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Analysis of Indicators of Morbidity and Care Activities in a Health Center Within the Sanitary Cordon in Benin in the Context of COVID-19

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Abstract: *Background:* Response measures to the COVID-19 epidemic such as containment or sanitary cordon have had an impact on the health system. *Methods:* In an intra-cordon health center in Cotonou Benin, data on morbidity, health services and care indicators were collected and compared 10 months before COVID and 10 months during. A linear regression model was made. *Results:* During COVID, a significant increase in the number of women attending prenatal consultations was observed [77.30; 0.001] and significant decrease in the average number of malaria cases [-22.20; 0.008]. And non-significant negative effects on acute respiratory infections, sexually transmitted infections and diarrheal diseases identified. *Conclusion:* The establishment of a cordon sanitaire to contain the spread of COVID has had an impact on the functioning of the health system. This has led to a restriction of population movements, which has also affected health workers. The observed effects do not necessarily mean fewer diseases. Health centers were perceived by the public as places where the risk of contamination was higher, which led to their fear of traveling unless necessary. Strengthening strategies had to be put in place to maintain the accessibility of care to the population.

Keywords: Sanitary Cordon, COVID, Health System

1. Introduction

For more than 2 years, the entire world has been affected by the COVID-19 pandemic, with hundreds of millions of confirmed cases and millions of deaths. All countries are affected. The United States and Europe have the highest prevalence and mortality rates. Africa is also affected with a variable geographical distribution [1-4]. The extremities of the continent are the most affected, with North and South Africa having the highest number of cases. The death toll is heavy [5, 6]. This pandemic has had negative impacts on all social, demographic and economic levels [7]. On the health front, countries' health systems have been severely impacted at all levels of the health pyramid [6, 8]. The capacity for response, hospitalization and care has been severely disrupted. A reorganization and rehabilitation of the entire health system was required to meet the challenges of this pandemic [9, 10].

In addition, the organization and implementation of the response required the implementation of binding and difficult measures for all components of the health system, including health care workers and health centers [11]. The population itself was severely affected by these measures, which were relevant and justified in order to contain the spread of the epidemic and reduce the mortality and morbidity associated with

the epidemic. Various response measures have been put in place by countries [12]. Measures such as confinement and social isolation have been implemented in some countries. In other countries, such as Benin, health authorities have established a sanitary cordon. This cordon sanitaire was a geographical area comprising several cities and aimed to limit the circulation of SARS COV 2 and protect the healthy population by reducing contacts with the most affected areas. Within the cordon sanitaire, logistic and human resource reinforcements were essential to ensure continuity of care. Indeed, it was necessary to manage the positive cases of COVID-19 but also to manage the cases related to other pathologies.

The objectives of this study were to describe the functioning of an intra-cordon health center and to measure the impact of the COVID-19 pandemic on morbidity and care indicators.

2. Methods

2.1. Study Design

This cross-sectional descriptive and analytical survey took place in the Houenoussou health center in Cotonou, the economic capital of Benin. It took place for 20 months from May 2019 to December 2020, spread over the period 10 months before the pandemic and the period 10 months after the pandemic. This breakdown provided a meaningful comparison of the data. The study population consisted of patients who came to the health center during the study period.

2.2. Sampling

In Cotonou, there are 4 health zones, and we used a simple 2-degree random probabilistic method. The first degree was the selection of the health area, the second degree was the selection of the health center. First, we listed all the health zones, and then we randomly selected one health zone. In a second step, we made a list of all the health centers located in this health zone, then we carried out a draw that allowed us to retain the health center of Houénoussou.

2.3. Data Collection

Our data sources were care activity records, consultation sheets, and medical records. We had two kinds of variables.

Indicators of morbidity:

1) Malaria.
2) Acute respiratory infection.
3) Sexually transmitted infection.
4) Diarrheal diseases.

Indicators of care and service activities:

1) Number of prenatal visits.
2) Number of post-natal consultations.
3) Number of consultations with children aged 0-11 months.
4) Number of consultations with children aged 12 to 35 months.

2.4. Statistical Analysis

The analysis was carried out in 2 parts. We first described the evolution of each indicator before and during the occurrence of COVID-19, and then analyzed the right-hand equations using a trend line. The effect of COVID on each indicator was investigated by univariate linear regression. We performed an r correlation test to assess the strength of the variables. The significance threshold was set at $p<0.05$.

