

Effects of COVID-19 on child health services utilisation and delivery in rural Mozambique: a qualitative study

Lilia Bliznashka, MA¹, Marilyn N. Ahun, BA², Daan Velthausz, PhD³, Rotafina Donco, PhD³, Svetlana Karuskina-Drivdale, Ed.D.⁴, Judite Pinto, Lic⁴, Aisha K. Yousafzai, PhD¹, Joshua Jeong, ScD¹

¹ Harvard T.H. Chan School of Public Health, Boston, MA, USA

² Université de Montréal School of Public Health, Montréal, QC, Canada

³ Maraxis B.V., Maputo, Mozambique

⁴ PATH Mozambique

ORCID IDs:

Lilia Bliznashka, 0000-0003-2084-1141

Marilyn N. Ahun, 0000-0002-1062-7240

Daan Velthausz, 0000-0002-7377-7609

Rotafina Donco, 0000-0002-1017-2258

Svetlana Karuskina- Drivdale, 0000-0003-1750-5374

Judite Pinto, 0000-0002-6881-4591

Aisha K. Yousafzai, 0000-0002-1592-8923

Joshua Jeong, 0000-0002-4130-468X

Corresponding author: Lilia Bliznashka

Email: lilia.bliznashka@gmail.com

Address: 665 Huntington Avenue, Building 1, 11th Floor, Boston, MA 02115, USA

Phone: 617-432-1232

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Key messages:

- Caregivers, providers, and government staff reported a decrease in the utilisation of child health services at primary health facilities in Monapo district, Mozambique since the start of the COVID-19 pandemic.
- Respondents described multiple challenges in utilising and delivering child health services.
- Administrative data showed persisting declines in monthly child health consultations since the start of the pandemic and dramatic increases in the number of cases of child malnutrition.

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Conception: Lilia Bliznashka, Joshua Jeong

Data collection: Daan Velthausz, Rotafina Donco

Data analysis and interpretation: Lilia Bliznashka, Marilyn N. Ahun, Joshua Jeong

Drafting the article: Lilia Bliznashka

Critical revision of the article: Lilia Bliznashka, Marilyn N. Ahun, Daan Velthausz, Rotafina Donco, Svetlana Karuskina-Drivdale, Judite Pinto, Aisha K. Yousafzai, Joshua Jeong

Final approval of the version to be submitted: Lilia Bliznashka, Marilyn N. Ahun, Daan Velthausz, Rotafina Donco, Svetlana Karuskina-Drivdale, Judite Pinto, Aisha K. Yousafzai, Joshua Jeong

Abstract

Little is known about the COVID-19 pandemic-related disruptions in health services and the resilience of the health system response in rural low-resource settings. We conducted a

phenomenological qualitative study (October-November 2020) to understand COVID-19-related influences on the utilisation and delivery of child health services in Monapo district, rural Mozambique. We interviewed 36 caregivers with children <2.5 years, 21 health providers, and 4 district health services staff using in-person in-depth interviews. Data were analysed using inductive thematic content analysis. Our findings showed that caregivers, providers, and district health services staff unanimously reported a decrease in child consultations at the start of the pandemic. Administrative data from health facilities confirmed persisting declines in monthly consultations. Respondents explained reductions due to miscommunication about health facility operations, fear of COVID-19, reduced consultation schedules, and reduced household incomes. Providers reported several challenges in delivering services including lack of caregiver compliance with risk mitigation measures, caregivers' fear of risk mitigation measures, perceived lack of caregiver knowledge about COVID-19, and lack of supplies and protective equipment. All respondents described how COVID-19 had increased food insecurity and food prices, and reduced incomes and livelihoods. These negative economic consequences were perceived as the main reason for reported increases in cases of child malnutrition. Despite reductions, child health service utilisation and delivery has largely continued throughout the COVID-19 pandemic, indicating an adaptive and resilient primary health system response in Monapo district. Our findings highlighted the persistent difficulties providers and caregivers face adhering to COVID-19 prevention and risk mitigation measures. A coordinated multi-sectoral response is needed to address the persistent negative economic impacts of the pandemic for young children and their families in rural areas.

