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ORIGINAL ARTICLE

Economic Challenges in Tanzanian Healthcare Facilities and Their Impact on PPE Availability During the COVID-19 Pandemic: A Qualitative Analysis

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ABSTRACT

Background: On March 11, 2020, the World Health Organization (WHO) declared COVID-19 a pandemic, highlighting the virus's widespread impact across numerous countries. This study evaluated the economic challenges and their impact on the availability of Personal Protective Equipment (PPE) during the COVID-19 pandemic in Tanzania. It aimed to explore the challenges faced by healthcare facilities, the effects on PPE distribution, and the adaptive measures implemented in response to shortages.

Methods: A qualitative cross-sectional survey was conducted between August 24 and October 3, 2022, in Dar es Salaam, Arusha, Dodoma, and Mwanza regions. A total of 96 participants from 24 healthcare facilities were recruited, ensuring equal representation across all four regions. Thematic analysis was applied for data analysis, and interviews were recorded using the Kobo Toolbox.

Results: The majority of healthcare professionals indicated that the economic conditions within healthcare facilities were deemed unsatisfactory, whereas only a limited number expressed a differing opinion. When asked about the availability of PPE in their facilities, nearly all expressed dissatisfaction. Most of the respondents indicated a shortage of masks, which were identified as the most commonly utilized PPE for self-protection during the COVID-19 pandemic.

Conclusions: This study underscores the insufficient availability of PPE and the widespread dissatisfaction with the economic conditions within healthcare facilities during the COVID-19 response, as reported by most of the participants. There is a critical need for enhanced financial support from the government to enable healthcare facilities to acquire necessary PPE.

Keywords: Economic Challenges; Healthcare Facilities; PPE Availability; COVID-19 Pandemic; Tanzania

INTRODUCTION

On March 11, 2020, the World Health Organization (WHO) declared a pandemic of COVID-19; more than 110,000 cases and more than 4000 deaths have already been reported in more than 110 countries in the first week of the pandemic [1]. The COVID-19 pandemic has caused significant disruptions in the global supply chains of almost every sector. This pandemic has greatly affected the world economy, especially the pharmaceutical industry [2]. The global health crisis revealed the vulnerable nature of medical supply chains, which heavily rely on imported active pharmaceutical ingredients (APIs) from China and India [3,4].

In particular, the distribution of medical products became essential for each country, as they were needed to manage and control the evolution of the COVID-19 pandemic [5,6]. By "medical products," professionals generally mean various products related to equipment used in the healthcare sector that differ from drugs [7]. Various products fall under this category, encompassing basic items like Personal Protective Equipment (PPE) and advanced equipment such as respirators and magnetic resonance imaging machines. The technical disparities within these product categories lead to the segmentation of the medical products sector into two

distinct business sectors: PPE-related and medical devices [8].

During the COVID-19 pandemic, many countries experienced significant disruptions in accessing essential products due to China, which accounts for 12.2% of global exports, imposing a mandatory quarantine. This heavy reliance on Chinese goods, especially among developing nations, hindered the availability of critical items like masks, respirators, and pharmaceuticals [9]. Consequently, the shortage of PPE in some areas contributed to the virus's rapid spread and worsened the pandemic, as it was raised by the World Bank and the United Nations [9].

Tanzania reported its first case of COVID-19 on March 16, 2020, at Mount Meru Hospital in the Arusha region, involving a citizen who returned to the country via Kilimanjaro International Airport [11]. Following the announcement of the first COVID-19 case in Tanzania's Arusha region, fear spread in the community and among healthcare workers about their safety. As of April 24th, 2020, the government of Tanzania reported 284 COVID-19 cases, including 7 in intensive care, 37 recoveries, and 10 deaths. Dar es Salaam recorded the highest number of infections, followed by Mwanza, Arusha, and Dodoma [12].

This study evaluated the economic challenges and their impact on the availability of Personal Protective Equipment (PPE) during the COVID-19 pandemic in Tanzania, focusing on the regions of Dar es Salaam, Dodoma, Mwanza, and Arusha, which were significantly affected. The objectives of this study are to explore the economic challenges faced by Tanzanian healthcare facilities during COVID-19, examine the impact of economic conditions on the availability and distribution of PPE, and understand the adaptive measures implemented in response to these shortages. The findings derived from this study will provide a foundational basis for policymakers to formulate resilience strategies and devise emergency preparedness plans that effectively address future public health emergencies.

METHODS

Study area: This study was conducted in the regions of Dar es Salaam, Arusha, Dodoma, and Mwanza, which are respectively located in the Eastern, Northern, Central, and Lake zones in Tanzania. The Ilala, Arusha urban, Nyamangana, and Dodoma urban districts were chosen as representatives of the Dar es Salaam, Arusha, Mwanza, and Dodoma regions due to the high prevalence of COVID-19 [12].

Study design and population: This study involved a qualitative cross-sectional survey design conducted from August 24 to October 3, 2022. The study included healthcare workers, such as nurses, clinicians (doctors), pharmaceutical personnel, laboratory personnel, administrative staff, and other health support staff from selected public hospitals, health centers, and dispensaries. Only government-owned healthcare facilities were involved in this study. Private healthcare facilities were not involved in this study to maintain a focus on the standardized practices and protocols typically found in government-owned healthcare settings and the supply of PPE normally done by the government to reduce the variability that may arise from differing operational procedures and resource allocation. Additionally, student healthcare practitioners engaged in short-term field practices during the data collection were excluded to maintain focus on the established and long-term practices of experienced participants to provide more reliable qualitative data.

