

Determinants of continued breastfeeding in children aged 12–23 months in three regions of Haiti

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Suggested citation. Decelles S, Nardocci M, Mildon A, Salameh B, Sebai I, Arasimowicz S, et al. Determinants of continued breastfeeding in children aged 12–23 months in three regions of Haiti. *Rev Panam Salud Publica.* 2024;48:e6. <https://doi.org/10.26633/RPSP.2024.6>

ABSTRACT

Objectives To identify the prevalence and determinants of continued breastfeeding in Haitian children aged 12–23 months.

Methods Three cross-sectional surveys were conducted yearly during the summers of 2017 to 2019 as part of a 4-year (2016–2020) multisectoral maternal and infant health initiative in the regions of Les Cayes, Jérémie, and Anse d'Hainault in Haiti. A total of 455 children 12–23 months of age and their mothers participated in the study. A child was considered to be continuing breastfeeding if the mother reported giving breast milk in the 24-hour dietary recall. Unadjusted and adjusted prevalence ratios were estimated, and associations were assessed between continued breastfeeding and explanatory factors related to sociodemographic characteristics, household food security, maternal nutrition, and breastfeeding knowledge and practices.

Results The prevalence of continued breastfeeding was 45.8%. Continued breastfeeding was significantly more prevalent among younger children, children who did not have a younger sibling, children whose mother was not pregnant, those living in the Jérémie region, children who had been exclusively breastfed for less than 1 month, and children whose mother knew the World Health Organization's recommendation for continued breastfeeding up to 2 years or beyond.

Conclusions The study results highlight the need for geographically equitable access to tailored and adequate health services and education that support breastfeeding in a way that is compatible with the local context.

Keywords

Breastfeeding; prevalence; epidemiology; infant health; Haiti.

Breastfeeding is crucial for the health and well-being of children and mothers worldwide. In low- and high-income countries alike, breastfed children have a lower risk of morbidity and mortality due to infectious diseases (1, 2). Longer duration of breastfeeding reduces the risk of type II diabetes for both mothers and children (1, 3) and lowers children's risk of obesity in adolescence and adulthood (1, 4). For these and many other benefits, the World Health Organization (WHO) recommends continued breastfeeding up to 2 years of age or beyond (5).

In low- and middle-income countries, the prevalence of continued breastfeeding is considerably higher in poorer populations. Nevertheless, between 1993 and 2013, a global decline

in continued breastfeeding was observed, primarily due to a reduction in the duration of breastfeeding among poorer populations (6). According to an analysis of Demographic Health Surveys (DHS) in 20 low- and middle-income countries, children whose mothers work and have a higher educational attainment are less likely to breastfeed during the child's second year of life (12–23 months) (7).

Continued breastfeeding has always been an important part of Haitian tradition, as in that of their African ancestors (8), as evidenced by the relatively high rate of continued breastfeeding since the first national survey in 1994–1995 (stable at around 60%) (9). In accordance with the declining rates of continued

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breastfeeding worldwide, the most recent national survey (2016–2017) recorded the lowest rate of continued breastfeeding yet, at 53% (10).

Results from the 2016–2017 DHS for Haiti show a tendency toward higher median breastfeeding duration among families in the lowest wealth index quintile (18.6 months) and among mothers with no formal education (17.4 months) compared with families in the highest wealth index quintile (15.6 months) and mothers who had completed secondary school (16.3 months) (10). Furthermore, breastfeeding duration was relatively shorter in the metropolitan region of Port-au-Prince (15.4 months) and throughout the Ouest department in which the region is situated (14.2 months), compared with most other departments of Haiti (between 16.7 and 19.6 months) except for Nippes department (15.4 months), which is adjacent to the Ouest department (10). Although these differences have yet to be tested statistically, the seemingly shorter duration of breastfeeding among Haitians of higher socioeconomic status and education, and those living in highly urbanized areas, follows tendencies observed across low- and middle-income countries (6).

The *Appui prénatal, périnatal, postnatal et nutritionnel en Grand'Anse et au Sud d'Haiti* project [Prenatal, perinatal, postnatal and nutritional support in the Grand'Anse and South departments of Haiti; A3PN project] is a 4-year maternal and infant health initiative aimed at reducing maternal and infant mortality in eight communes in the South and Grand'Anse departments of Haiti. The A3PN project used a community mobilization approach to improve families' knowledge, attitudes, and practices related to breastfeeding, nutrition, hygiene, and gender equity, and to improve families' access to financial resources, food, and essential perinatal and health services. The activities included mothers' support groups, community presentations, collective kitchens, mobile health clinics, home visits, home gardening initiatives, and solidarity funds (11–13).

