PAN AMERICAN JOURNAL OF PUBLIC HEALTH

Original research

Changes in reproductive, maternal, and child health in Haiti during the pre- and peri-COVID-19 pandemic

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Suggested citation Joseph G, Kobi-Jackson S, Birmingham M, Champetier de Ribes G, De Mucio B, Colomar M, et al. Changes in reproductive, maternal, and child health in Haiti during the pre- and peri-COVID-19 pandemic. Rev Panam Salud Publica. 2024;48:e57. https://doi.org/10.26633/RPSP.2024.57

ABSTRACT

Objective. To assess changes in reproductive, maternal, newborn, child, and adolescent health (RMNCAH) in Haiti from August 2018 to September 2021, before and during the COVID-19 pandemic.

Methods. A retrospective study using surveillance data from the Haitian Unique Health Information System, examining two periods: pre- and peri-COVID-19 pandemic. Health indicators at the national level in the two periods were compared using two-sample *t*-tests for proportions, and average absolute monthly changes were calculated using variance-weighted regression.

Results. There was a statistically significant decline in the proportion of most of the indicators assessed from the pre- to the peri-COVID-19 pandemic period. However, the most affected indicators were the proportions of pregnant women with four antenatal care visits, with five antenatal care visits or more, and those who received a second dose of tetanus vaccine, which decreased by over 4 percentage points during the two periods. Likewise, the proportions of children who received diphtheria, tetanus, and pertussis (DTaP), BCG, polio, pentavalent, and rotavirus vaccines also all declined by over 8 percentage points. In contrast, pneumococcal conjugate vaccine increased by over 4 percentage points. A statistically significant decrease was also observed in the average absolute monthly changes of several reproductive and child health indicators assessed.

Conclusions. The COVID-19 pandemic may have contributed to the decline observed in several RMNCAH indicators in Haiti. However, the role played by the sociopolitical crisis and control exercised by armed groups over the population in the last three years cannot be ruled out.

Keywords Child health; family planning; maternal health; reproductive health; women's health services; COVID-19; Haiti.

The COVID-19 pandemic has substantially affected healthcare systems worldwide. As of 3 August 2021, nearly 200 million cases had been reported globally along with 4.2 million deaths (1). When the World Health Organization alerted countries and then, in accordance with the International Health Regulations, in January 2020 declared a public health emergency of international concern, the initial response of many countries was characterized by extensive lockdowns to slow transmission and thereby gain time to prepare response actions and protect health services as much as possible from becoming overwhelmed (2). In many countries, a collateral effect of the lockdowns and the subsequent community transmission of COVID-19, coupled with fear and stigma surrounding COVID-19, was a reduction in demand and access to healthcare services including antenatal and postnatal care, particularly in lower income countries with fragile health systems (2). Analyses conducted by Stein et al. (3) on four low- and middle-income countries with poor maternal, newborn, and child health outcomes predicted that

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the overwhelming effects of the COVID-19 pandemic could lead to 31% additional maternal and newborn deaths due to reduced access to essential services such as family planning, antenatal care, facility-based deliveries, and postnatal care (3). In contrast, a retrospective review conducted in Ireland in 2020 by McDonnell et al. (4) using data from a large tertiary hospital in Dublin found no correlation between the monthly number of COVID-19 deaths and the monthly number of perinatal deaths, preterm births, and hypertensive pregnancies. However, it should be noted that the study focused on severity of the pandemic using the number of COVID-19 deaths as a marker instead of the COVID-19 infection rate (4).

Immediately after the report of the first COVID-19 case in March 2020 in Haiti, the Government put several preventive measures in place to limit the spread of the virus in the country (5, 6). Among these was the creation of the Multisectoral Commission for the Management of the COVID-19 Pandemic, to lead the strategic planning and response against COVID-19 (5, 6). Despite the measures adopted by the Government to limit the spread of the virus, low compliance to the measures by the population was reported (7). Given the fragile health system and poor health indicators in Haiti, it was predicted that disruptions to health services in Haiti could leave 212 600 children without diphtheria, tetanus, and pertussis (DTaP) vaccination, and lead to 26 500 fewer deliveries in health facilities and 228 200 fewer women receiving family planning services (8). To our knowledge, no previous study has been conducted to assess the impact of the pandemic on healthcare services in Haiti. This study aimed to assess the changes in reproductive, maternal, newborn, child, and adolescent health (RMNCAH) in Haiti before and during the COVID-19 pandemic and to derive lessons that would help in decision-making.