2.5. Ethics

Administrative authorization from the director of the health center was obtained. All data have been collected and treated confidentially and anonymously.

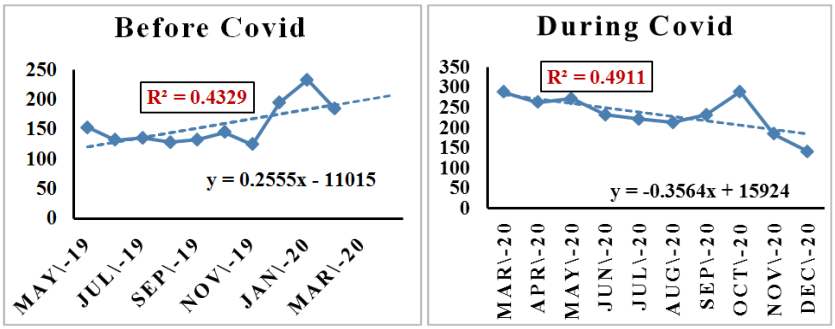

Figure 1. *Evolution of the number of prenatal consultations.*

3. Results

3.1. Description of Service and Care Activity Indicators Before and During COVID-19

3.1.1. Prenatal Consultations (PNC)

The number of pregnant women who have taken a PNC is almost constant in the first six months before COVID. In the 7th month, we notice a gradual decrease in the number of pregnant women who have taken a PNC, then a gradual increase in the 8th and 9th months and a decrease in the 10th month. During the COVID period, there was an increase in the number of pregnant women who had a PNC by the 1st month, followed by a decrease by the 2nd month and then an increase by the 3rd month. From the 4th to the 6th month, we notice a decrease in the number of pregnant women who have taken a PNC, followed by an increase in the 7th and 8th months, then a decrease in the last 2 months. The linear trend explains the variability of the PNC number before COVID to

43% and after COVID to 49%.

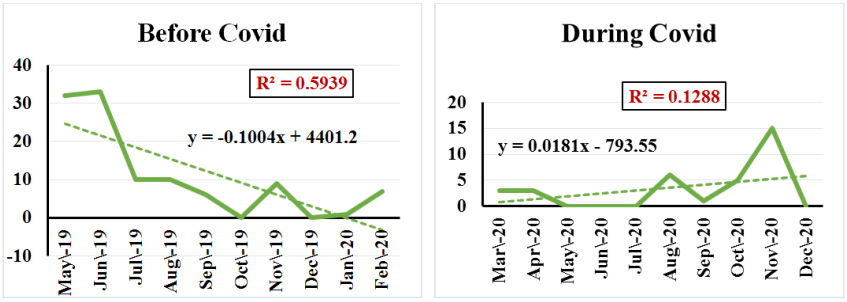

Figure 2. *Evolution of the number of post-natal consultations.*

3.1.2. Postnatal Consultations (PoNC)

The number of post-natal consultations decreased in the first months until canceling out in the 6th month, this number increased in the 7th month and decreased in the 8th month before gradually increasing in the remaining 2 months. After the occurrence of COVID, we note a decrease in the number of women who went to post-natal consultation in the first 5 months, followed by an increase in the 6th month, then a decrease in the 7th month. There was a gradual increase in the number of women who went to post-natal consultations in the 8th and 9th months, followed by a decrease in the 10th month. The trend line accounts for 59.39% of the variability in the number of women who went to post-natal consultations before COVID and 12.88% during COVID.