Introduction

The coronavirus disease 2019 (COVID-19) has affected millions of people and burdened health systems globally. Pandemic-related social, economic, food, and health system disruptions are threatening to hinder and even reverse progress towards global health and nutrition targets (Headey *et al.*, 2020). Early estimates from the beginning of the pandemic (April 2020) projected that the number of people facing acute food insecurity in low- and middle-income countries (LMICs) could double as a result of the pandemic to 270 million in 2020 (World Food Programme, 2020). Among children in LMICs, projections indicated that the pandemic could lead to a 14.3% increase in child wasting, translating into ~128,000 additional child deaths in 2020 (Headey *et al.*, 2020), and under more severe scenarios, child wasting could increase by 50% resulting in 2,313,900 additional child deaths (Robertson *et al.*, 2020). In turn, COVID-19-related consequences on child malnutrition could lead to future productivity losses of ~\$30 billion (Osendarp *et al.*, 2021), and long-term loss of human capital (Fore *et al.*, 2020), with disproportionate and greater burdens in sub-Saharan Africa (SSA) and South Asia (Headey *et al.*, 2020; Sumner *et al.*, 2020; Osendarp *et al.*, 2021).

These effects of the pandemic on children are expected to be primarily indirect, as severe cases of COVID-19 in paediatric populations are rare, with most children experiencing mild or no symptoms (Christophers *et al.*, 2020). Increased child malnutrition is attributable to reduced family incomes and limited financial resources, increased food insecurity and poor-quality diets, and limited or restricted health, nutrition, and sanitation services (Akseer *et al.*, 2020; Fore *et al.*, 2020), which in turn increase risk of child diarrhoea and fever, and reduce child dietary diversity (Headey and Ruel, 2020). Emerging evidence has already demonstrated the negative consequences of pandemic-related lockdowns on household incomes and food security in LMICs (Amare *et al.*, 2020; BRAC International, 2020; de Brauw *et al.*, 2020; Mobarak *et al.*, 2020;

Population Council, 2020; Wieser *et al.*, 2020; Egger *et al.*, 2021; Janssens *et al.*, 2021; Kansiime *et al.*, 2021; Mahmud and Riley, 2021).

In addition to economic disruptions, COVID-19 lockdowns have disrupted health services globally, with some of the most frequent disruptions to child health and nutrition services in LMICs (PATH, 2020; World Health Organization, 2020). Decreases in outpatient volume led to partial or severe disruptions in routine facility-based immunisation services, sick-child services, and management of child malnutrition (PATH, 2020; World Health Organization, 2020). Measles immunisations were delayed in 24 SSA countries and cancelled in 13 countries (Govender *et al.*, 2020). Reductions in perinatal health services have also been reported (Pallangyo *et al.*, 2020; Population Council, 2020; Kotlar *et al.*, 2021). Most of these data come from rapid phone-based assessments that aimed to quantify the immediate effects of initial COVID-19 lockdowns on child health services. However, few studies to date have explored how COVID-19 has affected caregiver and health provider experiences with child health services. Moreover, it is largely unclear whether disruptions in health facility operations and child health and nutrition service delivery have persisted since initial lockdowns in LMICs and whether any ensuing health system response efforts have been successful.

Pandemic-related disruptions in health and nutrition services and the resilience of the health system response will affect the short- and long-term impacts of COVID-19 on children. In this study, we sought to understand the nature of these disruptions based on the experiences of caregivers, health providers, and district health services staff in rural Mozambique. Specifically, we aimed to understand caregiver utilisation and provider delivery of child health services since the start of the pandemic, the health system's ability to respond and adapt child health services to

the ongoing crisis, and the broader COVID-19 influences on caregivers, families, and their communities.

Materials and methods

Study setting and context

This study took place in Monapo district, Nampula province, Mozambique. In Nampula, 50% of children under 5 are stunted, 12% are wasted, 68% are anaemic, and 52% receive all basic vaccinations (Secretariado Técnico de Segurança Alimentar e Nutricional, 2014; Ministério da Saúde (MISAU) *et al.*, 2015). Currently, Nampula province is facing numerous economic and public health challenges: 35% of the population have insufficient food consumption, 32% are using crisis or emergency food coping strategies (World Food Programme, 2021a), wheat and rice prices rose in 2020 relative to 2019 (Famine Early Warning System Network, 2020), and cases of malnutrition among children and pregnant women have been rising since November 2020 (WFP Mozambique, 2020). In April 2021, ~30% of Mozambicans reported challenges access health services due to distance or lack of money (World Food Programme, 2021b). A measles outbreak has been ongoing since January 2020 in northern Mozambique (WHO Health Emergencies Programme, 2021). Another unique challenge is the intensification of violence between Islamist insurgents and government forces in the Cabo Delgado province (Reuters, 2021), which has displaced >500,000 people to other provinces, including Nampula (WFP Mozambique, 2020).