MATERIALS AND METHODS

A retrospective study was conducted using data from the Haitian Unique Health Information System (Système d'Information Sanitaire Unique – SISNU in French). SISNU is a national health information platform launched in 2013 by the Ministry of Health of Haiti to track all health-related data on RMNCAH in the country on a monthly basis. SISNU captures health-related data from more than 800 facilities from the nation's 10 departments. The monthly reporting rate for the departments on patient attendance and outpatient clinics is estimated to be over 70%. SISNU collects data on several RMNCAH indicators that can be disaggregated by age and sex. Data collected by SISNU are periodically uploaded to the District Health Information Software 2 (DHIS2), a web-based platform that is being used by 73 low- and middle-income countries. More details on SISNU can be found elsewhere (https://dhis2.org/haiti-hmis/).

This study included all women of reproductive age (15–49 years) who had their information on reproductive and maternal health/death recorded on the above-mentioned databases from August 2018 to September 2021. The study also included newborns, under-5 children, and adolescents for which information was available for the same periods. All the data used in this study were anonymized to ensure the confidentiality of the participants. Ethical approval was obtained from the National Ethics Committee of the Ministry of Health of Haiti prior conducting the study. Participants provided verbal informed consent prior to data collection.

The indicators of interest used in this study were grouped according to each domain of RMNCAH. The reproductive health indicators included the number of women accepting modern contraceptive methods including condoms, intrauterine device, depot medroxyprogesterone acetate (DPMA), implant, progestogen-only pills, combined oral contraceptive pill, and tubal ligation. In this study, the term "accepting" refers to any woman aged 15–49 who agreed to use a modern method of contraception for the first time in her life as part of a structured public or private family planning program. Therefore, a woman who changed method – that is to say, who previously used another method in a structured family planning program – was excluded from the category of "accepting" (9).

Maternal health indicators included number of antenatal care visits during pregnancy, number of pregnant women with confirmed malaria and treated with chloroquine, and with anemia and treated for iron deficiency anemia. Also included were the number of pregnant women who received at least the second dose of tetanus toxoid vaccine (dT2+), number of institutional deliveries and deliveries by C-section, and number of women receiving post-abortion care.

Newborn and postnatal health indicators included: number of home visits/postnatal follow-up (0–3 days) after delivery, low birthweight (<2.5 kg), number of institutional live births beneficiaries of the kangaroo mother care method, and number of institutional live births with early initiation of breastfeeding.

Child health indicators analyzed were: total BCG doses (0–11 months), DTaP doses (12–23 months), measles 2 doses (12–23 months), pneumococcal conjugate vaccine 3 doses (0–11 months), polio 3 doses (0–11 months), pentavalent vaccine 3 doses (0–11 months), rotavirus 2 doses (0–11 months), and total fully vaccinated (0–11 months). Child health indicators were disaggregated by sex. It should be noted that most of the vaccine indicators were only available for 0–11 months.

Mortality indicators such as the number of maternal deaths per childbirth and number of stillbirths were also analyzed. More details about the indicators and their definition can be found in other resources (9, 10). This study is reported according to STROBE guidelines for observational studies (11).

Data analysis

To achieve the objective of the study, the analysis was divided into two periods: pre- and peri-COVID-19 pandemic. Pre-COVID-19 pandemic included the first 19 months before the report of the first COVID-19 case in Haiti (August 2018–February 2020); and peri-COVID-19, the 19 months starting from the detection of the first case (March 2020–September 2021). Two sample *t*-tests for proportions were used to compare the frequency of indicators before and during the COVID-19 pandemic. Analyses for reproductive and maternal indicators were disaggregated by age, and neonatal and child health indicators were disaggregated by sex wherever possible. For indicators with unknown denominator (unavailable in SISNU to calculate proportion), we relied on data from the Haitian Institute of Statistics and Informatics for denominators such as the number of expected pregnant women during the period and population of children under 5 years. We calculated the average absolute monthly changes (AAMC) of indicators at the national level using variance-weighted regression to compare the monthly changes in RMNCAH indicators for the two periods. Statistical

significance level was defined at less than 0.05. All the analyses were carried out using Microsoft Excel and Stata (Stata Statistical Software, Release 14, 2015; StataCorp, College Station, TX).