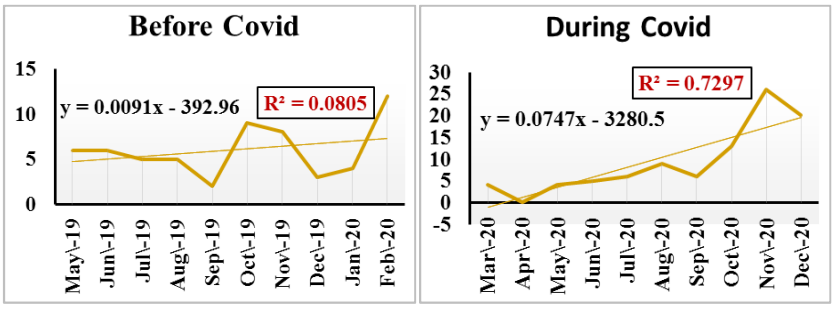

Figure 3. *Evolution of the number of visits among children aged 0-11 months.*

3.1.3. Consultations in Children 0-11 Months

The period before COVID was marked in the first 5 months by a decrease in the number of children from 0 to 11 months who had consulted. We notice an increase in the 6th and 7th months, then another decrease in the 8th and 9th months and then an increase in the 10th month. When the first confirmed COVID-19 case occurred, the first 2 months were marked by a decrease in the number of cases, followed by an increase in the next 7 months before a slight decrease in the 10th month. The overall trend is upward. The trend line accounts for 8.05% variability before COVID and 72.97% during COVID.

3.1.4. Consultations in Children 12-35 Months

There has been a decrease in activities for consultations with children aged 12 to 35 months. This decline in activity began from the 2nd month to the 5th month. From the 5th month onwards, there is again a slow gradual recovery in consultation activities, which however remain below the number of consultations observed in the period before COVID. However, in the 9th and 10th years of the COVID period this number of consultations exceeded what was observed before COVID. This is confirmed by the trend line, which explains the variability before COVID at 2.68% and during COVID at 61.71%.

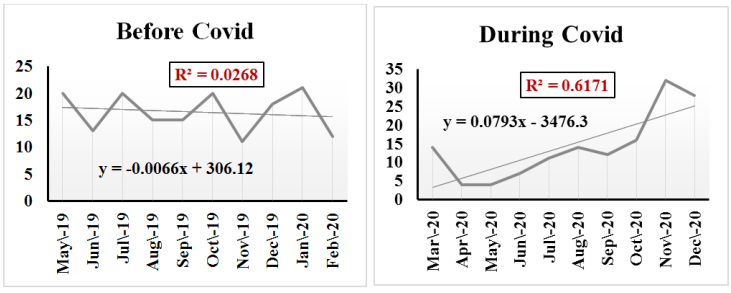

Figure 4. *Changes in the number of visits to children aged 12-35 months.*

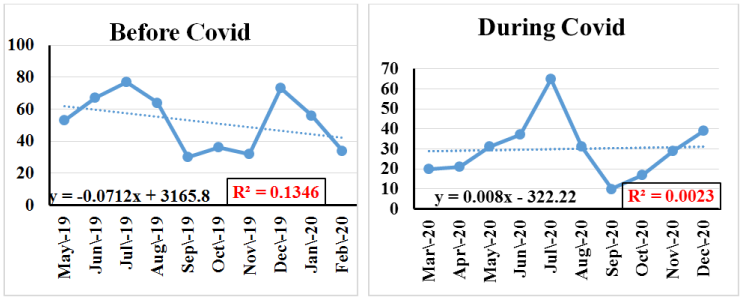

Figure 5. *Evolution of malaria.*

3.2. Description of Morbidity Indicators Before and During COVID-19

3.2.1. Malaria

In the period before COVID, there was a gradual increase in the number of malaria cases with a peak in July 2019, followed by a gradual decrease for 2 months, a slight increase in October 2019. We then had a gradual increase with a peak in December 2019, followed by a gradual decrease in the last 2 months. As soon as the first positive case occurred, we observed a decrease in the number of cases of malaria with a plateau phase during the months of March and April 2020, this phase was followed by a gradual increase in the number of cases of malaria with a peak in July 2020.

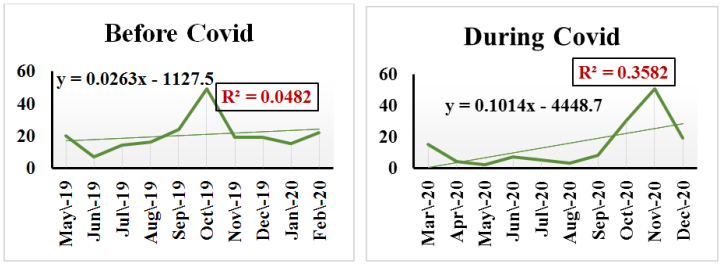

Figure 6. *Evolution of acute respiratory infections.*

3.2.2. Acute Respiratory Infection (ARI)

There was a decrease in the number of ARI cases from June onwards, then a gradual increase until October 2020, then a decrease until January 2020 and then a sudden increase during February. From the start of the pandemic, we observed a decrease in the number of cases of ARI until May 2020, then a sharp increase in June and then a decrease in the following 2 months. The linear trend explains 4.82% of the variability before COVID and 35.82% during COVID.

