac{TOTAL\ OF\ BREASTFEEDING\ SUPPORT\ GROUPS\ IN\ THE\ HEALTH\ REGION}{TOTAL\ NUMBER\ OF\ WOMEN\ OF\ CHILDBEARING\ AGE} \times 1000$$

In parallel, an online questionnaire was developed to analyze more deeply breastfeeding support groups. A sample of 37 breastfeeding support groups were surveyed via an online questionnaire (*see appendix I*). Of the 37 groups, 29 were linked to the Catalan public health system and 8 were not linked to the Catalan health system. In the case of the support groups linked to the Catalan public health system, the questionnaire was answered by the coordinating midwives of the different ASSIRs in Catalonia. In the case of groups not linked to the Catalan public health system, they were answered by the person responsible for the support group.

	BREASTFEEDING SUPPORT GROUPS		WOMEN OF CHILDBEARING AGE
	Linked public system	Not linked public system	25-49 years old
LLEIDA	27	1	59406
BARCELONA	146	34	736351
TERRES DE L' EBRE	18	0	28548
CAMP TARRAGONA	28	6	78269
ALT PIRINEU I ARAN	7	0	11510
CATALUNYA CENTRAL	68	2	85.085
GIRONA	50	7	30021
<b>TOTAL</b>	344	50	1.029.190

TABLE 5. Summary table of the number of support group included in the study and the number of women of childbearing age.

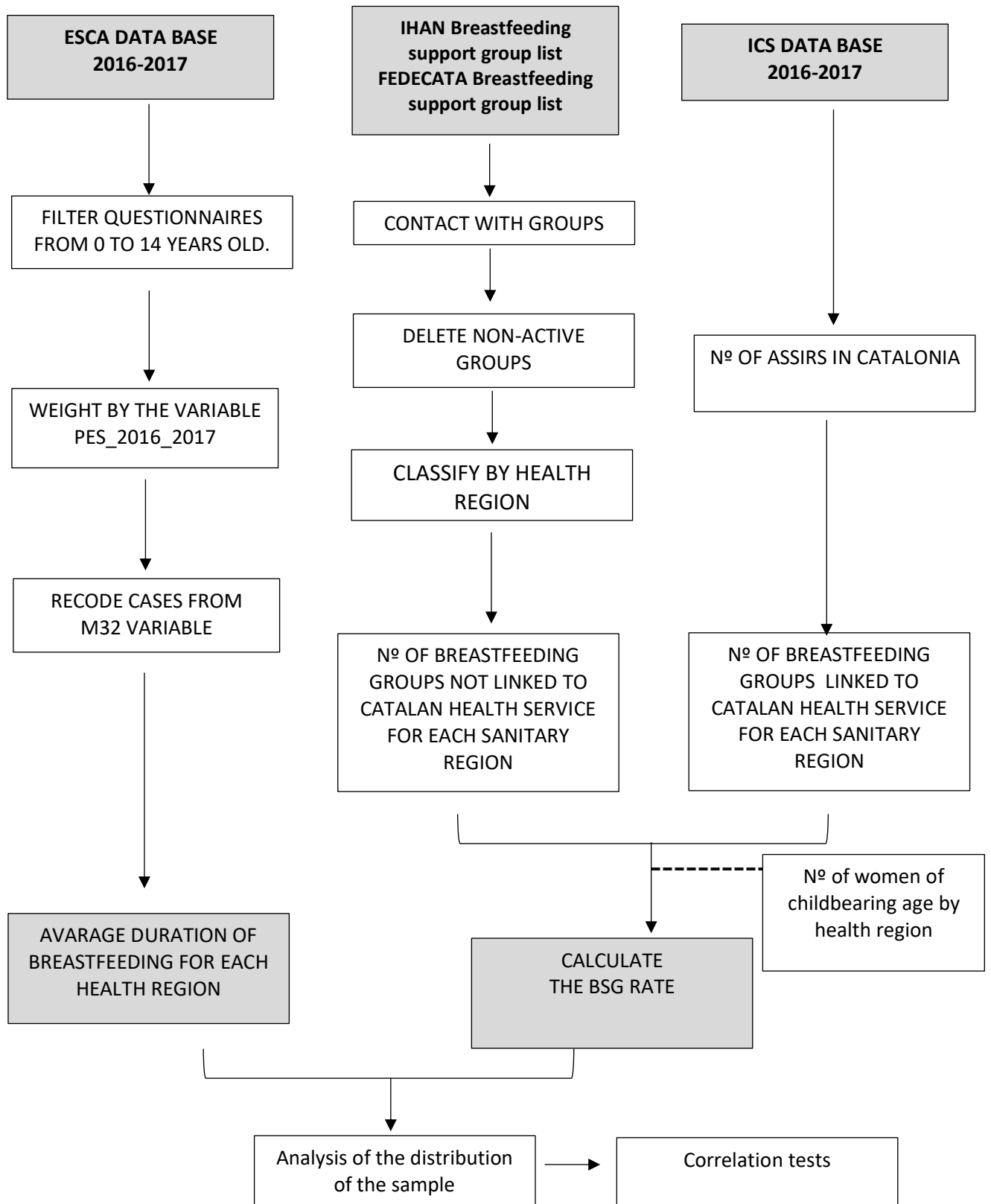


FIGURE 2. Scheme of the methodology carried out.