RESULTS

The proportion of women accepting a modern contraceptive method decreased significantly from the pre- to the peri-COVID-19 pandemic period (from 8.0% to 7.2%, $p < 0.001$) Similar results were obtained for the proportion of women who accepted condoms (from 2.3% to 1.9%, $p < 0.001$), DPMA (from 4.1% to 3.5%, $p < 0.001$), and tubal ligation (from 0.1% to 0.0%, $p < 0.001$). In contrast, a significant increase was observed in the proportion of women accepting intrauterine device (from 0.01% to 0.04%, $p < 0.001$), implant (from 0.3% to 0.4%, $p < 0.001$), combined oral contraceptive pill (from 0.9% to 1.0%, $p < 0.001$), and progestogen-only pill (from 0.3% to 0.4%, $p < 0.001$) (Table 1).

There were also reductions in the proportion of women receiving first antenatal care in the first trimester of pregnancy (from 26.6% to 25.4%, $p < 0.001$). Additionally, reductions were observed in women receiving four antenatal care visits (from 26.3% to 22.0%, $p < 0.001$) and in those receiving five or more (from 22.3% to 17.4%, $p < 0.001$).

Regarding recommended practices, anemia during pregnancy was less registered (from 27.4% to 24.1%, $p < 0.001$), with a significant reduction in pregnant women treated for iron deficiency anemia (from 26.3% to 21.9%, $p < 0.001$) during the same period. Reductions were also observed in pregnant women who received at least a second dose of tetanus toxoid (from 53.7% to 39.2%, $p < 0.001$). Conversely, there were increases in

TABLE 1. Comparison of reproductive and maternal indicators and deaths during the pre- and peri-COVID-19 pandemic period (August 2018–September 2021), Haiti

Indicator	August 2018–February 2020		March 2020–September 2021		
	n	%	*n*	%	*p*-value
Reproductive health					
Number of women of reproductive age (15–49 years)	4 479 088	--	4 581 853	--	--
Number of women accepting a modern contraceptive method	356 089	8.0	328 238	7.2	<0.001
Number of women accepting condoms	104 650	2.3	85 538	1.9	<0.001
Number of women accepting intrauterine device	780	0.0	1 248	0.0	<0.001
Number of women accepting DPMA	183 841	4.1	159 469	3.5	<0.001
Number of women accepting implant	15 544	0.3	19 197	0.4	<0.001
Number of women accepting combined oral contraceptive pill	39 521	0.9	43 159	1.0	<0.001
Number of women accepting progestogen-only pill	11 753	0.3	19 627	0.4	<0.001
Number of women accepting tubal ligation	3 714	0.1	1 666	0.0	<0.001
Maternal health					
Antenatal care (number of pregnant women expected)	514 053	--	523 640	--	--
Number of women receiving first antenatal care in the first trimester of pregnancy	146 910	26.6	132 925	25.4	<0.001
Number of pregnant women with four antenatal care visits	135 413	26.3	115 449	22.0	<0.001
Number of pregnant women with five antenatal care visits or more	114 491	22.3	90 902	17.4	<0.001
Number of pregnant women with confirmed malaria treated with chloroquine	1 083	0.2	1 758	0.3	<0.001
Number of pregnant women who received an insecticidal mosquito net	26 626	5.2	43 880	8.4	<0.001
Number of pregnant women with anemia	140 856	27.4	126 099	24.1	<0.001
Number of pregnant women treated for iron deficiency anemia	135 233	26.3	114 777	21.9	<0.001
Number of pregnant women who received a second dose (dT2+) of tetanus vaccine	276 204	53.7	205 048	39.2	<0.001
Total deliveries (institutional + noninstitutional deliveries)	284 980	--	219 394	--	--
Number of institutional deliveries:	197 276	69.2	148 523	67.7	<0.001
age <15 years	674	0.3	514	0.3	0.8259
15–19 years	25 504	12.9	19 050	12.9	0.3765
20–24 years	46 698	23.7	34 704	23.4	0.0362
25–29 years	48 066	24.4	35 737	24.1	0.0394
30+ years	73 192	37.1	56 540	38.1	<0.001
Number of vaginal deliveries	150 549	76.3	109 950	74.0	<0.001
Number of deliveries by cesarean section	34 466	17.5	30 049	20.2	<0.001
Maternal death per childbirth (institutional + community) and stillbirths					
Total live births	282 413	--	212 300	--	--
Maternal mortality ratio per 100 000 live births	551	195	488	230	0.0082
Stillbirth rate per 1 000 births	6 902	24.4	5 762	27.1	<0.001
Number of macerated stillbirths	2 027	9.7	1 624	9.7	<0.001
Number of fresh stillbirths	3 157	15.1	2 660	16.0	<0.001