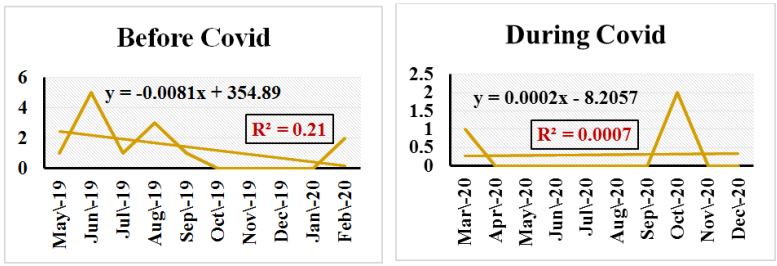

Figure 7. *Evolution of sexually transmitted infections.*

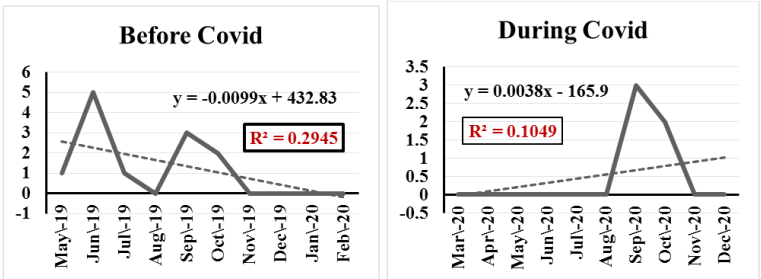

Figure 8. *Evolution of diarrheal diseases.*

3.2.3. Sexually Transmitted Infections (STI)

We noted a trend in the number of STI cases over the first 4 months, followed by a gradual decrease in the number of cases, with a plateau phase of the from October to January 2020 and then an increase in the number of cases as early as February 2020. During the COVID period, outside March and October, there had been no STI cases.

3.2.4. Diarrheal Diseases

Before COVID, a sawtooth evolution in the first four months with a peak in the second and fourth months has been observed. After that, we noticed a gradual decrease in the number of cases, which will go so far as to cancel during the last 3 months but also during the first 6 months of COVID. During this period, cases of diarrheal diseases appeared in the 7th and 8th months. The overall trend over the ten months of this period was downward, while over the COVID-19 period this coefficient was positive, indicating an overall upward trend. This trend accounts for 29.45% of the variability before COVID and 10.49% during COVID.

3.3. Effect of COVID-19 on Service and Care Activity Indicators

The univariate linear regression analysis showed that the incidence of COVID significantly increased the average number of women with NPC by 77.30. We note a positive effect on the average number of children from 0 to 11 who went to a consultation, and a negative effect on the average number of women who went to a post-natal consultation and the average number of children from 11 to 35 months who went to a consultation. But these effects were not significant.

The association between the COVID occurrence variable and the average number of women with NPC is average (r=0.486); it is low with the other variables.

Table 1. *Impact of COVID on service and care activity indicators. Linear regression.*

Variables	Constant [Coeff / *p*]	Occurrence of COVID [Coeff / *p*]	Correlation coeffr
PNC	[156.50; 0.000]	[77.30; 0.001]	0.486
PoNC	[10.800; 0.002]	[-7.50; 0.084]	0.157
Consultation in child 0-11 months	[6.00; 0.006]	[3.30; 0.242]	0.075
Consultation in child 12-35 months	[16.500; 0.000]	[-2.300; 0.479]	0.028

3.4. Effect of COVID-19 on Morbidity Indicators

There is a significant decrease in the average number of malaria cases. Negative effects on acute respiratory infections, sexually transmitted infections and diarrheal diseases have been identified, but these effects are not significant.