The project was implemented from April 2016 to March 2020 in three communes in Haiti's South department and five communes in the Grand'Anse department. In the South Department, Saint-Jean-du-Sud, Camp-Perrin, and Chantal are situated less than 25 km from Les Cayes, one of Haiti's major port cities (hereafter referred to as Les Cayes region). In the Grand'Anse department, Moron, Roseaux, and Corail are within 45 km of the town of Jérémie, the largest, although relatively isolated, city in the Grand'Anse department (hereafter referred to as Jérémie region). Lastly, Anse d'Hainault and Les Irois are in the Anse d'Hainault region, at the most western tip of Haiti's Tiburon Peninsula in the Grand'Anse department (hereafter referred to as Anse d'Hainault region).

All A3PN project regions were affected by Hurricane Matthew, a category 5 hurricane which devastated the South and Grand'Anse departments in early October 2016, with the most significant destruction in the Anse d'Hainault region. The hurricane was followed by sociopolitical unrest and the depreciation of the local currency in 2018 and 2019, which perpetuated food insecurity throughout the country (14).

The objective of the current study was to determine the prevalence and determinants of continued breastfeeding, as defined in the most recent *Indicators for assessing infant and young child feeding practices: definitions and measurement methods* (15), among children aged 12–23 months living in the eight communes that participated in the A3PN project in the South and Grand'Anse departments of Haiti.

METHODS

Data collection

Cross-sectional data were collected annually during the summer harvest season in the eight participating communes to measure the evolution of maternal and infant health and nutrition indicators during the A3PN project. Data were collected at baseline (4 July–5 September 2017), mid-intervention (21 July–30 August 2018), and post-intervention (15 July–24 August 2019). Although the areas of study remained stable during the 3 years of study, different people were invited to participate from one year to the next.

Participants were selected using a cluster sampling approach. Enumeration sections were the sampling units, based on the 2003 Haitian census, which was the last one available (16). The clusters were stratified by commune and type of region (15% urban and 85% rural, in accordance with the true population distribution). Sampling of clusters was proportional to population size, based on the 2013 population estimates (17). Within clusters, a starting location and direction were randomly selected, then each nearest household from the starting point in the selected direction was invited to participate in the study. Women aged 15–49 years with at least one child younger than 5 years and who were able to provide informed consent were eligible to participate. All children younger than 5 years in the participating household were included in the study until the quota of 10 children per cluster for each age group (0–5 months, 6–23 months, and 24–59 months) was reached. On average, the household response rate for all data collection cycles was 94.2%.

Questionnaires were administered in Haitian Creole by community health workers who were given 2 days of training annually with dietitians, who were also responsible for ensuring the quality of data collection. The questionnaire assessed child and maternal characteristics including age and sex of the child, age and education attainment of the mother, and household characteristics, including household composition, ownership of durable assets, infrastructure, sources of revenue, and access to land, livestock, water, sanitation and hygiene. These questions were taken from the 2012 DHS in Haiti (18). Questions about food production and harvesting practices were taken from *l'Enquête Nationale de la Sécurité Alimentaire (ENSA)* (19). Breastfeeding practices were assessed using questions from the *Indicators for assessing infant and young child feeding practices: definitions and measurement methods* (15) and questions about knowledge of WHO recommendations on exclusive breastfeeding and continued breastfeeding were taken from the *Guidelines for assessing nutrition-related knowledge, attitudes and practices* (20). The diet of the mothers and children was assessed using a non-quantitative 24-hour dietary recall of all food and drinks consumed in the day before the survey. Household food security was assessed using the food insecurity experience scale (21). Following administration of the questionnaire, the nutrition status of the mothers was assessed using mid upper-arm circumference. Mid upper-arm circumference was measured to 1 mm using a measuring tape placed around the left arm, mid-way between the shoulder and the elbow (22).

Data were collected on both paper forms and electronic tablets. Data collected on paper (household composition, anthropometry, and 24-hour dietary recall) were entered into Epi Info 7.2 (Centers for Disease Control and Prevention, Atlanta, USA),

and secondary data entry was carried out in Excel (Microsoft, Redmond, USA). Both databases were then compared using SAS 9.4 (SAS Institute, Cary, USA) to rectify any data input mistakes. All other data were collected using the mobile version of Epi Info 1.3.4 (Centers for Disease Control and Prevention, Atlanta, USA) on Lenovo TAB3 8 Android tablets, for which skip patterns and logical restrictions were programmed to minimize the occurrence of input mistakes.