## RESULTS

After the screening of the sample we obtained 1800 valid questionnaires distributed by the 7 health regions of Catalonia. After the corresponding weighting, a descriptive analysis was carried out with the following results.

	DAYS OF LACTATION (M32)		BSG RATE
	Mean	SD	Mean
<b>LLEIDA</b>	268,74	265,26	4,71
<b>BARCELONA</b>	267,11	295,94	2,44
<b>TERRES DE L'EBRE</b>	240,11	251,97	6,31
<b>CAMP DE TARRAGONA</b>	319,25	461,85	4,34
<b>ALT PIRINEU I ARAN</b>	233,84	278,83	6,08
<b>CATALUNYA CENTRAL</b>	249,96	262,82	8,22
<b>GIRONA</b>	250	258,26	18,97
<b>TOTAL CATALONIA</b>	262,8	296,55	7,28

TABLE 6. Descriptive results of the analysis.

The descriptive analysis of the dependent variable shows that in Catalonia, the average duration of breastfeeding is 262 days, that is, approximately 8 months. The health regions with a longer duration of lactation are "Camp de Tarragona" with an average of 320 days (10,6 month), Lleida with an average of 274 days (9,13 month) and Barcelona with an average of 268 days (8,9 months).

Regarding the independent variable, a higher BGS rate means that there are more support groups for fewer women. The health region with the most support groups in relation to the number of women is Girona followed by Catalunya Central and Lleida (See figure X).

	% NURSING SUBJECTS 1 MONTH	% NURSING SUBJECTS 3 MONTHS	% NURSING SUBJECTS 6 MONTHS	% NURSING SUBJECTS 12 MONTHS	% NURSING SUBJECTS 24 MONTHS
LLEIDA	82%	68%	61%	36%	15%
BARCELONA	77%	68%	60%	32%	13%
TERRES DE L'EBRE	84%	61%	56%	33%	5%
CAMP DE TARRAGONA	88%	76%	68%	40%	12%
ALT PIRINEU I ARAN	85%	80%	70%	25%	20%
CATALUNYA CENTRAL	90%	78%	56%	34%	10%
GIRONA	75%	61%	45%	27%	7%
TOTAL CATALONIA	83%	70%	60%	32%	12%

TABLE 7. Percentage of breastfed infants during the first two years of life.