COVID-19 pandemic and response measures

The first COVID-19 case in Mozambique was detected on March 22, 2020 (WHO Mozambique, 2020). **Supplemental Figure 1** shows a timeline of government response measures (Gentilini *et al.*, 2020, 2021; Hale *et al.*, 2020; Ministério da Saúde. Direcção Nacional de Saúde Pública., 2020). As of April 4, 2021, there were 68,119 confirmed cases and 782 deaths in Mozambique. Nampula had the lowest provincial case number per 100,000 (Ministério da Saúde. Direcção Nacional de Saúde Pública., 2021). Vaccinations of health providers in Nampula began in March 2021.

Study design, data collection, and data analysis

This was a phenomenological sub-study nested in a qualitative implementation evaluation that assessed the delivery, acceptability, and perceived impacts of a pilot intervention, which aimed to improve nurturing care for early childhood development in three health facility catchment areas in Monapo district. We interviewed 61 respondents sampled from these three health facilities using random and purposeful sampling: 36 caregivers with a child <2.5 years, 15 facility-based providers, 6 community health workers (locally called “Agente Polivalente Elementar” (APEs)), and 4 district health services staff. **Table 1** shows respondent demographic and socio-economic characteristics. At each health facility, 6-7 caregivers were randomly selected from a list of all caregivers who had attended a well-child or sick-child visit between September 9 and October 14, 2020, and 5-6 caregivers were interviewed as they exited the health facility during randomly conducted visits. Facility providers and APEs were randomly selected, unless a single provider filled the role, from all providers who worked with caregivers of young children at each of the three health facilities. District health services staff were purposefully

selected. We also conducted three random observation visits at each health facility (nine visits total) to assess adherence to COVID-19 risk mitigation measures.

Data were collected from October 17 to November 6, 2020 by four Mozambican research assistants from a local research firm using semi-structured topic guides and an observational guide. Topic guides were developed by first and last author and translated into Portuguese and Makua by a local research firm. Each topic guide included sub-questions and probe suggestions. Topic guides were pilot tested for three days prior to the start of data collection, and adaptations and refinements were made as needed. Research assistants received a five-day training on qualitative research methods, ethical conduct of research, and study-specific topic guides led by last author. Interviews were conducted face-to-face in the respondents' preferred language (Portuguese or Makua) in a private location. All interviews were audio-recorded, transcribed, and translated verbatim into English.

Data were analysed using inductive thematic content analysis (Schreier, 2014). Transcripts and observational notes were independently coded, annotated, and analysed in NVivo Version 12 by the first, second, and last authors. The initial codebook was developed by the last author based on the research questions, topic guides, and a review of three randomly selected caregiver transcripts. The codebook was then iteratively refined based on ongoing data analysis and recurring discussions to resolve any disagreements and discuss emerging themes. Supporting quotes to contextualise the emerging themes were extracted by the three analysts.

Administrative data on child health consultations at the three health facilities were obtained from the Nampula Provincial Health Directorate to analyse trends in the number of monthly consultations from January 2019 to February 2021.

Results

We identified four themes: COVID-19 knowledge, COVID-19 influences on health-seeking behaviour (five sub-themes), perceived barriers and challenges faced by facility-based providers (four sub-themes), and COVID-19 influences on families and communities (four sub-themes).

COVID-19 knowledge

Caregivers heard about COVID-19 at the health facility consultation and via a single media source (e.g., TV, radio, or community campaign). COVID-19 knowledge was limited, with most caregivers describing transmission methods (e.g., handshaking, hugging, kissing) or prevention measures (e.g., wearing masks, social distancing, and handwashing). A few caregivers correctly described COVID-19.

“a respiratory disease that is contagious” (Father-01),

“a very dangerous disease that can spread from person to person” (Mother-01),

“a worldwide disease, which is very lethal, and communicable” (Father-02).

However, most caregivers only described COVID-19 risk mitigation measures and knew little about the disease itself.

APEs learned about COVID-19 via the radio and demonstrated mixed knowledge. Some APEs correctly described COVID-19.

“respiratory disease that attacks the lungs, it causes coughs, muscle pains and diarrhea”
(APE-01)

However, others incorrectly described the disease.

“disease that came from China that attacks animals” (APE-02)

COVID-19 prevention and risk mitigation efforts

Supplemental Table 1 shows a comparison between reported and observed risk mitigation efforts in facility-based child health services. Although caregivers and facility-based providers reported adhering to multiple COVID-19 risk mitigation efforts, observation visits revealed inconsistent and inadequate implementation and non-compliance with prevention measures. Specifically, many caregivers wore their facial coverings incorrectly (e.g., under nose or chin) and handwashing and temperature screenings were inconsistently implemented. Importantly, there was no compliance with social distancing and facial coverings in the outdoor waiting area outside of the health facility.