DPMA, depot medroxyprogesterone acetate.
Source: Prepared by the authors based on DHIS2 data.

the proportions of pregnant women with confirmed malaria treated with chloroquine (from 0.2% to 0.3%, $p < 0.001$), and who received an insecticidal mosquito net (from 5.2% to 8.4%, $p < 0.001$).

There were also reductions in the proportion of institutional delivery (from 69.2% to 67.7%, $p < 0.001$) and vaginal delivery (from 76.3% to 74.0%, $p < 0.001$). When institutional delivery was disaggregated by age, no significant differences were observed for adolescent women younger than 15 years and for those aged 15–19 ($p > 0.05$). On the contrary, the C-section rate increased from 17.5% to 20.2% ($p < 0.001$) during the same period (see Figure S1 in the supplementary material).

Finally, the maternal mortality ratio showed a statistically significant increase from 195 to 230 per 100 000 live births from the pre- to the peri-COVID-19 pandemic period ($p = 0.0082$). The stillbirth rate also increased from 24.4 to 27.1 per 1 000 births during the same period.

Table 2 presents the newborn and child health indicators during the pre- and peri-COVID-19 pandemic periods. Statistically significant decreases were observed in the proportions of early initiation of breastfeeding among institutional live births (from 60.0% to 58.6%, $p < 0.001$) and low birthweight (from 11.1% to 10.9%, $p = 0.0078$). However, there were statistically significantly increases during the same period in the proportion of institutional live births beneficiaries of the kangaroo mother care method (from 8.6% to 10.4%, $p < 0.001$) and home visits/postnatal follow-up during days 0–3 (from 36.8% to 40.0%, $p < 0.001$).

The proportion of fully vaccinated children (0–11 months) decreased from 48.9% to 46.8% ($p < 0.001$). However, when the data were disaggregated by sex, these proportions seemed to decrease for female but increase for male children. We believe that such difference could be random and not due to a real difference between males and females in access to vaccination services in the country. The proportion of children aged 6–23 months who received a third dose of vitamin A increased from 1.7% to 2.1% ($p < 0.001$) and aged 24–59 months, from 2.0% to 2.2% ($p < 0.001$). There was a slight reduction in the proportion of under-5 children seen for the first time, screened for acute malnutrition (from 12.6% to 12.3%, $p < 0.001$) as well as for chronic malnutrition (from 3.5% to 3.0%, $p < 0.001$) (Table 2).

In the supplementary material, Table S1 and Figure S2 summarize the AAMC in RMNCAH during the two periods. Pre-COVID-19 pandemic we observed an average absolute monthly reduction in the number of pregnant women with at least a second dose of tetanus toxoid (–241.8, $p = 0.010$), the number of under-5 children seen for the first time, screened for acute malnutrition (–194.3; $p = 0.003$) and for chronic malnutrition (–52, $p = 0.017$). When data were disaggregated by age, average absolute monthly reductions were also observed in the number of children aged 24–59 months seen for the first time and screened for acute malnutrition (–81.5, $p = 0.010$). Likewise, we observed a significant reduction per month in the number of children aged 6–23 months (–28.1, $p = 0.012$) and 24–59 months (–25.0, $p = 0.009$) seen for the first time and screened for chronic malnutrition.

There was a statistically significant reduction per month for the number of women accepting DPMA (–102.1, $p = 0.034$). However, the number of women accepting combined oral contraceptive (86.0; $p = 0.026$), progestogen-only pill (78.2, $p = 0.007$), and having four antenatal care visits (102.3, $p = 0.004$) showed significant increases per month during the peri-COVID-19 pandemic period (see Table S1 in the supplementary material).