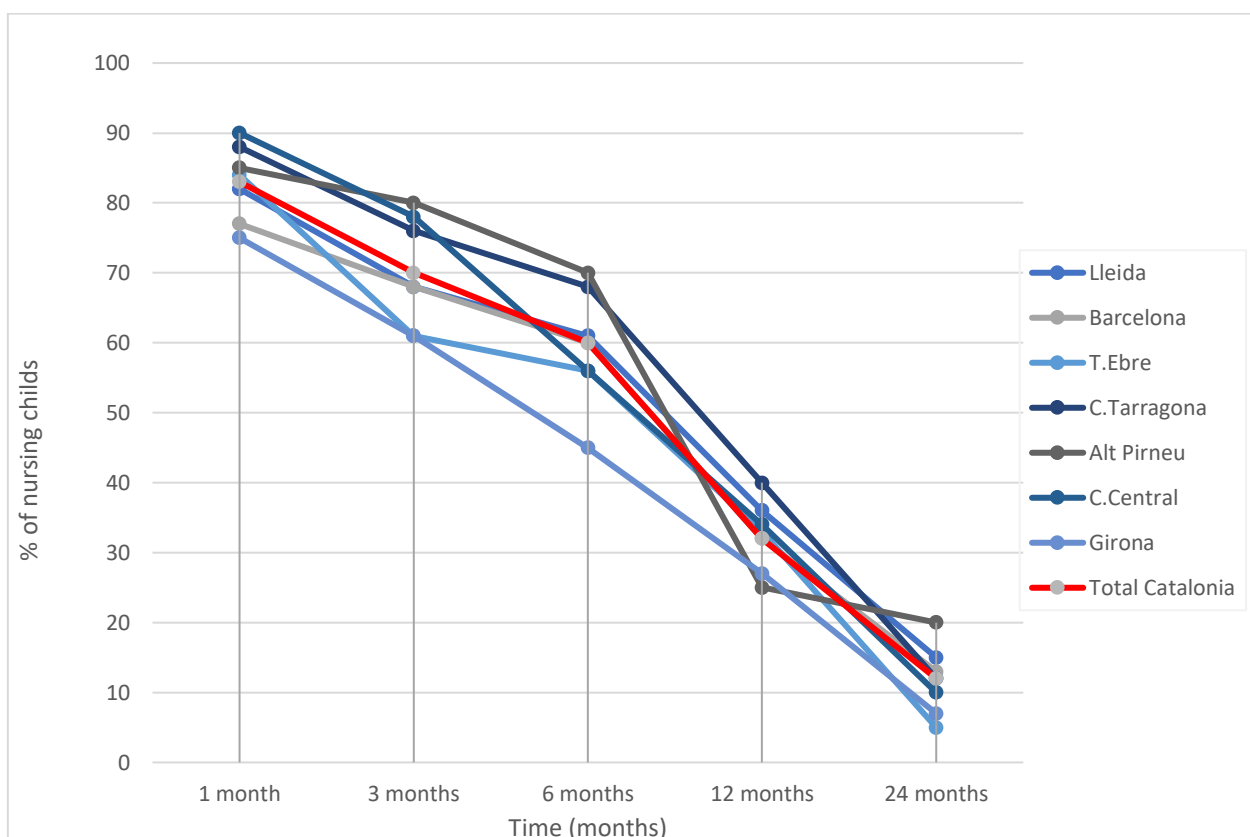


FIGURE 3. Percentage of infants at one month of age, four months, six months, first year and second year by each health region.



FIGURE 4. The darkest colored health regions are those that have a longer duration of breastfeeding in Catalonia.



FIGURE 5. The darkest colored health regions are those that have more breastfeeding support groups by population in Catalonia.

To analyze the correlation between days of breastfeeding and exposure to breastfeeding support groups, compliance with the assumption of normality of variable M32 (days of breastfeeding) was studied. An asymmetry result of 2.014 and a kurtosis result of 8.625 was obtained, therefore, both results of Z-symmetry and the Z-kurtosis escape the range of -1.96 and 1.96. The distribution of this variable is not normal (it does not resemble the normal distribution of the population). Finally, in the histogram of variable M32 it indicates that there is no normal behavior, most of the values accumulate at the left extreme of the graph.

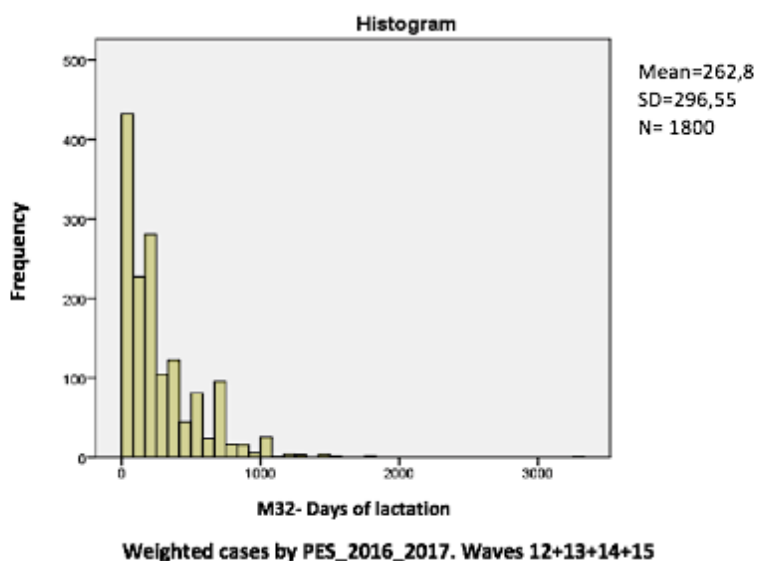


FIGURE 6. Histogram of variable M32.

The normal Q-Q graph confirms the previous conclusion since the observed values are not placed on the expected line under the assumption of normality.

