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# Impact of COVID Pandemic on the Use of Services in a Peripheral Health Center in Southern Benin

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**Abstract:** *Background:* COVID-19 pandemic has had negative impacts on health systems of most countries. *Methods:* we conducted a descriptive and analytical cross-sectional study in a peripheral health center in southern Benin. The morbidity indicators and the functioning of the services were collected and analyzed 10 months before COVID and 10 months during COVID by a linear regression model. *Results:* The onset of the COVID pandemic led to a non-significant drop in the number of consultations among children aged 12 to 35 months [-8,100; 0.297], and borderline negative effects on malaria [-44.20; 0.098], and significant for acute respiratory infections [-34.200; 0.039] and diarrheal diseases [-4.100; 0.036]. *Conclusion:* Even in a rural outlying health center, the outbreak of the COVID-19 pandemic had an impact on the health system. This repercussion led to a drop in consultations on morbidity indicators such as malaria, acute respiratory infections and diarrheal diseases. This reflects both the fear of the populations to come to the health center in during pandemic period but also the reduction in the functioning of the center due to the outbreak. Strengthening measures are needed to ensure quality care for the population, Such as the increase in the number of health care workers, the increase in the security and protection arrangements for health workers and users of health centers.

**Keywords:** Peripheral Health Center, COVID, Impact

## 1. Introduction

The global outbreak of the COVID-19 pandemic has had consequences in all countries. Although America, Europe, has been the worst hit in terms of morbidity and mortality, Africa has also had negative impacts. These negative impacts were mostly observed on the health system. The COVID-19 pandemic has severely shaken health systems in their organization and functioning. The management of the epidemic and the management of cases have disrupted health structures [1-5]. Before COVID-19, health systems in low-resource countries were already characterized by fragility in terms of health coverage and hospital infrastructure, although significant improvements have been noted in some countries in recent decades. The emergence of this pandemic has further exacerbated systemic fragilities and inequalities in access to care [6-8]. Urgent response measures have been put in place in most countries to curb the spread of the epidemic [9, 10]. These measures have caused profound shocks to the health-care system [11-15].

In Benin a country in West Africa, one of the measures taken was the establishment of a sanitary cordon between regions with a high prevalence and those with a low prevalence of COVID-19. While a great deal of human, financial and logistical resources were deployed to manage the epidemic, it was necessary to maintain continuity of care for the population vis-à-vis other pathologies. This challenge was important in large cities, but it was even more vital in rural and remote areas of the peripheral health system. The impact of COVID has been striking and very visible on the health system in large cities, especially in large hospitals which have experienced an influx of cases and difficulties in organization, management and care. In Benin, treatment centers have been specially created for the care of patients with COVID. Many health workers and logistical resources have been mobilized for the benefit of large hospitals and to the detriment of the peripheral health system. Even if the peripheral health centers did not experience the same influx of COVID cases, their functioning was disrupted. The problem raised was above all linked to the continuity of the supply of care and the availability of health workers, who themselves were affected by COVID with work stoppages. These absences have greatly weakened the functioning of peripheral health centers leading to a drop in health coverage for populations living in remote areas. Common illnesses such as diarrheal diseases, malaria, and acute respiratory infections were still prevalent and prevalent in communities, among adults as well as infants and young children [16, 17]. The outlying health centers were already suffering from certain shortcomings, which the pandemic has exacerbated. The objective of this study was to assess the impact of the outbreak of the COVID-19 pandemic on the use of care services in a peripheral health center.

# 2. Material and Methods

### 2.1. Study Area

The study took place in the Ouèdèmé-Pédah health center, which is in the Comè health zone, in southern Benin.

### 2.2. Study Design and Period

This was a cross-sectional descriptive and analytical study that ran from June to November 2021 and covered two 10-month periods:

1) Before the health crisis: May 2019 to February 2020 (10 months).
2) During the health crisis: March 2020 to December 2020 (10 months).

### 2.3. Population

It consisted of all patients who came to the health center during the study period.