Figure 1 presents the evolution of the maternal mortality ratio during the two periods. The maternal mortality ratio decreased slightly from 195.0 in August 2018 to 183.0 per 100 000 live births in February 2020. The highest ratio was observed in June 2020 (372.4 per 100 000 live births) and in November 2020 (356.6 per 100 000 live births). During the peri-COVID-19 pandemic, it increased from 179.6 in March 2020 to 185.9 per 100 000 live births in September 2021.

DISCUSSION

We showed the overall changes in RMNCAH indicators during the first 19 months following the first reported COVID-19 case in Haiti compared with the previous 19 months. Most of the indicators analyzed declined from the pre- to the peri-COVID-19 pandemic period. However, the most affected indicators were for antenatal care and childhood immunization. Indicators such as the proportions of pregnant women with four antenatal care visits, pregnant women with five antenatal care visits or more, and pregnant women who received a second dose of tetanus vaccine (dT2+) declined by over 4 percentage points from the pre- to the peri-COVID-19 pandemic period. Likewise, the proportions of children who received BCG, DTaP, polio, pentavalent, and rotavirus vaccines all declined by over 8 percentage points during the same period. The only indicator that increased by more than 4 percentage points during the period was for pneumococcal conjugate vaccine.

Several studies have demonstrated the indirect impact of the pandemic on RMNCAH services (12–15). Balogun et al. (14), in a cross-sectional study conducted in 2021, revealed that in Nigeria one-third of the women included in the study had limited access to RMNCH services during the pandemic due to the lockdown measures imposed by the Government, unavailability of transport, and closure of some health facilities. Likewise, Baloch et al. (13) in Pakistan, using data from DHIS, showed that the number of clients who availed of routine care or RMNCH services at the primary health care level declined considerably during the initial phase of the first wave of the COVID-19 pandemic. Such decline may be explained by the immense pressure on the healthcare system in managing COVID-19, disruption in health services due to fear of contacting the virus and restrictions on movement, and closure of certain RMNCH services, among others (13, 14). Both of these are lower-middle-income countries that might share similar obstacles in delivering sufficient services in times of crisis, comparable with Haiti. In contrast, Shikuku et al. (16), investigating the initial impact of COVID-19 pandemic on RMNCAH services in Kenya, found no significant change in the mean total hospital attendance. Nonetheless, the short period examined might be a possible explanation for the absence of significant impact of the COVID-19 pandemic on RMNCAH services in that study.

The number of women opting for the contraceptive implant and children receiving a third dose of pneumococcal conjugate vaccine increased significantly from the pre- to the peri-COVID-19 pandemic period. This result is, in part, consistent with findings from a study by Karp et al. (17) who, using longitudinal data collected from women at risk of unintended pregnancy in sub-Saharan Africa during the pre- and peri-COVID-19 pandemic periods, showed that most women did not change contraceptive status in the early months of the pandemic, and those who did were more likely to adopt

TABLE 2. Comparison of newborn and child health indicators during the pre- and peri-COVID-19 pandemic period (August 2018–September 2021), Haiti