Study sample

The pooled sample from all three cycles of data collection (2017–2019) included a total of 484 children aged 12–23 months. In households where data were collected for more than one child aged 12–23 months, only one child per household was randomly selected to be part of the analysis to avoid double counting determinants related to the mother and household. During this step, an additional 29 children were excluded. Participating children from these households were given a higher statistical weight to represent the total number of children aged 12–23 months in the household. The final analytical sample was 455 children.

Statistical analyses were also conducted for a subsample of ever-breastfed children from cycles 2018–2019 whose mothers answered additional questions on breastfeeding knowledge and practices ($n=257$).

Continued breastfeeding

Children aged 12–23 months were considered to be continuing breastfeeding if their mother mentioned breastmilk in their 24-hour recall.

Explanatory variables

Explanatory variables included in this analysis were: (i) infant – age, sex, and number of younger siblings; (ii) mother – age, educational attainment, pregnancy status, mid upper-arm circumference, dietary diversity, and responsibility for the main or secondary source of income for the household; (iii) household – food security, socioeconomic status, and dependency ratio; and (iv) setting – region, residential zone (rural/urban), and year of data collection. In the subsample including only data from ever-breastfed children who participated in the 2018 and 2019 cycles, additional explanatory variables include: (v) breastfeeding knowledge and practices – early initiation of breastfeeding, exclusive breastfeeding duration, and mother's knowledge of the WHO recommendation for continued breastfeeding duration.

Dietary diversity was estimated using the minimum dietary diversity for women (MDD-W) indicator, which is a proxy for micronutrient adequacy among women of reproductive age (15–49 years) based on consumption of foods from at least five of 10 food groups in the past 24 hours (23).

Mid upper-arm circumference values were split into tertiles as a global mid upper-arm circumference cut-off for assessing undernutrition in pregnant and non-pregnant women does not currently exist (24, 25).

Data from the food insecurity experience scale were validated following the methods proposed by the Food and Agriculture Organization of the United Nations (FAO), and the household's

probability of severe food insecurity was calculated (continuous, from 0 to near 1) (21).

The household dependency ratio was used to assess the number of social and economic dependents versus working-age adults (26) and was calculated as the number of dependents aged ≤ 14 years or ≥ 65 years divided by the number of individuals 15–64 years old in the household. Hence, the dependency ratio is < 1 in homes where fewer people aged ≤ 14 years or ≥ 65 years (dependents) reside compared to working-age adults (15–64 years).

An index for household socioeconomic status was developed using principal component analysis with variables that capture living standards, such as household ownership of durable assets and household infrastructure (27). The variables included were: electricity; radio; television; cellphone; clock; bank account; mosquito net; moped or motorbike; access to land for farming; livestock; roof made from metal/cement/wood; walls made from metal/cement/rock/wood; and ratio of the number of people to the number of bedrooms in the household. For the subsample including only data from ever-breastfed children who participated in 2018 and 2019, the variables also included improved source of drinking water in household and improved sanitation in household. The index was split into tertiles to reflect low, medium, and high socioeconomic status.

Statistical analyses

The prevalence of continued breastfeeding was estimated overall and by its potential determinants. For descriptive purposes, age of the infant (12–15, 16–19, and 20–23 months), age of the mother (15–24, 25–34, and 35–48 years), and dependency ratio (≤ 1 , > 1) were categorized (Table 1), and treated as continuous in the regression analyses (Table 2).

To identify the determinants of continued breastfeeding, unadjusted and adjusted prevalence ratios (PR) and their 95% confidence intervals (CI) were calculated. Cox proportional hazard models for complex surveys were used, assigning an equal time of follow-up to all individuals (27).

Continued breastfeeding (yes/no) was the dependent variable. Model 1 was unadjusted and performed for each potential determinant. Model 2 was adjusted for: (i) infant's age (continuous), sex (female/male), number of younger siblings (none/one or more); (ii) mother's age (continuous), educational attainment (less than primary school/primary school/secondary school or more), pregnant (yes/no), mid upper-arm circumference (tertiles), diet meets or exceeds MDD-W (yes/no), responsibility for the main or secondary source of income for household (yes/no); (iii) household's probability of severe food insecurity (continuous), socioeconomic status (tertiles), dependency ratio (continuous); and (iv) region (Les Cayes/Jérémie/Anse d'Hainault), residential zone (rural/urban), and year of data collection (2017/2018/2019). Model 3, which only used data from ever-breastfed children who participated in 2018 and 2019, included the same variables as in model 2 with three additional variables which were only available for these years of data collection: (iv) initiation of breastfeeding within 1 hour (yes/no); exclusive breastfeeding duration (less than 1 month/1–3 months/4–5 months/6 months or more); and mother's knowledge of the WHO recommendation for continued breastfeeding duration (yes/no).