### 2.4. Sampling

We conducted a simple random survey of all health centers in the Comè health zone. Following this survey, the Ouèdémé-Pédah health center was selected. Sampling was non-probabilistic, exhaustive.

### 2.5. Data Collection

The data were collected through a review of care activity records, medical records, and consultation sheets. Before the examination of the documents, there were interviews with the director and certain agents of the health center to obtain information on the usual functioning of the center.

### 2.6. Variables

We collected data on morbidity indicators (malaria, acute respiratory infection, sexually transmitted infection, diarrhoeal diseases) and indicators of care and service activities (number of prenatal visits, number of post-natal visits, number of visits to children 0-11 months old, number of visits to children 12-35 months old). The data collected were daily data recorded in the registers, on routine consultation activities, mother and child care activities and vaccination activities.

### 2.7. Data Analysis

After a description of the indicators before and during the occurrence of COVID-19, the straight line equations and trend curves were made. We then quantified the effect of COVID on each indicator using univariate linear regression. The correlation coefficient r was calculated to judge the strength of the link between the variable "occurrence of COVID" and each indicator. The significance threshold was set at $p<0.05$.

### 2.8. Ethical Considerations

The data was anonymous and confidential. Authorization from the health center manager was obtained prior to the start of the investigation. The study has received a favorable opinion from the national health research ethics committee.

# 3. Results

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

#### 3.1.1. Prenatal Consultations (PNC)

Prior to COVID, we observed an increase in the number of pregnant women who had a PNC in the first three months, followed by a slight decrease in the 4th month, and followed by an increase in the 5th month. In the 6th and 7th months, we noticed a decrease in the number of pregnant women who had a PNC, then an increase in the 8th and 9th months before a decrease in the 10th month. As soon as COVID-19 occurred, the number of pregnant women following PNC increased on the 1st month, there was a decrease on the 2nd month, followed by a gradual increase on the 3rd and 4th months. In the 5th month, we noticed a decrease in the number of pregnant women who had a PNC, followed by an increase in the 6th month. From the 7th to the 10th month, we noticed a decrease in the number of women who had a PNC.

The overall trend over the ten months before COVID-19 is upward and negative thereafter. This trend explains 12.74% variability before COVID and 37.03% after.