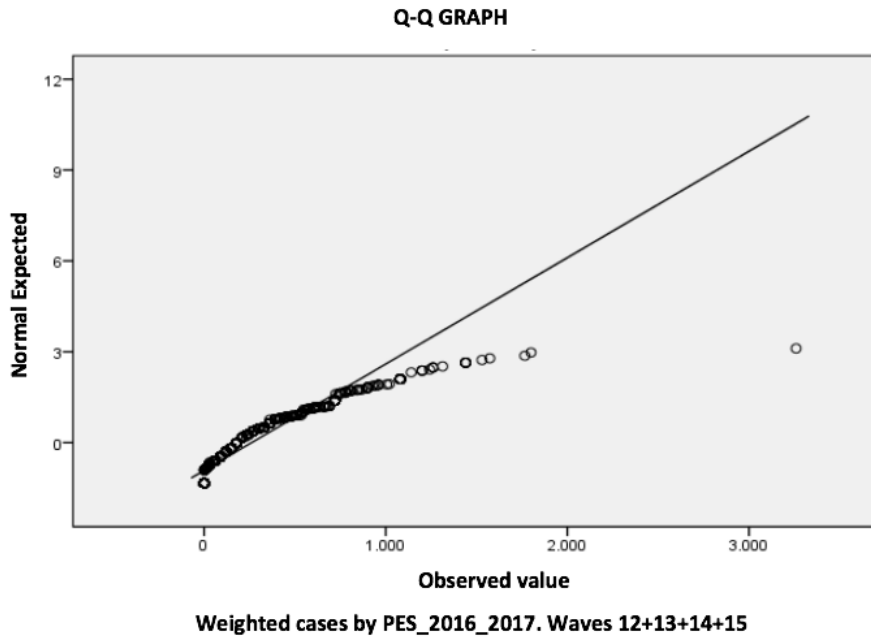


FIGURE 7. Q-Q graph of variable M32.

Regarding the normal compliance of the variable BSG RATE, its coefficient of asymmetry was 4.2 and that of kurtosis 2.8. Both values, Z-score of symmetry and kurtosis, are very far from the critical zone  $\pm 1.96$ . In addition, the histogram clearly shows that the purpose of normality is not met.

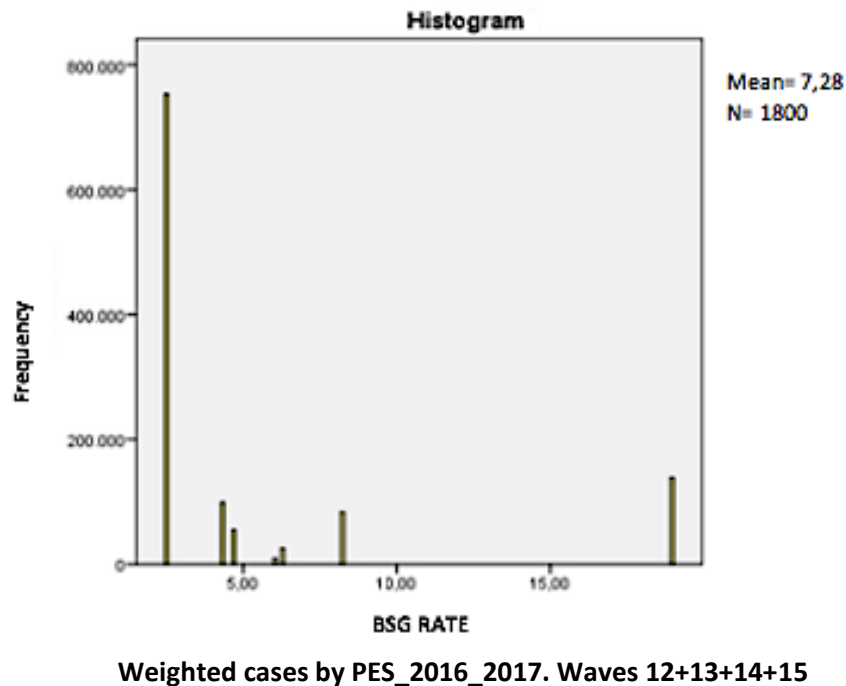


FIGURE 8. Histogram of the variable BSG RATE.