APEs and district health staff described COVID-19-related changes in APE services: additional training to educate community members about COVID-19 and related prevention measures, reduced group size at community educational talks, fewer educational talks per month, and shifts from group educational talks to individual home visits. Additional prevention and risk mitigation measures implemented by APEs included mask wearing, no hugging or handshaking, handwashing, and social distancing. Initial difficulties in adapting APE services to COVID-19 were overcome through capacity building and provision of additional tools and protection equipment.

COVID-19 influences on facility-based child health services

Most caregivers reported minimal changes in the frequency or quantity of routine and emergency visits for their child, with some caregivers reporting only going when necessary.

Interviewer: Do you always go to the hospital or rarely, during this time of the pandemic?

Respondent: I have been gone a few times due to the Coronavirus and I only go if my daughter happens to be sick or needs a vaccine. (Mother-02)

Several caregivers noted a reduced child growth monitoring schedule from monthly to once every three months. COVID-19 affected health facility visits through prevention and risk mitigation measures, resulting in most caregivers feeling safe attending the health facility. Those caregivers who felt unsafe going to the health facility expressed that only the elimination of COVID-19 could make them feel safe.

In contrast, providers and district health services staff reported that COVID-19 decreased the number of consultations due to miscommunication about health facility operations at the pandemic's start (March-June 2020), fear of COVID-19, reduced consultation schedule, and reduced income which prevented caregivers from complying with some risk mitigation measures (**Table 2**). Respondents indicated that consultation numbers were starting to return to normal at the time of the interview. However, they reported rising cases of child malnutrition.

Administrative data confirmed the reported decline in child health consultations, with cases at the three health facilities dropping by 50% from February to October 2020 (**Figure 1, Panel A**), and the reported cases of malnutrition increasing by 100% from February to October 2020 (**Figure 1, Panel B**). Further, when comparing levels in 2020 to 2019, the administrative data consistently indicated reduced child health consultations and increased malnutrition cases for all months between March and December in 2020 versus 2019.

Providers reported four main COVID-19-related challenges in the delivery of child health services: lack of caregiver compliance with risk mitigation measures, caregiver fear of risk mitigation measures such as temperature screenings and mask use, lack of caregiver COVID-19 knowledge, and lack of supplies and protective equipment (**Table 3**). Of note is that three of

these challenges pertained to caregivers and how in turn they complicated health service delivery difficult by providers.

COVID-19 influences on families and communities

In addition to influences on child health services, respondents described other COVID-19 influences on families and communities. Four prominent themes emerged: increased food insecurity, ranging from not eating preferred foods to going a whole day without eating; increased food prices; reduced or eliminated livelihoods; and decreased child interactions with others (**Table 4**). Spending sufficient time with their children was a unique challenge for providers who continued working during the pandemic.

Future support during the pandemic

When asked what future changes were necessary to effectively support providers, caregivers, and children during the pandemic, facility-based providers unanimously highlighted the need for educational talks to sensitise the community about COVID-19, stricter enforcement of prevention and risk mitigation measures such as correct use of face coverings and handwashing, and continued attendance at child health visits. Likewise, community-based providers indicated that more COVID-19 counselling was needed, more personal protection equipment for all health providers, and monetary and food assistance for caregivers.

Discussion

We conducted a qualitative study to understand COVID-19-related disruptions in child health services utilisation and delivery in rural Mozambique. We found poor knowledge of

COVID-19 as a disease among caregivers of young children and mixed knowledge among community health providers. However, respondents unanimously recognised the primary COVID-19 prevention measures, which have been the focus of government campaigns. We observed poor compliance with COVID-19 prevention and risk mitigation measures at health facilities, specifically incorrect mask wearing, limited handwashing, and few temperature screenings. Providers attributed this lack of compliance primarily to caregiver fear of these measures and lack of financial means to comply with some measures, though few caregivers themselves expressed fear of COVID-19 risk mitigation measures.