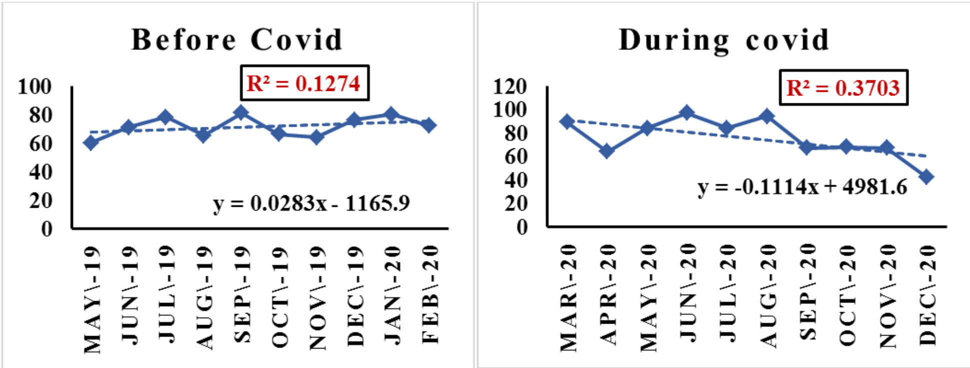


***Figure 1.*** *Evolution of the number of prenatal consultations.*

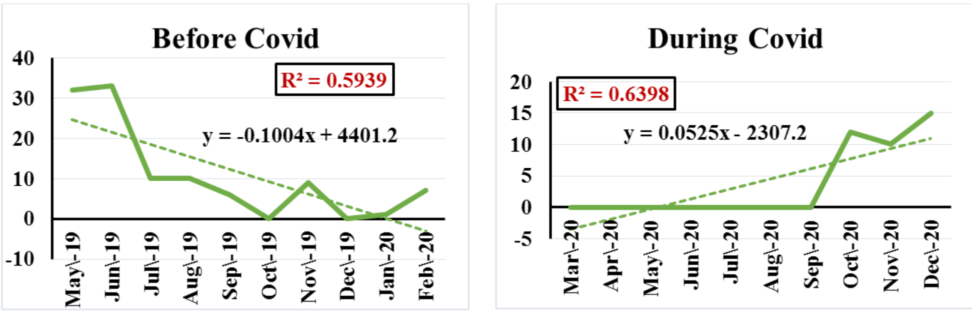


***Figure 2.*** *Evolution of the number of post-natal consultations.*

### *3.1.2. Postnatal Consultations (PoNC)*

There were no post-natal consultations prior to COVID. When COVID occurred, this number remained zero for the first 7 months, before gradually increasing in the last 3 months. This increase is confirmed by the coefficient of the trend line. This trend line explains the variability in the number of women who came to post-natal consultations during the COVID period at 63.98%.

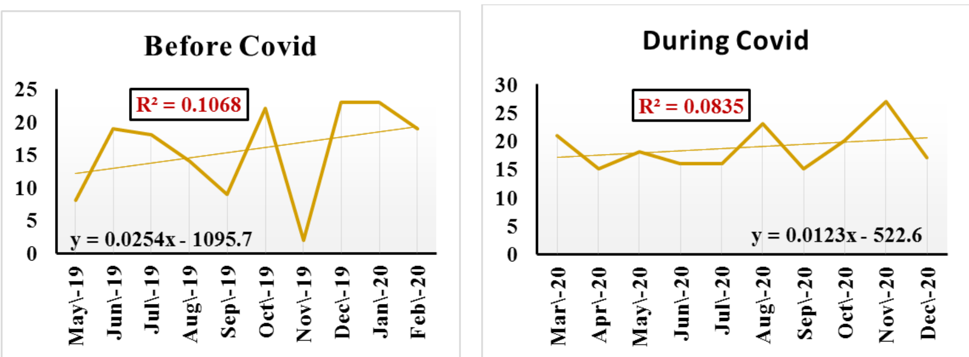


***Figure 3.*** *Evolution of the number of visits among children aged 0-11 months.*

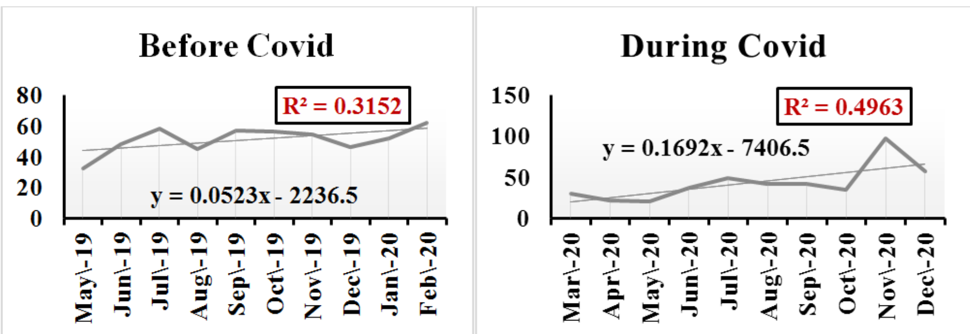


***Figure 4.*** *Changes in the number of visits to children aged 12-35 months.*

### *3.1.3. Consultations in Children 0-11 Months*

Prior to COVID, the number of children aged 0-11 months who came to consultations increased in the first 2 months. We noticed a decrease in this number for the next 4 months, then an increase in the 5th and 6th months. There was a decrease in the number of children from 0 to 11 months of age who consulted during the 7th month, followed by an increase in the next 2 months and a slight decrease in the 10th month. When the first confirmed case of COVID-19 occurred, the number of children aged 0-11 months received in consultation decreased in the first 2 months. There was a slight increase in the 3rd month, but it was again followed by a decrease in the number of visits in the 4th and 5th months. In the 6th month, there was an increase in the number of children from 0 to 11 months having consulted, then a decrease in the 7th month, then we notice an increase in consultation in the 8th and 9th months before a decrease in the number of consultations in the 10th month. The trend line explains the variability before COVID to 10.68% and after 8.35%.