All statistical analyses were weighted to account for the sampling design and unequal probability of selection, and to be

TABLE 1. Characteristics of children aged 12–23 months and mothers, Haiti, 2017–2019

Characteristic	All children (n=455)		Breastfed yesterday (n=455)	
	Estimate	SE	Estimate	SE
I. Child				
Breastfed in the previous day, %	45.8	2.8	NA	NA
Age in months, %				
12–15	30.9	2.4	76.0	4.7
16–19	35.2	2.4	51.9	4.2
20–23	34.0	2.1	12.1	2.8
Mean	17.9	0.2	–	–
Sex, %				
Female	51.0	3.4	45.0	2.8
Male	49.0	3.4	46.5	5.4
Number of younger siblings, %				
None	94.2	1.2	47.9	2.8
≥ 1	5.8	1.2	13.0	6.6
II. Mother				
Age in years, %				
15–24	32.0	2.1	46.5	4.3
25–34	46.6	2.6	44.4	4.8
35–49	21.4	2.1	47.8	5.6
Mean	29.4	0.3	–	–
Pregnant, %				
No	87.6	1.6	49.7	3.0
Yes	12.4	1.6	15.5	5.8
Educational attainment, %				
Less than primary school	40.5	3.1	51.4	4.5
Primary school	56.5	2.7	40.9	3.5
Secondary school or higher	3.0	1.0	21.4	14.7
Main or secondary income earner for household, %				
No	79.0	2.1	45.8	3.0
Yes	21.0	2.1	45.8	7.5
Arm circumference, %				
Tertile 1 (205–249 mm)	29.4	3.4	47.4	4.8
Tertile 2 (250–277 mm)	37.4	2.6	47.2	3.8
Tertile 3 (278–465 mm)	33.2	2.9	42.9	5.1
Mean (mm)	268.6	2.3	–	–
Diet met or exceeded MDD-W, %				
No	77.7	2.6	47.7	2.7
Yes	22.3	2.6	39.3	6.3
III. Household				
Severe food insecurity, %				
	73.9	2.6	–	–
Socioeconomic status, %				
Tertile 1 (lowest)	32.4	3.8	56.3	5.4
Tertile 2	34.4	2.2	47.4	4.6
Tertile 3 (highest)	33.2	3.7	34.0	4.3
Dependency ratio, %				
≤1	64.1	2.3	42.6	3.1
>1	35.9	2.3	52.0	3.9
Mean (number of dependents to adults)	1.2	0.0	–	–
IV. Setting				
Region, %				
Les Cayes	36.3	9.4	33.9	3.6
Jérémie	38.3	9.4	54.7	4.5
Anse d'Hainault	25.4	7.6	49.5	3.2

(Continue)

TABLE 1. (Cont.)

Characteristic	All children (n=455)		Breastfed yesterday (n=455)	
	Estimate	SE	Estimate	SE
Residential zone, %				
Rural	86.9	6.0	45.6	3.1
Urban	13.1	6.0	47.3	5.0
Year of data collection, %				
2017	32.1	5.0	41.0	5.4
2018	39.2	3.6	44.2	4.4
2019	28.7	3.4	53.4	7.2
V. Breastfeeding knowledge and practices^a				
Initiation of breastfeeding within 1 hour, % (n=287)				
No	16.9	2.8	55.8	8.9
Yes	83.1	2.8	55.0	3.5
Duration of exclusive breastfeeding in months, % (n=281)				
≥ 6	47.1	4.3	59.0	6.3
4–5	8.9	2.1	53.5	10.2
1–3	28.7	2.8	49.7	6.0
<1	15.3	3.2	57.3	8.3
Mother knows the recommended duration of continued breastfeeding, % (n=332)				
No	76.3	3.8	43.0	3.5
Yes	23.7	3.8	64.3	7.8

MDD-W, minimum dietary diversity for women; SE, standard error.

^a Data available only for summers 2018 and 2019.