Our findings confirm global concerns that increased poverty and fear of COVID-19 can lead to delays in seeking care, increases in severe illness, and lower uptake of childhood vaccination (Buonsenso *et al.*, 2020; Laouan, 2020; Menendez *et al.*, 2020; Zar *et al.*, 2020). We found reductions in child health services utilisation, in line with evidence from other LMICs and SSA (PATH, 2020). Our findings extend prior work showing that reductions in child consultations have persisted since the start of the pandemic and have yet to fully recover to pre-pandemic levels. However, respondents did not describe disruptions in child immunisation services. The decrease in child consultations coupled with the perceived fear of COVID-19 and risk mitigation measures and lack of financial means to comply with some measures implies that many caregivers might still be missing child immunisations. More efforts are needed to encourage caregivers' return to health facilities for routine immunisations and the continuation of community-based immunisation campaigns. The benefits of sustaining routine child immunisation in Mozambique outweigh the costs of a resulting COVID-19 infection by a ratio of 98:1 (Abbas *et al.*, 2020).

Overall, we found that COVID-19 prevention and risk mitigation measures led to some disruptions of facility- and community-based services. Specifically, fear of facility-based risk mitigation measures and financial inability to pay associated expenses prevented caregivers from attending child health visits. At the community-level, the frequency and size of educational talks and home visits were reduced. After initial hurdles were overcome, adaptation appeared successful and although reduced, no facility- or community-based services halted completely due to COVID-19. Despite this robust health system response and generally resilient service delivery, our findings indicated an alarming increase in cases of child malnutrition persisting into early 2021, confirming global projections (Headey *et al.*, 2020; Robertson *et al.*, 2020). Most respondents attributed this increase to reduced family incomes and increased food insecurity. These findings complement early studies showing negative economic effects of COVID-19 lockdowns in SSA and other LMICs (Amare *et al.*, 2020; BRAC International, 2020; de Brauw *et al.*, 2020; Mobarak *et al.*, 2020; Population Council, 2020; Wieser *et al.*, 2020; Egger *et al.*, 2021; Janssens *et al.*, 2021; Kansiime *et al.*, 2021; Mahmud and Riley, 2021) by demonstrating that these negative economic impacts have persisted eight months after the start of the pandemic and are particularly impactful among caregivers of young children. Persistent food insecurity and food systems disruptions due to COVID-19 will likely continue to disproportionately affect poor households in LMICs, restricting their access to food, nutrition, and health services (Swinnen and McDermott, 2020). Moving forward, reducing food insecurity will be key to curtailing health-seeking for child malnutrition, which can alleviate the burden on local and national health systems.

Nevertheless, our findings were based on the experiences of caregivers who had visited the health facility recently or that day, and they may not be generalisable to other caregivers in the

community. Other limitations that should be acknowledged are the qualitative nature of the study, which did not allow us to gauge the magnitude of economic shocks, and the possibility of respondents overstating their problems. In addition, we only focused on child health services and caregivers with young children. More research is needed to better understand and quantify the indirect effects of COVID-19 on other vulnerable groups and to help design effective, feasible, and acceptable governmental and non-governmental response efforts.

Our findings highlight several potential strategies to address the pandemic effects in rural Mozambique. More COVID-19 information and protective equipment is needed to help caregivers and providers comply with risk mitigation measures. Education talks and information campaigns could further help promote caregivers' return to health facilities. Alternatively, some child health services could be shifted to community-based providers to improve reach of caregivers who do not currently attend child health services.

Importantly, many other challenges remain outside of the health system, including food insecurity, reduced incomes, and reduced livelihoods. The current situation could serve as an opportunity to devise long-term solutions for these persistent problems in rural communities. Lessons learned from responses to past pandemics, economic crises, and natural disasters suggest that financial assistance can help reduce poverty, protect household income, and improve food security (Tirivayi *et al.*, 2020). Despite the expansion of the Post Emergency Direct Cash Transfer Programme to address COVID-19 effects (Ministério do Género, 2020), the number of new beneficiaries has been low and some of the worst reports of hunger in the study area came after enrolment was closed. To address the needs of rural households, the two other existing safety net programmes could be leveraged. For example, the public works programme, limited to four months in rural areas (Arruda, 2018), could be expanded given evidence that public works

programmes can be particularly responsive to the newly-poor because of their self-targeting (Tirivayi *et al.*, 2020). However, the public works programme was discontinued in Nampula province due to lack of coordination (Gentilini *et al.*, 2021). Leveraging existing social protection systems requires capacity building and multi-sectoral coordination as much as financial resources. Lastly, Mozambique can also leverage its experience in rapid response and multi-lateral partnerships that helped prevent a cholera outbreak and ensured continuity of child immunisation and supplementation services following cyclones Idai and Kenneth which hit the country in March-April 2019 (Dwyer, 2019; Lequechane *et al.*, 2020).