The correlation between the COVID occurrence variable and the mean number of malaria is average (r=0.329), but strong with the other variables.

Table 2. *Impact of COVID on morbidity indicators. Linear regression.*

Variables	Constant [Coeff /*p*]	Occurrence of COVID [Coeff /*p*]	Correlation coeff r
Malaria	[52.200; 0.000]	[-22.20; 0.008]	0.329
ARI	[20.50; 0.000]	[-6.00; 0.336]	0.51
STI	[-0.600; 0.005]	[-0.500; 0.314]	0.56
Diarrheal diseases	[1.200; 0.015]	[-0.700; 0.284]	0.64

4. Discussion

The main objective of this study was to describe the functioning of an intra-cordon health center and to measure the impact of the COVID-19 pandemic on morbidity and care indicators.

The health center where the study was conducted was selected using a simple probabilistic random sampling method at each level of the health pyramid, from the departmental level to the health zone. The information collected had little missing data. Aggregated data were collected daily and monthly for the 10 months prior to COVID and 10 months after COVID. This allowed a good range of comparison. This methodology has guaranteed us a good internal validity of our work.

In our study, we observed a significant increase in the average number of women who had prenatal visits, although a slight decrease was noted during the first two months after the occurrence of COVID. These findings are contrary to findings in other studies [9, 13]. This review of the impact of COVID-19 on HIV, TB, Malaria and health systems services showed a 66% drop in stroke in health centers in 7 Asian countries. This could be explained by strict containment in Asia, coupled with fear and distrust of being infected with COVID-19 during stroke. Our results differ from a study conducted in Côte d'Ivoire by UNICEF on the impact of coronavirus disease on vulnerable households and basic social services. The study found that a perception of health centers as a source of contamination led to a social distancing of vulnerable households from care structures, especially those of the public. Distancing report results in non-compliance with ACV's RDV. The WHO report on the African region's strategic response to COVID-19 revealed that prenatal care was among the most frequently interrupted services due to the implementation of

public health measures to contain the spread of the virus. The same observation is also noted in a study carried out in others countries on the impact of COVID-19 on the use of health services [9, 14-16]. This study noted a decrease in prenatal counseling use by pregnant women in 10 of 17 health centers targeted. However, in the other 7 health centers, there was a significant increase in the number of women taking a PNC, which is comparable to our results. While the pregnant woman is concerned about the outcome of pregnancy and the well-being of her child, the pandemic has worsened the state of stress and anxiety. Non-compliance with the stroke schedule increases the risk of maternal-infant death as well as all other morbidity related to the pregnancy condition (abortion, prematurity, home delivery with its risks such as postpartum hemorrhage, etc.); maintaining stroke services becomes a public health emergency during the pandemic [15, 17-19].

Our results showed a significant decrease in the average number of malaria cases recorded during the COVID period. These findings are consistent with a study conducted in Africa on attendance at the country's main health services [20]. The study noted a decrease in the number of malaria cases mainly in March and April with an increase in June and July 2020 due to a relaxation of COVID-related restrictions from June and July. Our results are also consistent with a study by the Global Fund on the impact of COVID-19 on HIV, Tuberculosis and Malaria services [17]. Indeed, in this meta-analysis of 24 African and 7 Asian countries, there was a 17% decline in malaria diagnosis in African institutions, and a 56% decline in Asian institutions. These services were particularly affected between May and July 2020, when many countries imposed total or partial travel restrictions and other public health measures to limit the spread of the virus. However, it is useful to put a nuance in this observation because there is an important element to consider. Malaria in its epidemiological modalities is seasonal. In Benin, the periods when malaria is severe are known and vary according to the rainy seasons. During these periods, there was an increase in the number of cases, and then calming phases corresponding to the dry seasons.

5. Conclusion

The establishment of a cordon sanitaire to contain the spread of COVID has had an impact on the functioning of the health system. This has led to a restriction of population movements, which has also affected health workers. The observed effects do not necessarily mean fewer diseases. Health centers were perceived by the public as places where the risk of contamination was higher, which led to their fear of traveling unless necessary. Strengthening strategies had to be put in place to maintain the accessibility of care to the population.

Conflict of Interest

The authors declare that they have no competing interests.