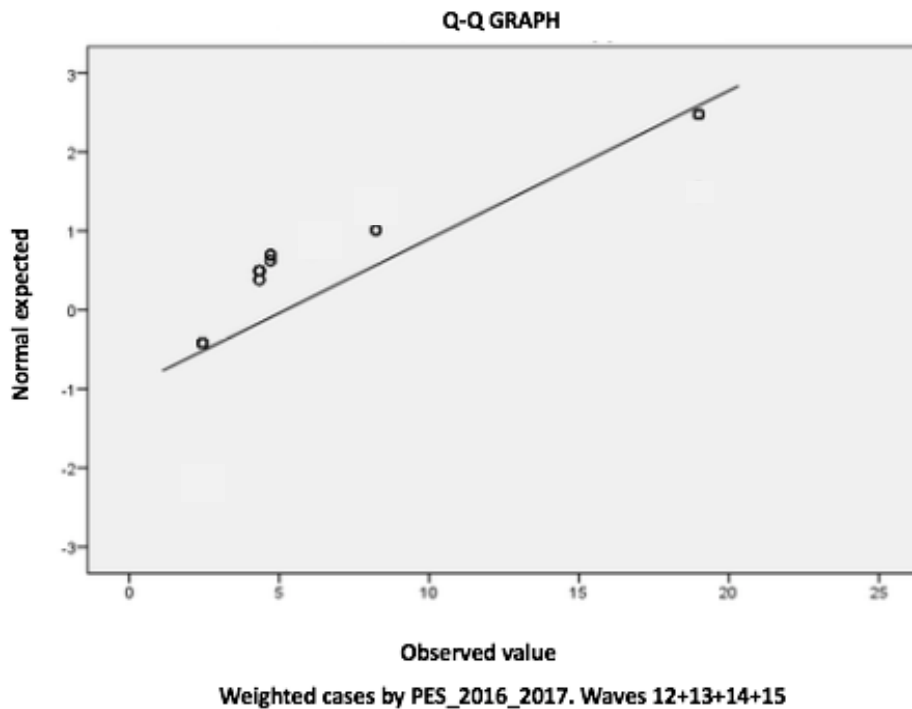


FIGURE 9. Q-Q graph of variable M32.

Given that neither of the two variables has a normal behavior, to determine whether or not there is a correlation between the two variables, we do the Spearman correlation test. The test gives a result of -0.536 with a significance level of 0.215. Since the p-value is greater than 0.05, we accept the null hypothesis, therefore, there is no relationship between these two variables.

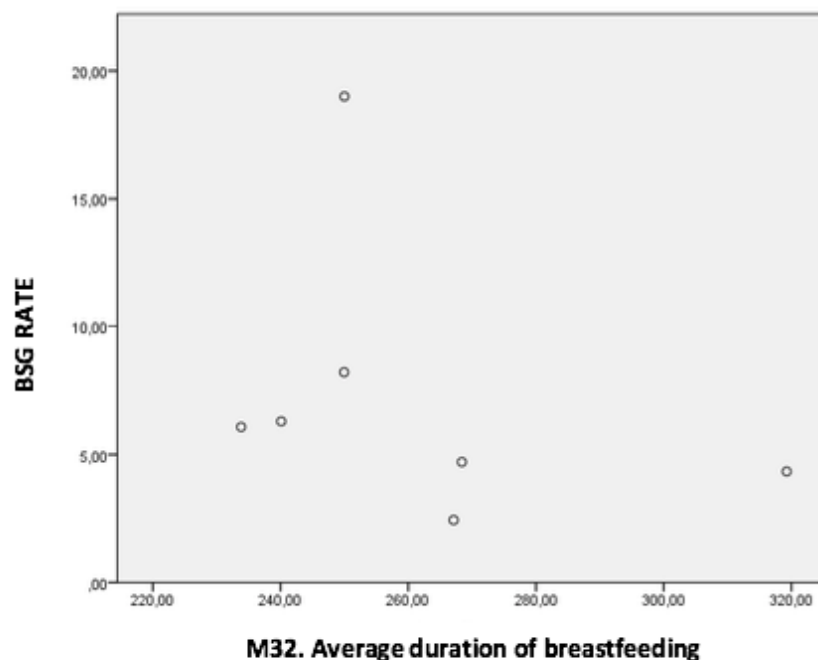


FIGURE 10. Dispersion graph of the two variables studied (M32 and BSG RATE)

Regarding the result of the questionnaires, 100% of the sample are support groups for breastfeeding that do activities both before and after birth. The 29 breastfeeding support groups (BSG) linked to the Catalan public health system are led by professionals trained in breastfeeding; however, three of the eight support groups not linked to the public health system are led by people not professionally trained in breastfeeding. That is, 100% of the sample of support groups linked to the Catalan public system are guided by professionals trained in breastfeeding while in support groups not linked to the Catalan public system, 62.5% of the sample were guided by people professionally trained in breastfeeding.

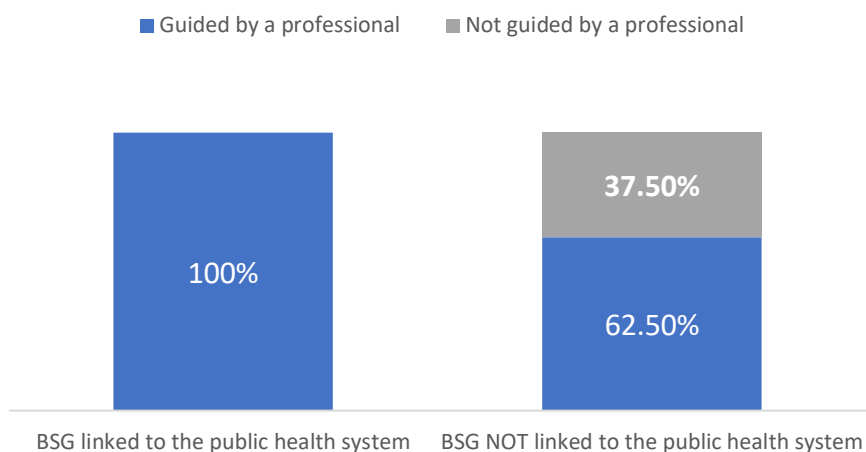


FIGURE 11. Professional training of breastfeeding support groups (BSG)