Our study demonstrated a robust health system response in rural Mozambique that has, for the most part, ensured continuity of facility- and community-based child health services. It also elucidated persisting negative pandemic effects on household income, food security, and livelihoods, which are likely to remain unresolved or even increase in the absence of interventions or activities to address them. Our findings highlighted potential strategies that can help promote an equitable, child-centric response to COVID-19 impacts in Mozambique. These measures may be relevant and adaptable to other rural areas in SSA. They could help strengthen the health system and social protection response to similar types of emergencies and help address economic, social, and health inequities in the long-term.

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Figure 1

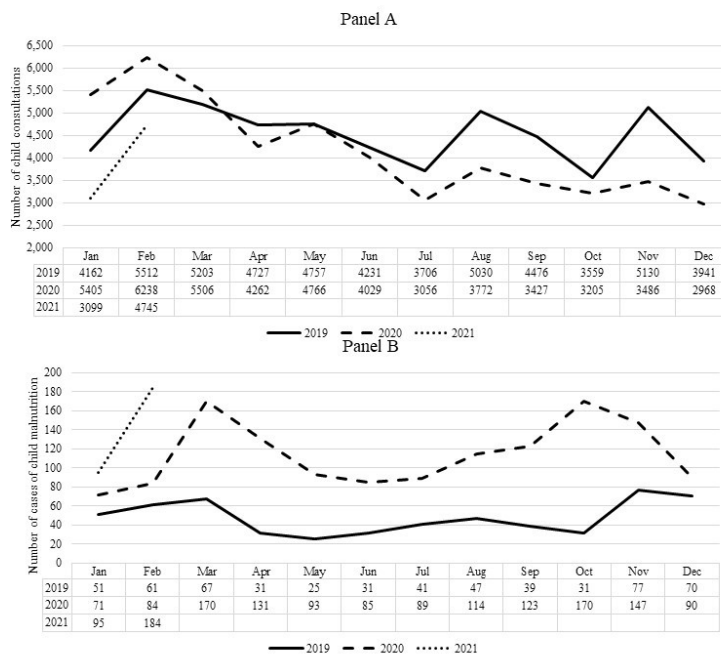


Table 1 Sample demographic and socio-economic characteristics

Respondents	N (%) or mean \pmSD
<i>Caregivers</i>	
N	36
Relationship to child	
Mother	32 (89%)
Father	3 (8%)
Other (i.e., uncle)	1 (3%)
Age (in years)	24.4 \pm 4.2
Highest education level	
None	3 (8%)
Some primary	9 (25%)
Completed primary	15 (42%)
Completed secondary	9 (25%)
Occupation	
Housewife	21 (58%)
Farmer	9 (25%)
Informal business	4 (11%)
Teacher	1 (3%)
Office clerk	1 (3%)
Child age (in months)	10.7 \pm 8.3
Child sex	
Male	19 (53%)
Female	17 (47%)
Average number of children	3.4 \pm 1.8
Average monthly household income (MT) ^a	2,482 \pm 2,011
Average walking time from household to health facility (minutes)	37 \pm 21
Average number of times visited health facility in past 10 months	5 \pm 3
<i>Health facility providers</i>	
N	15
Type of provider	
Maternal and child health nurses	6 (40%)
Well-child consultation providers	3 (20%)
Sick-child consultation providers	3 (20%)
Health facility directors	3 (20%)
Age (in years)	32.7 \pm 10.0
Sex	
Male	3 (20%)
Female	12 (80%)
Highest education level	
Some secondary	2 (13%)
Completed secondary	5 (33%)
Professional degree	3 (20%)
University Bachelor's degree	5 (33%)

Average number of years employed in current role	8.4±9.3
<i>APE^b</i>	
N	6
Age (in years)	35.5±10.5
Sex	
Male	5 (83%)
Female	1 (17%)
Highest education level	
Some primary	1 (17%)
Completed primary	3 (50%)
Some secondary	2 (33%)
Average number of years employed in current role	4.3±3.6
<i>District health services staff</i>	
N	4
Type of provider	
Chief medical officer	1 (25%)
District lead - maternal and child health	1 (25%)
District focal point - nutrition and early child development	1 (25%)
District APE program coordinator	1 (25%)
Age (in years)	36.3±5.9
Sex	
Male	3 (75%)
Female	1 (25%)
Highest education level	
Completed secondary	2 (50%)
University Bachelor's degree	2 (50%)
Average number of years employed in current role	7.4±5.9

^a 1 Mozambican metical (MT) is equivalent to 0.013 US dollars.

^b APE stands for "Agente Polivalente Elementar", the local term for a community health worker.