### *3.1.4. Consultations in Children 12-35 Months*

We noted an increase in the number of children from 11 to 35 months of age who had consulted in the first three months of the period before COVID. During this period the highest number of children was reached on the 10th month. During COVID, there was a decrease in the number of children who had consulted since the first month, this number increased gradually over the next 4 months, the highest number was reached in the 9th month. The overall trend is upward. The trend line accounts for 31.52% of the variability before COVID and 49.63% after COVID.

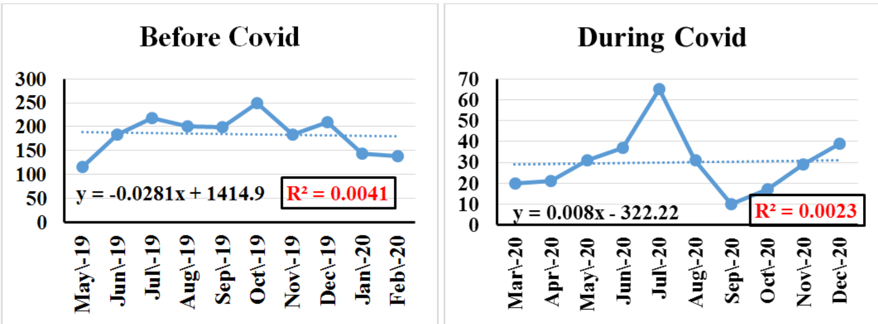


***Figure 5.*** *Evolution of malaria.*

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

### *3.2.1. Malaria*

This curve shows a gradual increase in the number of malaria cases in the first two months of the period before COVID, then a plateau period followed by two peaks, and finally a gradual decrease. As soon as the first confirmed case of COVID-19 occurs in Benin, there is a reduction in the number of malaria cases during the first three months (March, April and May 2020) and then a sudden increase until reaching a peak followed by a plateau period. Then a further decline with a peak in November 2020. The overall trend evolves is negative before COVID and is upwards after. The linear trend explains the number of malaria cases reported before COVID at 0.41% and after 0.23%.

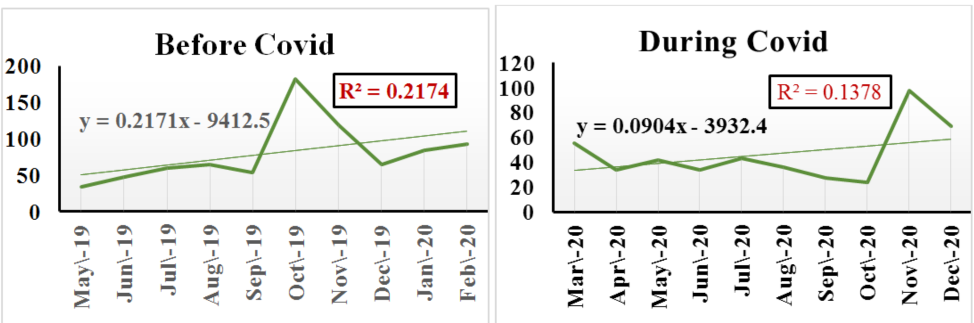


***Figure 6.*** *Evolution of acute respiratory infections.*

### *3.2.2. Acute Respiratory Infection (ARI)*

This curve shows a gradual increase in the number of cases of ERI from May to August 2019, followed by a decrease in the number of cases in September, followed by a peak in October. After this peak, we see a decrease in the number of cases during the following 2 months, then an increase during the months of January and February 2020. As soon as the first confirmed case occurs, we see a decrease in the number of cases of ARI during the months of March and April 2020, followed by a sudden increase in May 2020, then a decrease in June. In July we see a sharp increase, followed by a decrease in the following 3 months then a peak in November 2020 and a decrease in December 2020.