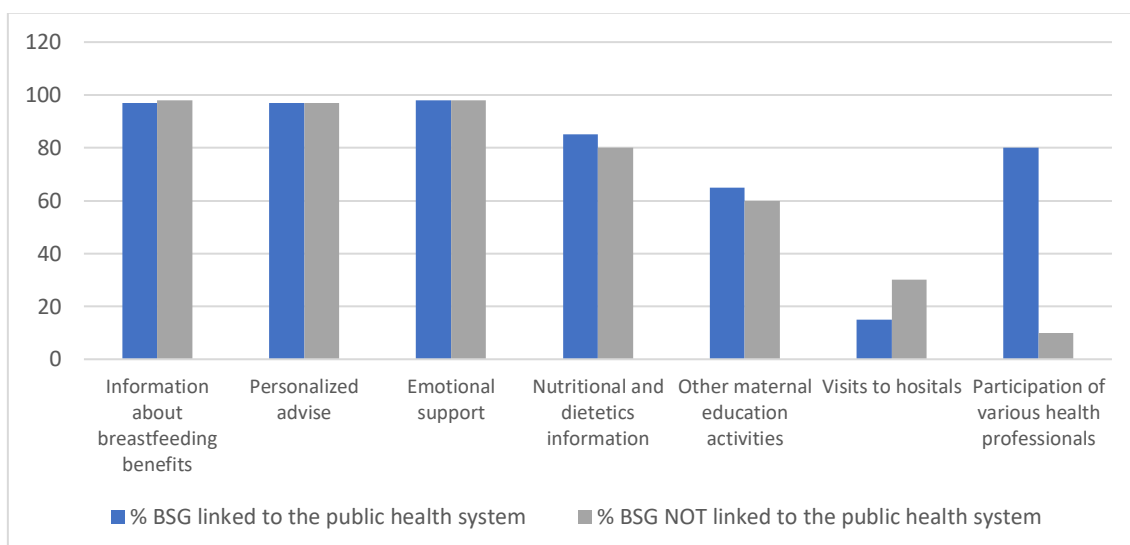


FIGURE 12. Main activities carried out by the support groups according to the results of the survey.

The only difference that has been found in terms of organized activities is that 80% of the groups linked to the Catalan health system had the collaboration of other health professionals (mainly psychologists and doctors) while the groups that are not linked to the system of public health do not almost have this collaboration (15%) . 87% of the entire sample admits having given nutritional and dietary information although none of the support groups of the sample had the collaboration of a dietitian-nutritionist.

## **DISCUSSION AND CONCLUSIONS**

As we have seen, we cannot confirm our hypothesis, that is, we cannot confirm a relationship between breastfeeding rates and the presence of support groups in the different health regions of Catalonia. There are several studies (31,32) that have shown a positive correlation between breastfeeding support groups with a longer duration of breastfeeding but, in our study, being an ecological design we could not find the correlation due to the presence of some limitations.

On the one hand, we have a total sample of 1800 subjects, however, by dividing them into seven health regions, we have decreased the power of the statistical test. In addition, we consider the difficulty of controlling confounding variables since there are a variety of health determinants that can affect the duration of breastfeeding as maternal age, education and prenatal classes attendance, peripartum experiences and delivery, lactation factors and previous experience of breastfeeding; as demonstrated by *L. Colombo et al.* in their study (38).

When comparing the results of our study, in terms of breastfeeding rates, with the rates previously obtained by the “*Agència de Salut Pública de Catalunya*”, they are very similar although for both the first month and the third month we have obtained superior values. The rate of breastfeeding in Catalonia described in *Table 7* is obtained through the health data management system of each individual, while in our case it has been obtained through a questionnaire, this makes them somewhat different rates.

	Our Study Rates	Catalonia Rates (18)	Spanish Rates (19)	Norway Rates (39)
1 month	83%	80%	-	98%
3 months	70%	76%	66%	-
6 months	60%	53%	46%	82%

TABLE 8. Comparison of different rates of breastfeeding of the 2016-2017 years.