Table 2 Supporting quotes for the main themes identified with respect to COVID-19 influences on health-seeking behaviour for facility-based services^a

Themes	Supporting quote	Respondent
Decrease in consultations – misconceptions	<p>I: Has COVID-19 affected your work as a health service provider?</p> <p>R: I can say that it has affected a little. That was in the beginning some of the caregivers were limited because of the information that was being disseminated that people should not go to the health facilities and as a result we had very few people coming to the health facility. The mothers were not coming for the consultations. At one point, we health service providers contributed to misinforming the community, but as time went by, we managed to sensitize the community and now they are returning.</p>	Provider-01
Decrease in consultations – fear of COVID-19	<p>I: How has COVID-19 affected the caregivers and the children in Monapo district?</p> <p>R: COVID-19 has affected because [...] we are afraid of it. The caregivers reduced their consultations at the health facilities because of the fear of the unknown. We are however, investing all the effort to communicate, to inform the community leaders, to inform the community.</p>	District health services staff-01
Decrease in consultations – structural changes	<p>I: Were there changes with the caregivers bringing their children to the health facility as a result of COVID-19?</p> <p>R: A little, it is a change driven by the health facility. Before, the consultations were frequent or monthly, currently, consultations such as family planning, post-natal and pre-natal are done every three months.</p>	Provider-02
Decrease in consultations – reduced income	<p>I: How has COVID affected your role as a provider?</p> <p>R: There is also a decline in the number of children who are coming for vaccination, because before, the hospitals used the same weighing pant passing this from one child to another child. Presently, we cannot do that because we do not know what each child has, and each child has to bring his/her own weighing pants. This has influenced some appointments, because there are some families who</p>	Director-01

cannot afford to buy or order from a tailor a simple weighing pant and they opt to staying at home. ...

Rising cases of malnutrition	<p>R: This is because the cases are still growing and the cases of malnutrition are rising. I think COVID-19 has contributed to malnutrition because we are having so many cases of children who have problems of malnutrition.</p> <p>I: You are registering this?</p> <p>R: Yes, we are.</p> <p>I: How many cases have you noted presently that passed via CCD?</p> <p>R: Monthly?</p> <p>I: Yes, some numbers that you can recall recently?</p> <p>R: Well, I do not have the exact numbers in my head, but I think from August till now, the children that I have registered with malnutrition are to the tune of 10 to 15.</p> <p>I: Oooh! It is very high.</p> <p>R: Yes, it is hence, the COVID 19 situation has affected the children as well.</p>	Provider-03
	<p>R: In terms of nutrition the situation changed, the pandemic affected the whole economy of our community, markets were closed, very little was produced in the small farms, because people had movement restrictions... a lot of effort was done last year aiming at reducing [malnutrition] cases, but suddenly everything stopped. The children were the first to be affected by this situation.</p>	District health services staff-02

^a In the “Supporting quote” column, “I” stands for interviewer and “R” stands for respondent.

Table 3 Supporting quotes for the main perceived barriers and challenges faced by facility-based providers in delivering health facility-based services during the coronavirus pandemic^a

Themes	Supporting quote	Respondent
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Lack of caregiver compliance with risk mitigation measures	<p>I: How has COVID-19 affected your work as a health provider?</p> <p>R: The caregivers do not take seriously the prevention measures against a COVID-19, we should always call their attention on the proper way of wearing masks and social distancing themselves.</p>	Provider-04
	<p>Another thing that was affected is the adherence to the measures for COVID-19 protection, it has been very difficult to sensitize the people in the community to implement the protection measures. If we can go out now, we will see people just going about their business without masks, they convene at places without the proper protection measures, and this leaves us very susceptible being at the front line, this is one of the aspects that has a greater impact on our work.</p>	Director-02
Caregiver fear of COVID-19 risk mitigation measures	<p>I: In your opinion, how has COVID 19 affected parenting, child nutrition and child development in this community?</p> <p>R: Well, that is what I was saying before that COVID-19 brought a very negative impact, because a mother does not want to go to the hospital because she is afraid of using a mask. She is afraid of the thermometer, we have a lot of children in the community who are malnourished but do not come to the hospital [...] because the mother is afraid to go to the hospital [...].</p>	Director-03
Lack of caregiver knowledge about COVID-19	<p>I: How has COVID-19 affected your role as a provider?</p> <p>R: [...] one of the main challenges we are having is that our communities till now have not understood [COVID] very well, the perception is not efficient about this disease. The understanding is not 100% relative to this disease. We have given educational talks, house to house campaigns talking about the usage of masks and washing hands, there is still complacent in our community and this is a challenge.</p>	Director-03
Lack of supplies and protective equipment	<p>I: How has COVID-19 affected your role as health provider?</p> <p>R: COVID-19 created many changes mainly with the consultations, there are no masks or alcohol for health service providers. There is lack of cleaning material, the education talks sessions under the tree shade are short and there are no conditions for social distancing, the health provider is required to shout so that those standing at the back can hear what is being said.</p>	Provider-05

^a In the “Supporting quote” column, “I” stands for interviewer and “R” stands for respondent.