Note: All estimates presented in the table are weighted.

Source: prepared by authors based on the results.

TABLE 2. Determinants of continued breastfeeding in children aged 12–23 months, Haiti, 2017–2019

Determinant variables	PR (95% CI)		
	Model 1: unadjusted (n=455)	Model 2: adjusted ^a (n=430)	Model 3: subsample adjusted (ever-breastfed children) ^b (n=257)
I. Child			
Age in months (continuous)	0.83 (0.81–0.86)***	0.84 (0.81–0.87)***	0.83 (0.79–0.88)***
Sex, %			
Female	Reference	Reference	Reference
Male	1.04 (0.78–1.37)	0.98 (0.79–1.20)	1.13 (0.94–1.35)
Number of younger siblings, %			
None	Reference	Reference	Reference
≥1	0.27 (0.10–0.74)*	0.30 (0.11–0.78)*	0.30 (0.09–1.01)
II. Mother			
Age in years (continuous)	1.00 (0.99–1.02)	1.01 (0.99–1.02)	1.01 (0.99–1.02)
Pregnant, %			
No	Reference	Reference	Reference
Yes	0.31 (0.15–0.66)**	0.34 (0.17–0.71)**	0.43 (0.23–0.82)*
Educational attainment, %			
Less than primary school	Reference	Reference	Reference
Primary school	0.80 (0.62–1.03)	0.93 (0.75–1.16)	0.94 (0.76–1.16)
Secondary school or higher	0.42 (0.10–1.74)	0.45 (0.14–1.48)	0.80 (0.39–1.64)
Main or secondary income earner for household, %			
No	Reference	Reference	Reference
Yes	1.00 (0.70–1.43)	0.75 (0.56–1.01)	0.83 (0.63–1.08)
Arm circumference, %			
Tertile 1 (160–245 mm)	Reference	Reference	Reference
Tertile 2 (246–275 mm)	0.99 (0.80–1.24)	1.13 (0.96–1.33)	1.04 (0.80–1.35)

(Continue)

TABLE 2. (Cont.)

Determinant variables	PR (95% CI)		
	Model 1: unadjusted (n=455)	Model 2: adjusted ^a (n=430)	Model 3: subsample adjusted (ever-breastfed children) ^b (n=257)
Tertile 3 (276–415 mm)	0.91 (0.65–1.26)	1.03 (0.81–1.32)	0.93 (0.68–1.28)
Diet meets or exceeds MDD-W, %			
No	Reference	Reference	Reference
Yes	0.82 (0.60–1.14)	0.90 (0.63–1.29)	1.02 (0.75–1.40)
III. Household			
Probability of severe food insecurity (continuous)	1.20 (0.82–1.77)	0.95 (0.62–1.45)	0.80 (0.50–1.28)
Socioeconomic status, %			
Tertile 1 (lowest)	Reference	Reference	Reference
Tertile 2	0.84 (0.64–1.11)	0.99 (0.78–1.27)	0.98 (0.80–1.19)
Tertile 3 (highest)	0.60 (0.42–0.86)**	0.87 (0.63–1.21)	0.90 (0.69–1.18)
IV. Setting			
Les Cayes	Reference	Reference	Reference
Jérémie	1.61 (1.23–2.12)**	1.50 (1.12–2.00)**	1.45 (1.07–1.97)*
Anse d'Hainault	1.46 (1.14–1.87)**	1.30 (0.88–1.92)	1.22 (0.85–1.76)
Residential zone, %			
Rural	Reference	Reference	Reference
Urban	1.04 (0.79–1.36)	1.19 (0.84–1.68)	1.41 (0.93–2.15)
Year of data collection, %			
2017	Reference	Reference	–
2018	1.08 (0.76–1.53)	1.22 (0.92–1.63)	Reference
2019	1.30 (0.88–1.93)	1.23 (0.90–1.68)	0.90 (0.68–1.17)
V. Breastfeeding knowledge and practices^b			
Initiation of breastfeeding within 1 hour, % (n=287)			
No	Reference	–	Reference
Yes	0.99 (0.71–1.36)	–	1.26 (0.91–1.73)
Duration of exclusive breastfeeding in months, % (n=281)			
≥6	Reference	–	Reference
4–5	0.91 (0.58–1.42)	–	0.97 (0.67–1.42)
1–3	0.84 (0.58–1.23)	–	1.22 (0.89–1.65)
<1	0.97 (0.71–1.33)	–	1.49 (1.02–2.19)*
Mother knows the recommended duration of breastfeeding, % (n=332)			
No	Reference	–	Reference
Yes	1.49 (1.10–2.03)*	–	1.34 (1.03–1.75)*

PR, prevalence ratio; CI, confidence interval; MDD-W, minimum dietary diversity for women.