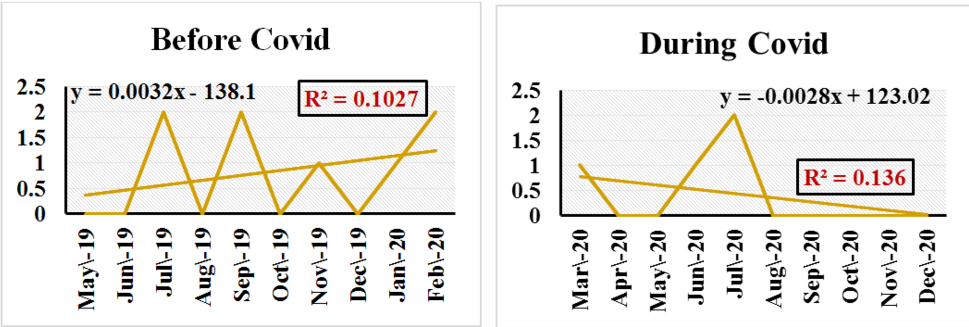


***Figure 7.*** *Evolution of sexually transmitted infections.*

### *3.2.3. Sexually Transmitted Infections (STI)*

We observed a trend in the number of STI cases with peaks in July 2019, September 2019 and February 2020. During the COVID period, there was only one STI case in the first month, the following 2 months, there were no STI cases. In June and July 2020, there were 1 and 2 cases respectively, no cases were recorded in the last 4 months. The trend is positive before COVID and negative after. This trend explains the variability in the number of STI cases reported before COVID to 10.27% and during COVID to 13.6%.

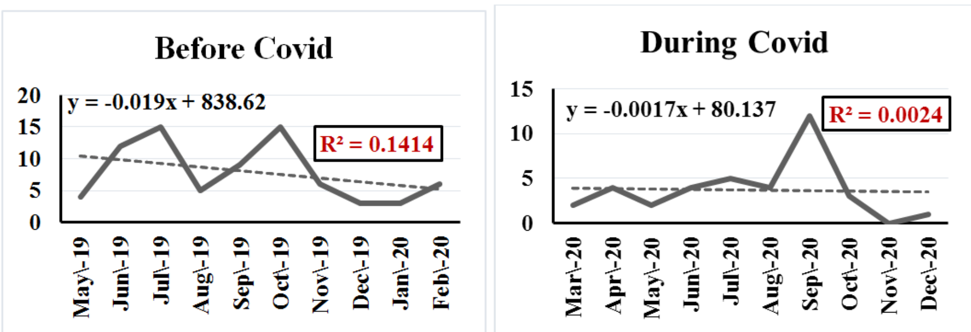


***Figure 8.*** *Evolution of diarrheal diseases.*

### *3.2.4. Diarrheal Diseases*

Prior to COVID, there was an increase in the number of cases of diarrheal diseases in the first 2 months with a peak in the 3rd month, then a gradual decrease in the 4th month. There is a further increase in the number of cases, the following 2 months with a new peak in the 6th month. Then we see a decrease in the number of diarrheal disease cases over the next 3 months, followed by a slight increase in the 10th month. As soon as the first case of COVID occurs, there is a decrease in the number of cases of diarrheal diseases in the first 6 months, followed by a peak in the 7th month. Then we see a decrease in the number of cases, the last 3 months remaining. The linear trend accounts for 14.14% of diarrheal disease cases reported before and 0.24% during COVID.

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

There was no significant effect between the occurrence of COVID and indicators of service and care activities. With a weak linear relationship.