Table 4 Supporting quotes for the main themes identified with respect to COVID-19 influences on families and communities, based on interviews with caregivers^a

Themes	Supporting quote	Respondent
Increased food insecurity	I: Did the global pandemic affect your way of life as a mother? R: Yes, because things have been difficult lately. For example, yesterday at home we slept without dinner because we had nothing to eat.	Mother-03
	I: Has Corona virus affected the family life? R: It affected it, because there are days we sleep hungry, we have a house we used to rent but there are no clients now, there are days we go hungry.	Mother-04
	I: Has the global COVID-19 pandemic affected your life as a father? R: Before the Corona virus I used to be able to bring something for my daughter to eat. Now that the doors have closed during this time of Corona virus, my livelihood is very complicated. What I manage today is not 70% of what I used to get before the pandemic. This disease brought me some losses, life is so difficult in order to raise the children. For my daughter's food am sacrificing at the moment.	Father-01
	I: And how has it affected nutrition with the children? R: Many of the caregivers lost their jobs and maybe businesses closed, because the market fairs were closed and that resulted in low income for many families and it became difficult for them to buy food to feed their children.	Mother-05
	I: Has coronavirus affected the nutrition of children? R: It has been with difficulties. I: Why? R: There is no money, only a few went to the fields to cultivate hence there is no produce, in the markets there are not a lot of things and the products prices have gone up.	APE-01

Increased prices	<p>I: In terms of food that you give [your child]? Did anything change because of corona virus? R: She does eat, but the prices of products have hiked a lot because of Corona virus [...]. Before yesterday, I went to buy Danone for my daughter and I saw that the price had change from 25 Meticaais to 30 meticaais and I was not able to buy. When I asked, they told me that Corona virus has blocked all the money</p>	Mother-06
Reduced livelihoods	<p>I: Have you heard about Corona virus? R: Yes, I have. I: Has it affected your life as a mother? R: Yes, it has affected? I: How? R: I used to have a small business here at home, my business went down because everyone is at home, I used to make some cookies and leave them at Boa Viagem area and they could sell out within a short period of time. Today you can make the cookies and no one will buy them because there is no money.</p>	Mother-04
	<p>I: Ok, and everything you have heard about Corona virus, has it changed your life as a mother? R: Nowadays, when I go to the fields, at 04:00, I do not come back at 09:00 but at 06:00. This Corona virus has reduced our production, because we do not spend a lot of time like we used to before. Money today has disappeared and if we do not produce and sell, we will not have money to buy clothes for her.</p>	Mother-07
	<p>I: Has Corona virus affected the nutrition of children? R: There is lack of money nowadays and lack of food. The prices of food products have gone up and the men are complaining a lot that they are not able to buy things for children like before. There are no jobs [...].</p>	APE-02
Reduced child interactions with others	<p>I: Has the global COVID 19 pandemic affected your life as a father in the life of your son? R: Yes, with the Corona virus, this has obliged us to control more our children very closely. We cannot allow the babies to be held by different people.</p>	Father-03

I: What as a mother have you started doing or stopped doing due to Corona virus? Mother-08
R: I had to separate the children there at home, each now sleeps alone and I bought plastic plates for everyone. I do not leave them to go out of the compound and play.

I: What about your time management, is it the same? Mother-09
R: It has changed. Before, we used to take visits with the children but we no longer do that, we come from work and stay at home taking care and watching them so that they do not go to areas of risk.

I: How has the COVID-19 affected your work? Provider-03
R: COVID-19 affected so much our role [...]. One of the first reasons is that we cannot stay at home, as health workers, we have to be at the frontline to attend to the population or people that are sick. For me this has affected my personal life, because I cannot manage and care my children who are at home during this pandemic. Children are always those ones that you tell, please do not leave the compound but when you come from work, you get the children outside. This is very different for the person who is at home because he/she is able to control their children.

^a In the “Supporting quote” column, “I” stands for interviewer and “R” stands for respondent.