^a Adjusted for all variables except: initiation of breastfeeding within 1 hour; duration of exclusive breastfeeding; and mother knows recommended duration of breastfeeding.

^b Data only for summers of 2018 and 2019.

*P<0.05, **P<0.01, ***P<0.001.

Note: All estimates presented in the table are weighted.

Source: prepared by authors based on the results.

representative of the Haitian population. Alpha level was set at 0.05 and analyses were conducted using SAS 9.4.

Ethics

The A3PN project was approved by the Comité d'Éthique de la Recherche en Santé (CERES) of the Université de Montréal and the Comité National de Bioéthique in Haiti. All participants were provided with informed consent forms written in Haitian Creole, which were read to them by the interviewer. Verbal consent obtained from the participant was documented by the interviewer on the form and a printed copy of the details of the study, including staff contact information, was provided to the participant. Participant names and contact information were recorded on the consent forms, which are kept in a locked

room at the Université de Montréal. To protect participants' anonymity, a participant number was used instead of participant names on paper and electronic data collection forms, and no individual data are presented in any form of publication or dissemination.

RESULTS

As presented in Table 1, the prevalence of continued breastfeeding was 45.8% overall. The distribution of participating children according to age (30.9% 12–15 months, 35.2% 16–19 months) and sex (51.0% female) were balanced, and very few children had younger siblings (5.8%). As for mothers, 32.0% were aged 15–24 years and 46.6% were 25–34 years. Few mothers (12.4%) were pregnant and 21.0% were responsible for the

main or secondary source of income for the household. More than half of the mothers (56.5%) had completed primary school, but only 3.0% had a secondary school education. About one third (29.4%) of mothers had a mid upper-arm circumference smaller than 250 mm (tertile 1) and most (77.7%) had not achieved MDD-W on the day before the survey. Close to three quarters of homes (73.9%) had severe food insecurity and 64.1% had a dependency ratio of ≤ 1 . Fewer mothers came from the Anse d'Hainault region (25.4%), as was expected given that this region only included two of the eight participating communes, and 86.9% of mothers lived in rural areas.

In the subsample of ever-breastfed children who participated in the 2018 and 2019 cycles, most children (83.1%) were breastfed within 1 hour of birth and 47.1% were exclusively breastfed for up to 6 months or more. Only 23.7% of the mothers knew about the WHO recommendation for continued breastfeeding.

Table 2 presents the results of the regression models. From the adjusted model 2, the prevalence of continued breastfeeding was lower among older children (PR 0.84, 95% CI 0.81–0.87), children who had a younger sibling (PR 0.30, 95% CI 0.11–0.78), children whose mother was pregnant (PR 0.34, 95% CI 0.17–0.71), and children who lived in the region of Les Cayes (reference) compared to Jérémie (PR 1.50, 95% CI 1.12–2.00).

In the adjusted model 3 (cycles 2018 and 2019), ever-breastfed children who exclusively breastfed for less than 1 month (PR 1.49, 95% CI 1.02–2.19) and whose mothers knew the WHO recommendation on the duration of continued breastfeeding (PR 1.34, 95% CI 1.03–1.75) were most likely to be breastfed the day before the survey.

DISCUSSION

The aim of this study was to identify the determinants of continued breastfeeding using cross-sectional data collected annually (2017–2019) among mothers and children living in regions participating in a 4-year multisectoral maternal and infant health initiative.

Of the 14 factors included in the logistic regression model 2, four were significantly associated with continued breastfeeding: infant's age; presence of a younger sibling; mother's pregnancy status; and region of residence. An additional two out of three factors included in adjusted model 3 (duration of exclusive breastfeeding and knowledge of WHO recommendation on duration of continued breastfeeding) were also significantly associated with continued breastfeeding.