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

| Variables | Constant [Coeff /*p*] | Occurrence of COVID [Coeff/ *p*] | Correlation coeff r |
|---|---|---|---|
| PNC | [71.300; 0.000] | [4.300; 0.471] | 0.29 |
| PoNC | [1.459; 1.000] | [3.700; 0.070] | 0.171 |
| Consultation in child 0-11 months | [18.700; 0.000] | [0.100 0.969] | 0.000 |
| Consultation in child 12-35 months | [51.00; 0.000] | [-8.100; 0.297] | 0.60 |

## *3.4. Effect of COVID-19 on Morbidity Indicators*

There was a significant decrease in the average number of acute respiratory infections and diarrheal diseases. Moreover, there is a marginal adverse effect on malaria. The correlation between the COVID occurrence variable and the average number of acute respiratory infections is average (r=0.215), as is the average number of diarrheal diseases (r=0.221).

However, it is low 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 | [184,200; 0,000] | [-44,20; 0,098] | 0,145 |
| ARI | [80,400; 0,000] | [-34,200; 0,039] | 0,215 |
| STI** | [0,800; 0,006] | [-0,400; 0,288] | 0,063 |
| Diarrheal diseases | [7,800; 0,000] | [-4,100; 0,036] | 0,221 |

# 4. Discussion

The main purpose of this work was to assess the impact of the outbreak of the COVID-19 pandemic on the use of care services in a peripheral health center. We worked a total of 20 months, 10 months before the outbreak and 10 months after. This scope allowed for a meaningful comparison of the data. Data were recorded daily and monthly and we calculated monthly average indicators. Simple random sampling was used to select the health center where the study was conducted. We noted that there were no post-natal consultations in the period before COVID-19 and a few months after the start of the pandemic. This could be explained by the usual low post-natal consultation rate among rural populations. Our results showed an evolving trend in the number of malaria cases recorded during the COVID period, like others [18]. The clinical signs of COVID-19 and malaria are similar, especially in the early phase. Believing they were infected with COVID-19, patients went to the health centers to receive the appropriate care, hence the influx observed. Conversely, we observed a significant decrease in the average number of cases of diarrheal diseases during the COVID period. These results are comparable to the results of others [6, 19]. Indeed, in a retrospective study on the impact of COVID-19 on diarrhea admissions to emergency rooms at the largest specialized pediatric hospital in Kinshasa, there was a significant decrease in diarrhea admissions to pediatric wards during containment due to the COVID-19 pandemic [20]. Our results are also comparable to others [21]. In a retrospective study conducted from January to August 2020 in Singapore's largest pediatric hospital, there was a significant decrease in admissions due to acute infections including diarrhea, to pediatric emergencies. This significant reduction during the current crisis may be related to the reluctance of parents, at the beginning of the pandemic, to take their children to hospital for fear of contracting COVID-19 infection during consultation.

The same applies to the average number of acute respiratory infections recorded during the COVID period [22]. Because most acute respiratory infections are viral in origin, they are transmitted by "droplets" emitted during coughing, sneezing or sneezing. The implementation of physical barrier measures against COVID-19 (physical distancing, hand washing, wearing masks) may have had a reducing effect on acute respiratory infections. Our results are similar to those of other researchers [23, 24]. In more than 3,000 patients tested, they found a decrease in the detection rate of all respiratory viruses, including rhinovirus, after confinement. Similar results are reported in other studies. The World Health Organization (WHO) influenza data for Oceania, South America and Southern Africa showed very low influenza activity from June to August 2020, when it is usually a season of high influenza prevention in future seasons.

# 5. Conclusion

Even in a rural outlying health center, the outbreak of the COVID-19 pandemic had an impact on the health system. This repercussion led to a drop in consultations on morbidity indicators such as malaria, acute respiratory infections and diarrheal diseases. This reflects both the fear of the populations to come to the health center in during pandemic period but also the reduction in the functioning of the center due to the outbreak. Strengthening measures are needed to ensure quality care for the population, Such as the increase in the number of health care workers, the increase in the security and protection arrangements for health workers and users of health centers.

# Conflict of Interest

The authors declare that they have no competing interests.

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