Indicator	August 2018–February 2020		March 2020–September 2021		
	n	%	*n*	%	*p*-value
Newborn health and postnatal care					
Number of institutional live births	192 674	--	145 395	--	--
Number of institutional live births beneficiaries of kangaroo method	16 540	8.6	15 055	10.4	<0.001
Number of institutional live births breastfed within an hour after birth	115 634	60.0	85 215	58.6	<0.001
Number of children born with low birthweight (<2.5 kg) (denominator: all live births)	31 419	11.1	23 111	10.9	0.0078
Number of home visits/postnatal follow-up (0–3 days) (denominator: total deliveries)	105 000	36.8	87 777	40.0	<0.001
Child immunization					
Number of children <1 year old	438 479	--	448 835	--	--
Total BCG doses (0–11 months)	379 295	85.5	306 912	68.4	<0.001
Total DTaP doses (12–23 months)	235 557	53.7	198 299	44.2	<0.001
Total PCV3 doses (0–11 months) [a]	166 499	38.0	294 308	65.6	<0.001
Total polio 3 doses (0–11 months)	291 132	66.4	214 595	47.8	<0.001
Total measles 2 doses (12–23 months)	188 200	42.9	177 082	39.5	<0.001
Total pentavalent 3 doses (0–11 months)	345 651	78.8	313 534	69.9	<0.001
Total rotavirus 2 doses (0–11 months)	328 294	74.9	295 729	65.9	<0.001
Number of children fully vaccinated, 0–11 months:	214 633	48.9	209 961	46.8	<0.001
females	116 586	54.3	108 693	53.2	<0.001
males	98 047	45.7	96 432	47.2	<0.001
Nutrition					
Number of children attended	3 596 712	--	3,388 325	--	--
Distribution of vitamin A dose 3, by age:					
under 5 years	133 549	3.7	143 586	4.2	<0.001
6–23 months	60 832	1.7	70 660	2.1	<0.001
24–59 months	72 717	2.0	72 926	2.2	<0.001
Number of children seen for first time	1 077 997	--	933 365	--	--
Number of children seen for first time, screened for weight–height for acute malnutrition, by age:					
under 5 years	135 587	12.6	114 520	12.3	<0.001
under 6 months	16 317	1.5	13 757	1.4	0.0206
6–23 months	72 115	6.7	61 959	6.6	0.1443
24–59 months	47 155	4.4	38 804	4.2	<0.001
Number of children seen for first time, screened for height–age for chronic malnutrition, by age:					
under 5 years	37 508	3.5	27 806	3.0	<0.001
under 6 months	4 243	0.4	4 909	0.5	<0.001
6–23 months	18 619	1.7	14 052	1.5	<0.001
24–59 months	14 646	1.4	8 845	0.9	<0.001

BCG, bacillus Calmette–Guérin; DTaP, diphtheria, tetanus, and pertussis; PCV, pneumococcal conjugate vaccine.
Note: [a] This variable had 5% missing during the pre-COVID-19 period.
Source: Prepared by the authors based on DHIS2 data.

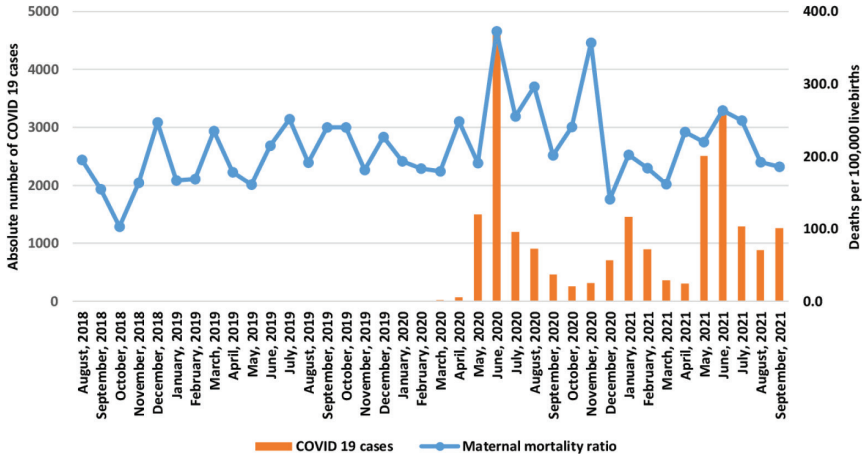
contraception than to discontinue. On the other hand, the increase observed in Haiti in the number of children who received a third dose of pneumococcal conjugate vaccine may be explained by the fact that this vaccine was recently introduced into the Government's routine immunization program in 2018 (18). Thus, the Government might be more motivated to distribute the new vaccine and vaccinate as many children as possible. However, our results show that the proportion of children aged 0–11 months that were fully vaccinated decreased significantly by 2.1 percentage points from the pre- to the peri-COVID-19 pandemic period.

The maternal mortality ratio also increased significantly during the COVID-19 pandemic. This finding is in line with the observations made by de Carvalho et al. (19) in Bahia, Brazil, indicating a marked rise in the maternal mortality ratio during the COVID-19 pandemic (19). Such increase might result from maternal illness directly linked to COVID-19 infection, or to the indirect consequence of disruptions in health services and other secondary effects induced by the pandemic.

When we assessed the time trends in RMNCAH indicators with statistically significant AAMC ($p < 0.05$) during the COVID-19 pandemic, several dips were observed, particularly coinciding with the peaks of COVID-19 in the country (May–July 2020, December 2020–February 2021, and May–July 2021).