The decline in continued breastfeeding with increasing age of the child is consistent with tendencies observed in Haiti (10) and globally (28). The significantly higher prevalence of continued breastfeeding among children whose mothers knew about the WHO recommendation was also in the expected direction, although the results show that few participants were actually aware of (or believed in) this recommendation (23.4%). Although continued breastfeeding is an important part of Haitian tradition, traditional beliefs may also act as barriers to continued breastfeeding, particularly for the periods 16–19 months and 20–23 months during which only 51.9% and 12.1% of children, respectively, were reported to be continuing breastfeeding, as opposed to 76.0% of children aged 12–15 months. In Haiti, continued breastfeeding is often believed to be required only until 12 or 18 months, depending on the region. The most commonly reported beliefs are that: (i) breast milk is no longer

necessary for a well developed child aged 12–18 months; (ii) the nutritional quality of breast milk deteriorates with time which may lead to the formation of worms in the child; and (iii) it is necessary to stop breastfeeding when becoming pregnant again for fear of harming the fetus (29–31). These beliefs, which have been reported in our study region (12), also align with the findings that continued breastfeeding prevalence was significantly lower in children who had a younger sibling (13.0%) or whose mother was pregnant (15.5%).

Another important outcome of this study is the significant association between continued breastfeeding and exclusive breastfeeding duration among ever-breastfed children in the adjusted model 3. Continued breastfeeding rates were highest among children whose mothers had lowest adherence to the WHO guideline for exclusive breastfeeding, that is, children who were exclusively breastfed for less than 1 month (PR 1.49, 95% CI 1.02–2.19). This finding aligns with a meta-analysis of DHS data from 153 countries between 1995 and 2013, in which most national breastfeeding indicators were not strongly associated, with only a moderate correlation (Pearson $r=0.54$) between exclusive and continued breastfeeding at 1 year in low- and middle-income countries (6). As mentioned earlier, continued breastfeeding is an important part of tradition among Haitians (8); however, tradition can also be a barrier to optimal exclusive breastfeeding practices, with prelacteal feeds and early introduction of complementary foods being frequently reported (12, 30). Therefore, the association between early introduction of complementary food and beverages and good continued breastfeeding practices is to be expected in our study population.

The significantly higher rates of continued breastfeeding in the Jérémie region (54.7%) are likely the result of careful planning and sustainable regional investment in maternal and infant well-being. As discussed in a previous article (11), the Haitian Health Foundation has been actively engaged in promoting breastfeeding in the Jérémie region since the 1980s through the creation of the first two baby-friendly certified villages in Haiti (32).

Strengths and limitations

To our knowledge, this is the first study to statistically assess the determinants of continued breastfeeding in children living in Haiti using the WHO standard infant and young child feeding indicator and a wide range of potential predictors. The study results should, however, be interpreted considering some limitations. Data collection was cross-sectional; therefore, the findings cannot be used to draw causal inferences. Data from this study were self-reported which may have led to misreporting due to recall or social-desirability bias, particularly in the later data collection cycles as the A3PN project activities promoted continued breastfeeding and dietary diversity. Certain results should be interpreted with caution due to the small subsample in some categories, notably the number of children whose mothers had a secondary or higher education (only 12 mothers).

With regard to household food security using the food insecurity experience scale, the sample size ($n=239$) used for statistical validation was smaller than recommended ($n>300$) for the data collected during the summer of 2017 and the flat Rasch reliability was 0.7 for all data cycles, whereas the FAO recommends a value >0.7 (18). Other potential problems could be related to the accuracy and nuances of translation of the questions (21).

Therefore, food insecurity results for this study should be interpreted with caution.

CONCLUSION

Nearly half (45.8%) of children aged 12–23-months were continuing breastfeeding. Determinants of continued breastfeeding included younger infant age, absence of younger siblings, no maternal pregnancy, exclusive breastfeeding duration <1 month postpartum, and geographic area. These findings demonstrate the need for geographically equitable access to tailored and adequate health services and education that support breastfeeding. This support should be compatible with the local context and recognize the strengths, weaknesses and opportunities related to the traditional and biomedical knowledge systems affecting continued breastfeeding.

Author contributions. SD was the research coordinator for the A3PN project for 3 out of the 4 years and wrote the first draft of the manuscript. MN undertook data cleaning and statistical analysis. MB was the research project lead for A3PN. All authors participated in the interpretation of the findings and contributed substantially to the intellectual content of the article. All authors reviewed and approved the final version.

Acknowledgements. We thank the study participants and project partners: Fondation Paul Gérin-Lajoie and the Catholic

Relief Service for their continuous support. We also thank the community nurses and health workers who moderated the many focus groups and collected data from more than 800 mothers in the participating regions. We acknowledge the work of the dietitians, who each spent more than 4 months overseeing the research activities in Haiti: Sabrina Arasimowicz, Andréanne Bégin, Geneviève Boulanger, Andréa Dufour, Samuel Frappier, Élise Jalbert-Arsenault, Marie-Jeanne Rossier-Bisaillon, Bana Salameh, and Caroline Vaillancourt. Finally, we thank the dietetic interns: Madison Behr, Marjolaine Cadieux, and Emilie Lacaille who contributed to the literature review for this article.