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References

[1] Folayan, M. O., et al., Differences in COVID-19 Preventive Behavior and Food Insecurity by HIV Status in Nigeria. AIDS Behav, 2022. 26 (3): p. 739-751.

[2] Bright, B., et al., COVID-19 preparedness: capacity to manufacture vaccines, therapeutics and diagnostics in sub-Saharan Africa. Global Health, 2021. 17 (1): p. 24.

[3] Coker, M., et al., Things must not fall apart: the ripple effects of the COVID-19 pandemic on children in sub-Saharan Africa. Pediatr Res, 2021. 89 (5): p. 1078-1086.

[4] Afolalu, O. O., et al., Perceived impact of coronavirus pandemic on uptake of healthcare services in South West Nigeria. Pan Afr Med J, 2021. 40: p. 26.

[5] Taboe, H. B., et al., Predicting COVID-19 spread in the face of control measures in West Africa. Math Biosci, 2020. 328: p. 108431.

[6] Heuschen, A. K., et al., Public health-relevant consequences of the COVID-19 pandemic on malaria in sub-Saharan Africa: a scoping review. Malar J, 2021. 20 (1): p. 339.

[7] Bitanihirwe, B. K. Y., Ssewanyana, D., et al., The health and economic burden of the coronavirus in sub-Saharan Africa. Glob Health Promot, 2021. 28 (1): p. 70-74.

[8] Dandena, F., B. Teklewold, and D. Anteneh, Impact of COVID-19 and mitigation plans on essential health services: institutional experience of a hospital in Ethiopia. BMC Health Serv Res, 2021. 21 (1): p. 1105.

[9] Bell, D., et al., Predicting the Impact of COVID-19 and the Potential Impact of the Public Health Response on Disease Burden in Uganda. Am J Trop Med Hyg, 2020. 103 (3): p. 1191-1197.

[10] Ahmed, S., et al., Impact of the societal response to COVID-19 on access to healthcare for non-COVID-19 health issues in slum communities of Bangladesh, Kenya, Nigeria and Pakistan: results of pre-COVID and COVID-19 lockdown stakeholder engagements. BMJ Glob Health, 2020. 5 (8).

[11] Mbunge, E., Effects of COVID-19 in South African health system and society: An explanatory study. Diabetes Metab Syndr, 2020. 14 (6): p. 1809-1814.

[12] Ogunleye, O. O., et al., Response to the Novel Corona Virus (COVID-19) Pandemic Across Africa: Successes, Challenges, and Implications for the Future. Front Pharmacol, 2020. 11: p. 1205.

[13] Hategeka, C., et al., Impact of the COVID-19 pandemic and response on the utilisation of health services in public facilities during the first wave in Kinshasa, the Democratic Republic of the Congo. BMJ Glob Health, 2021. 6 (7).

[14] Atim, M. G., et al., COVID-19 and Health Sector Development Plans in Africa: The Impact on Maternal and Child Health Outcomes in Uganda. Risk Manag Healthc Policy, 2021. 14: p. 4353-4360.

[15] Adeyemo, J. O., et al., COVID-19 Pandemic and Its Potential Impact on Sexual and Reproductive Health Indicators in Nigeria. Ann Ib Postgrad Med, 2021. 19 (Suppl 1): p. S52-S57.

[16] Sevalie, S., et al., The impact of the COVID-19 pandemic on hospital utilisation in Sierra Leone. BMJ Glob Health, 2021. 6 (10).

[17] Ekwebelem, O. C., et al., Threats of COVID-19 to Achieving United Nations Sustainable Development Goals in Africa. Am J Trop Med Hyg, 2020. 104 (2): p. 457-460.

[18] Parbhoo, A. N., et al., COVID-19: Experience of a tertiary children's hospital in Western Cape Province, South Africa. S Afr Med J, 2021. 111 (4): p. 295-298.

[19] Garcia-Prats, A. J., et al., Mitigating the Impacts of COVID-19 on Global Child Health: a Call to Action. Curr Trop Med Rep, 2021. 8 (3): p. 183-189.

[20] Namuganga, J. F., et al., Impact of COVID-19 on routine malaria indicators in rural Uganda: an interrupted time series analysis. Malar J, 2021. 20 (1): p. 475.