Only a small number of indicators, such as the use of intrauterine devices and rate of C-section, increased during the pandemic. An increase in intrauterine device demand during the pandemic might be attributed to the likelihood of women seeking long-acting reversible contraceptives, which

FIGURE 1. Monthly trends in maternal mortality ratio during the pre- and peri-COVID-19 pandemic period (August 2018–September 2021), Haiti



Source: Prepared by the authors based on DHIS2 data.

offer effective contraception over an extended duration without necessitating frequent visits to healthcare facilities. Alterations in labor and delivery procedures within certain healthcare environments may have led hospitals to adopt new protocols aimed at limiting access to labor-inducing methods, like walking or hydrotherapy, while increasing reliance on surgical interventions such as C-sections. Additionally, expectant mothers may have been more predisposed to choose C-section out of concern for contracting COVID-19 in a hospital environment. The complete lockdown implemented by the Government in March 2020 in response to the swift spread of COVID-19 in other countries, alongside concerns about the risk of COVID-19 infection in facilities also treating COVID-19 patients, could partially account for the decline observed in RMNCAH services in Haiti.

The COVID-19 pandemic came on top of a country already deeply affected by a sociopolitical and economic crisis, with a precarious healthcare system, and ravaged by corruption (20). Since 2017, Haiti has been severely affected by political unrest, violent protests, national lockdowns, armed gang activities, and frequent kidnappings, all of which are frequently associated with disruption in essential RMNCAH services.

In time of crisis like the COVID-19 pandemic, when governments and other decision-makers must prioritize which health services to maintain, women's sexual and reproductive health services are among the first to be affected (21, 22). It is important to highlight that such services become even more crucial, given that pandemic response measures could potentially result in a rise in unintended and unwanted pregnancies due to shortages in contraceptive supplies and the closure of certain healthcare services, which represents a violation of reproductive and sexual rights by impeding access to essential reproductive and sexual health services (22–24).

Our study has strengths and limitations. As strengths, we were able to use a long period to compare the indirect impact of COVID-19 on several RMNCAH indicators nationally. We considered that such a period was sufficient to assess time trends in the indicators and see the effect of public health measures on limiting the spread of the virus. We used data collected from more than 800 health facilities distributed in the 10 geographic departments, with a monthly reporting rate of over 70%. The analyses were disaggregated by age, and by sex when applicable. However, in terms of limitations, our analyses relied on secondary data from SISNU–DHIS2, which may include inaccurate and incomplete reporting, as frequently found in low- and middle-income countries (25, 26). For example, we were unable to distinguish between missing data and true zero values. Nonetheless, in this analysis, the only variable with missing data was the pneumococcal conjugate vaccine indicator, which had a 5% missing rate during the pre-COVID-19 pandemic period. We believe that this level of missing data would likely have minimal or negligible impact on the study's results. Moreover, the SISNU–DHIS2 reporting system itself may have been negatively impacted by COVID-19, as well as the political turmoil and natural events that have affected Haiti.

Conclusion and recommendations

The COVID-19 pandemic may have contributed to the decline observed in those RMNCAH indicators. However, we cannot rule out the role played by the sociopolitical crisis, natural disasters, as well as the control exerted by armed groups over the population in the last three years. Coordinated actions at multiple levels are necessary to strengthen the quality and accessibility of RMNCAH services in the country and accelerate progress across the Sustainable Development Goals (SDGs), specifically SDGs 3.1 and 3.2, as well as toward achieving universal access to health and universal health coverage. More studies are needed to understand the factors and root causes of the declines observed in such indicators.

Author contributions. GJ, SK-J, MB, and GCdR conceived the study. SK-J and MB acquired funding for the study. GJ and SK-J acquired the data. GJ curated the data, performed the analyses, interpreted the findings, and drafted the manuscript. SK-J, MB, GCdR, BdM, MC, CS, JPA, and RT revised the manuscript.

All the authors read and approved the final version of the manuscript.

Conflict of interest. None declared.

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Manuscript received on 1 January 2024. Revised version accepted for publication on 22 April 2024.

Cambios en materia de salud reproductiva, materna e infantil en los periodos pre y peripandémico de la COVID-19 en Haití

RESUMEN

Objetivo. Evaluar los cambios en materia de salud reproductiva, materna, neonatal, infantil y adolescente que se produjeron en Haití desde agosto del 2018 hasta septiembre del 2021, antes de la pandemia de COVID-19 y durante ella.