Conflicts of interest. None declared.

Funding. Data collection was funded by Global Affairs Canada and Fondation Paul Gérin-Lajoie as part of the A3PN project. Data analysis and manuscript writing were funded by MB's Canada Research Chair in Nutrition and Health Inequalities.

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Manuscript received on 4 October 2023. Revised version accepted for publication on 10 October 2023

Determinantes de la continuación de la lactancia materna en la población infantil de entre 12 y 23 meses en tres regiones de Haití

RESUMEN

Objetivos. Determinar la prevalencia y los determinantes asociados a la continuación de la lactancia materna en la población infantil haitiana de entre 12 y 23 meses.

Métodos. Durante los veranos del 2017 al 2019 se llevaron a cabo tres encuestas transversales anuales como parte de una iniciativa multisectorial de salud materna e infantil de 4 años (2016 a 2020) en las regiones de Les Cayes, Jérémie y Anse d'Hainault de Haití. En el estudio participaron 455 menores de edades comprendidas entre 12 y 23 meses y sus madres. Se consideró que un menor continuaba con la lactancia materna si, en la evaluación de la alimentación basada en el recuerdo de 24 horas, la madre declaraba la toma de leche materna. Se calcularon los cocientes de prevalencia ajustados y sin ajustar y se evaluó la asociación entre la continuación de la lactancia materna y posibles factores explicativos relacionados con las características sociodemográficas, la seguridad alimentaria de la familia, la nutrición materna y los conocimientos y prácticas en materia lactancia materna.

Resultados. La prevalencia de la continuación de la lactancia materna fue del 45,8%. Esta prevalencia fue significativamente mayor cuando se trataba de lactantes de menor edad, cuando no había hermanos menores, cuando la madre no estaba embarazada, en los residentes en la región de Jérémie, cuando había habido una alimentación exclusiva con leche materna durante menos de un mes y cuando la madre conocía la recomendación de la Organización Mundial de la Salud de continuar con la lactancia materna hasta los dos años o más.

Conclusiones. Los resultados del estudio ponen de relieve la necesidad de disponer de un acceso geográfico equitativo a unos servicios de salud y una educación que respalden la lactancia materna de una manera compatible con el contexto local.

Palabras clave

Lactancia materna; prevalencia; epidemiología; salud del lactante; Haití.

Determinantes do aleitamento materno continuado em crianças de 12 a 23 meses de idade em três regiões do Haiti

RESUMO

Objetivos Identificar a prevalência e os determinantes do aleitamento materno continuado em crianças haitianas de 12 a 23 meses de idade.

Métodos Três pesquisas transversais foram realizadas anualmente nos verões de 2017 a 2019 como parte de uma iniciativa multisectorial de saúde materno-infantil de quatro anos (2016–2020) nas regiões de Les Cayes, Jérémie e Anse d'Hainault no Haiti. Um total de 455 crianças de 12 a 23 meses de idade e suas mães participaram do estudo. Considerou-se que a criança continuava sendo amamentada se a mãe relatasse ter dado leite materno no recordatório alimentar de 24 horas. Foram estimadas as taxas de prevalência não ajustadas e ajustadas e foram avaliadas as associações entre o aleitamento materno continuado e os fatores explicativos relacionados às características sociodemográficas, à segurança alimentar da família, à nutrição materna e aos conhecimentos e práticas de aleitamento materno.

Resultados A prevalência de aleitamento materno continuado foi de 45,8%. O aleitamento materno continuado foi significativamente mais prevalente entre crianças mais novas, crianças que não tinham irmão mais novo, crianças cuja mãe não estava grávida, residentes da região de Jérémie, crianças que haviam sido exclusivamente amamentadas por menos de um mês e crianças cuja mãe conhecia a recomendação da Organização Mundial da Saúde de manter o aleitamento materno por 2 anos ou mais.

Conclusões Os resultados do estudo destacam a necessidade de acesso geograficamente equitativo a educação e serviços de saúde adaptados e adequados para apoiar o aleitamento materno de forma compatível com o contexto local.

Palavras-chave

Aleitamento materno; prevalência; epidemiologia; saúde do lactente; Haiti.