When we compare them with the rest of Spain we can see that they are superior to those of Catalonia, probably this is due to the great effort that is being carried out by Catalan public health institutions, including the promotion of breastfeeding in various health protocols (15,16); in which the creation of support groups for breastfeeding is included.

Norway is the European country with a higher breastfeeding rate as shown in the study by *Theurich MA et al* (40). Long-term maternity and paternity leave, possibility of part-time work for women, breaks in working hours to breastfeed their children, in addition to a high level of training in breastfeeding of health professionals and a large number of health institutions supporting breastfeeding. These are some of the reasons why Norway has these high rates of breastfeeding and, according to the *State of the World's Mothers Report 2011*, it is the best country in the world to be a mother (41). The data extracted from this study are another reason to continue working from different points of view with the aim of improving the duration and quality of breastfeeding in Spain and, specifically in Catalonia.

Breastfeeding rates are very high in the first month of life (even so Spain and, Catalonia do not reach Norwegian rates) and they decrease with the passage of time. From the sixth month, there is a much more marked decrease in the rate of breastfeeding that we relate to the incorporation of the mother to work and the introduction of complementary feeding. According to the study by *M. Díaz-Gómez et al* (20), the main reason for abandoning breastfeeding is the incorporation into work. That is why we want to vindicate the importance of adapting legislation to current scientific evidence. The increase in maternal leave time after 6 months would be a great advantage for

family conciliation and, therefore, for longer duration and better quality of breastfeeding.

The average duration of breastfeeding in Catalonia during the years 2016-2017 according to our study is 262 days, that is, approximately 8 months. We can affirm that more than half of Catalan children are breastfed for at least the first six months of life. This is a very positive aspect, although we must recognize that we are not only considering exclusive breastfeeding as recommended by the *WHO*, because in our data collection process there was no difference between exclusive breastfeeding or not. Therefore, half of Catalan children breastfeed until 8 months of life although we cannot say that they do it exclusively.

If we analyze the rates of breastfeeding by region, the health region with the highest percentage of nursing infants in the first month of life is "*Central Catalonia*", however it is the third health region with the shortest duration of breastfeeding and the second with the most support groups. On the other hand, "*Girona*" is the health region with the lowest percentage of nursing infants in the first month of life, but it is the fourth with the longest duration and the one with the most support groups.

The health regions with a higher percentage of infants during the first month tend to have a shorter duration; this is the case of "*Central Catalonia*", "*Alt Pirineu i Aran*" and "*Terres de l'Ebre*". In contrast, the health regions with the lowest percentage of infants during the first month of life tend to have a longer duration; this is the case of "*Lleida*", "*Barcelona*" and "*Girona*". "*Camp de Tarragona*" shows an exception to this behavior, being the second region with the highest percentage of infants in the first month of life and also the health region with the longest duration of lactation.

Precisely in three of the four health regions with longer duration of breastfeeding ("*Camp de Tarragona*", "*Lleida*" and "*Barcelona*") there is the presence of hospitals accredited by the IHAN ("*Iniciativa para la Humanización de la Asistencia al Nacimiento y la Lactancia*"). These are centers that have strict protocols in favor of breastfeeding (42) and pressure these health regions to develop policies that protect it. Children born

in these hospitals have much easier to maintain breastfeeding for longer. In order to achieve this accreditation, hospitals must overcome several phases that involve a large deployment of means, above all economic, for this reason we consider essential the development of public health policies in favor of these accreditations since they have shown to have an effect on the duration of breastfeeding in Catalonia.

Regarding the presence of support groups, the health region with the most exposure to these groups is "*Girona*"; to each woman of childbearing age corresponds 0.0019 support groups while "*Barcelona*" is the health region with a lower BSF rate because each fertile woman corresponds to 0.00024 support groups. The health regions of "*Lleida*", "*Tarragona*" and "*Barcelona*", being provincial capitals, have few support groups in relation to their total population.

Statistically, we have not found a correlation between the duration of breastfeeding and the BSG rates, probably because, as we mentioned earlier, there are a great variety of social and economic factors that affect the duration of breastfeeding, as shown by several studies done in Spain (43–45) and some limitation of our study previously explained.

In the bibliography there are no studies related to breastfeeding support groups with an ecological design like ours, however, we can compare it with other studies done in Spain. According to the study conducted in Spain by *AM.Sacristán Martín et al.* (44) did not find significant support groups for breastfeeding either as a factor that influences the start, or in the maintenance of exclusive breastfeeding at 6 months. However, an intervention study conducted in Spain by *P.Molinero et al.* (46) in which mothers were given a breastfeeding session by professionals, showed that this support decreases the rates of breast-feeding abandonment at hospital discharge. Another observational study by *R-Villa Candel et al.* (47) concludes that support professional nursing mothers would be a solution to avoid to stop breastfeeding by false beliefs such as the belief of having hypogalactia. The same result concluded the study by *M. Oribe et al.* (43).