Metodología. Estudio retrospectivo basado en datos de vigilancia del sistema único de información de salud de Haití para estudiar los periodos pre y peripandémico. La comparación de los indicadores de salud a nivel nacional de estos dos periodos se realizó mediante pruebas de t de dos muestras para comparar proporciones, y se calculó el promedio de la variación mensual absoluta mediante una regresión ponderada por la varianza.

Resultados. Al comparar el periodo prepandémico con el peripandémico, se observó un descenso estadísticamente significativo de la mayoría de los indicadores porcentuales evaluados. Sin embargo, los indicadores porcentuales más afectados fueron los de mujeres embarazadas con cuatro visitas de atención prenatal, con cinco visitas de atención prenatal o más, o que recibieron una segunda dosis de la vacuna contra el tétanos; estos indicadores disminuyeron en más de cuatro puntos porcentuales en el segundo periodo en comparación con el primero. Asimismo, las proporciones de niños y niñas que recibieron las vacunas contra la difteria, el tétanos y la tosferina (DTPa), contra la poliomielitis, antirrotavírica, BCG, y pentavalente también disminuyeron en más de ocho puntos porcentuales. En cambio, la proporción de niños y niñas que recibieron la vacuna antineumocócica conjugada aumentó en más de cuatro puntos porcentuales. También se observó un descenso estadísticamente significativo en el promedio de la variación mensual absoluta de varios indicadores de salud reproductiva e infantil.

Conclusiones. La pandemia de COVID-19 puede haber contribuido al descenso observado en varios indicadores relacionados con la salud reproductiva, materna, neonatal, infantil y adolescente en Haití. Sin embargo, no se puede descartar el papel que ha desempeñado en dicho descenso la crisis sociopolítica y el control ejercido por los grupos armados sobre la población en los últimos tres años.

Palabras clave Salud infantil; servicios de planificación familiar; salud materna; salud reproductiva; servicios de salud para mujeres; COVID-19; Haití.

Mudanças na saúde reprodutiva, materna e infantil no Haiti antes e durante a pandemia de COVID-19

RESUMO

Objetivo. Avaliar mudanças na saúde reprodutiva, materna, neonatal, da criança e do adolescente no Haiti entre agosto de 2018 e setembro de 2021, antes e durante a pandemia de COVID-19.

Métodos. Estudo retrospectivo usando dados de vigilância do Sistema Único de Informações de Saúde do Haiti, examinando dois períodos, antes e durante a pandemia de COVID-19. Os indicadores de saúde do país nos dois períodos foram comparados por meio de testes *t* de duas amostras para proporções, e as variações mensais absolutas médias foram calculadas por meio de regressão linear ponderada.

Resultados. Entre o período anterior e o período durante a pandemia de COVID-19, houve uma queda estatisticamente significante na proporção da maioria dos indicadores avaliados. Os indicadores mais afetados, porém, foram as proporções de gestantes com quatro consultas de pré-natal, gestantes com cinco ou mais consultas de pré-natal e gestantes que receberam uma segunda dose de vacina antitetânica, que sofreram uma diminuição de mais de 4 pontos percentuais na comparação entre os dois períodos. Similarmente, as proporções de crianças que receberam vacinas contra difteria, tétano e pertússis (DTPa), BCG, poliomielite, pentavalente e rotavírus também diminuíram em mais de 8 pontos percentuais. Por outro lado, no caso da vacina pneumocócica conjugada houve um aumento de mais de 4 pontos percentuais. Além disso, foi observada uma redução estatisticamente significante nas variações mensais absolutas médias de vários indicadores de saúde reprodutiva e infantil avaliados.

Conclusões. A pandemia de COVID-19 pode ter contribuído para a piora observada em vários indicadores de saúde reprodutiva, materna, neonatal, da criança e do adolescente no Haiti. No entanto, não se pode descartar o papel desempenhado pela crise sociopolítica e pelo controle exercido por grupos armados sobre a população nos últimos três anos.

Palavras-chave Saúde da criança; serviços de planejamento familiar; saúde materna; saúde reprodutiva; serviços de saúde da mulher; COVID-19; Haiti.