On the other hand, analyzing the results obtained by the questionnaires made to the support groups, we observed that, in both types of breastfeeding support groups, a large part of their time is devoted to giving personalized information on breastfeeding as well as emotional support. As we saw earlier in the study by *C.Pascual et al.* (18) emotional support is one of the needs most mothers perceive after birth; aspect that the support groups carry out perfectly.

97% of the support groups give information about nutrition and dietetics however, neither the support groups linked to the Catalan public health system nor the independent support groups, have the participation of dietitians-nutritionists (they do have the participation of psychologists and pediatricians). Considering that mothers during this stage of life are especially receptive to improve their nutrition and that of their children, the participation and support of dietitians-nutritionists in these support groups would be essential to ensure the rigor of the scientific evidence, in addition to being the perfect opportunity to establish a basis on healthy eating to avoid future health problems.

There is no scientific bibliography on the specific tasks carried out in the support groups, it seems very obvious however, the fact that they treat such diverse issues makes essential the participation of several health professionals among which are the dietitians-nutritionists, with the aim of achieving a transversal work.

The promotion of breastfeeding seems to be one of the most powerful interventions from a cost-effective point of view. For this reason, it is very important to concentrate efforts on weak social groups considering that breastfeeding is more prevalent in less developed countries but in the most developed countries, it is more frequent in women with higher income and higher education level (48).

Our study can be the basis to create models in order to identify those most vulnerable population groups in Catalonia and adapt resources to those social groups that need them most, especially in those health regions with a great intention to breastfeed at the beginning but, as time goes by, they tend to decrease their rates much to the point of

being the health regions with lowest breastfeeding rates (*“Alt Pirineu i Aran”, “Terres de l’Ebre”* and *“Catalunya Central”*). The results of this study show that within the same community there is great variety, therefore, equity plays a fundamental role.

In the same way that we should identify those regions or social groups with the greatest need of support for breastfeeding, it would also be very important to develop protocols to evaluate the effect of these support groups on breastfeeding rates. In this way, we could develop health policies adapted to the real needs of nursing mothers and fathers.

It is clear that fathers and mothers have special needs in the breastfeeding stage and that if we want to maximize breastfeeding, not only in time but also quality breastfeeding, we must provide information on breastfeeding updated and based on the scientific evidence and, secondly, but not least, we must create attractive environments for breastfeeding by joining the efforts of different professionals, not only health professionals.

In conclusion, there is no correlation between the presence of breastfeeding support groups and the duration of breastfeeding in the different health regions of Catalonia, although previous intervention studies have shown that support groups for breastfeeding decrease the rates of breastfeeding abandonment (31,32). With this study, we have provided new statistical information, never before studied by health regions, on the rates of breastfeeding in Catalonia during the years 2016 and 2017. We have studied, the great variety of topics that are treated in the support groups among them, related topics on the nutrition of mothers and children, and the need for dietitians-nutritionists to participate in these support groups as well.

This is a pioneering ecological study in Spain and Catalonia whose results we hope will serve to broaden scientific knowledge, to propose future studies as well as to adapt public health policies to new scientific evidence.



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## APPENDIX I

### QUESTIONNAIRE BREASTFEEDING SUPPORT GROUPS IN CATALONIA

1. Name of the breastfeeding group:

\_\_\_\_\_

2. Is your breastfeeding group linked to the Catalan public health system?

Yes  No

3. What kind of support gives your group ?

Before birth  After birth  Both

4. During meetings with parents, who is the person who guides breastfeeding counseling?

Person trained professionally to support breastfeeding  
 Person not trained professionally to support breastfeeding

5. What activities do you usually do in the support group?

- Information on Breastfeeding benefits during the first 6 months of life
- Personalized advice to the mother in case of problems to carry out a successful breastfeeding (various pathologies, correction of the posture, etc.)
- Emotional support
- Advice to maternal breastfeeding via telephone
- Visits to hospitals to support breastfeeding
- Organization of other maternal education activities
- Information about nutrition and diet during this stage of life for both mothers and babies
- Other Activities: \_\_\_\_\_

6. During the meetings, parents express dietary-nutritional doubts? For example, what feeding should nursing mothers follow?

Yes  No

7. Do you have the collaboration of other health professionals in the meetings of the support groups?

Yes  No

8. Only if you have answered the aforementioned question affirmatively, with which healthcare professionals do you collaborate with?

- Pediatrician
- Nurses
- Psychologists
- Dieticians-nutritionist
- Physiotherapists