Sample size: The study included 96 participants from 24 healthcare facilities, with the qualitative sample size obtained based on the saturation principle. It involved interviewing 48 healthcare workers, 2 from each facility, in individual interviews. Additionally, 48 key informants were interviewed, including healthcare workers (HCWs) and administrative leaders dedicated to the COVID-19 team within the healthcare facility, with 2 representatives from each facility participating in the study.

***Sampling procedure*:** HCWs dedicated to caring for only COVID-19 patients during disease outbreaks and leaders directly involved in the COVID-19 team were purposefully selected as key informants for in-depth interviews. Healthcare workers not dedicated to the COVID-19 team were selected randomly for individual interviews. The random selection was conducted using a stratified sampling method, where a list of all eligible healthcare workers was compiled. From the list, names were randomly drawn using a random number generator to ensure that each individual had an equal chance of being selected, minimizing bias and ensuring a representative sample.

Data management: Data was analyzed using thematic analysis, employing semi-structured

interview guides to explore insights from respondents via the Kobo Toolbox. The researcher, who is bilingual and an expert in Kiswahili and English, personally collected the data to ensure a deep understanding of the nuances of communication. The interviews included a series of thoughtfully crafted questions, such as: "How would you describe the current economic conditions in your healthcare facility?" and "Can you share your experiences regarding PPE availability in your facility?" Additionally, the researcher asked about the impact of PPE shortages on patient care and measures implemented to protect healthcare workers during the pandemic. This meticulous approach involved listening to recorded interviews multiple times, transcribing them in Kiswahili, and accurately translating them into English. The interviewer received training to enhance qualitative interviewing skills and focused on avoiding leading questions to gather genuine responses.

The application of Resource Dependency Theory (RDT) and Crisis Management Theory (CMT) provided a robust framework for developing inquiries related to resource allocation and crisis management in Tanzanian healthcare facilities during the COVID-19 pandemic. Related questions were asked, such as, what are your thoughts on the reliance on imported PPE? How has this affected your facility? What measures have been implemented in your facility to protect healthcare workers during the pandemic? This approach yielded valuable insights into resource dependency and crisis response, contributing to the establishment of sustainable healthcare systems that can effectively adapt to future crises [13].

ETHICAL APPROVAL

The Open University of Tanzania approved the research clearance letter with document number PG202001923. After obtaining permission to conduct research at regional and district levels, participants at healthcare facilities were requested to complete a consent form to safeguard their privacy. Only those who agreed to complete the consent form were able to participate in the study.

RESULTS

Socio-demographic characteristics of participants

The study includes 96 participants, with a slightly higher representation of females 56 (58.3%) compared to males 40 (41.7%). Most participants are young to middle-aged, with 25 (26.0%) aged 20-29 and 32 (33.3%) aged 30-39. Nurses make up the largest group at 34 (35.4%,) followed by administrative staff 24 (25.0%) and clinicians 22 (22.9%). Regarding education, 41 (42.7%) hold diplomas, and 36 (37.5%) have bachelor's degrees. Notably, 50% are part of dedicated COVID-19 teams, highlighting their critical roles during the pandemic. Experience levels vary, with 32 (33.3%) having 6-10 years of service, creating a diverse workforce that enriches the study's insights into healthcare perspectives during the pandemic, as detailed in the **Table.**

Table: Socio-demographic characteristics of participants (N=96)

Variables	Frequency (n)	Percentage (%)
Gender		
Male	40	41.7
Female	56	58.3
Age in years		
20 – 29	25	26.0
30 – 39	32	33.3
40 – 49	16	16.7
50 and above	23	24.0
Field profession		
Clinician (doctor)	22	22.9
Nurse	34	35.4
Pharmaceutical personnel	9	9.4

Variables	Frequency (n)	Percentage (%)
Laboratory personnel	7	7.3
Administrative staff	24	25.0
Highest level of education		
Certificate	13	13.5
Diploma	41	42.7
Bachelor degree	36	37.5
Master degree	6	6.3
Dedicated in the COVID-19 team		
Yes	48	50.0
No	48	50.0
Service experience in years		
1 – 5	22	22.9
6 – 10	32	33.3
11 – 15	20	20.8
16 – 20	14	14.6
Above 20	8	8.3

1. Healthcare facilities' economic situation to fight against COVID-19 outbreak

Based on the Individual Interviews (II) and Key Informant Interviews (KII), the following five solid themes were identified concerning Healthcare Facilities' Economic Situation to Fight against COVID-19 Outbreak:

i. Insufficient financial resources

Many participants highlighted that their healthcare facilities were not economically prepared to handle the increased demand for protective equipment and other resources needed to combat COVID-19.

- II Insight: *"No, we were not fully prepared economically"* (II, Health Center O).
- KII Insight: *"No, the economic situation was not good at our facility"* (KII, Dispensary C).

Experience of budget constraints and the reduction in patient numbers led to a significant drop in Governmental hospitals revenue, exacerbating the financial strain.

- II Insight: *"We were serving 1,000 patients per month before COVID-19, but during the outbreak, they decreased to 300 per month. Where will you get the income?"* (II, Hospital W).

ii. Economic Challenges Affecting Healthcare Workers' Morale

Lack of risk allowance, while some healthcare workers were paid overtime, a risk allowance was not given which negatively impacted their motivation.

- II Insight: *"We were paid overtime, although we were not paid risk allowance, this affected our morale"* (II, Hospital R).
- KII Insight: *"Healthcare workers needed to be at least given risk allowance because the pandemic was too risky"* (KII, Health Center L).

Personal financial burden, healthcare workers often had to purchase their protective gear, which added a personal financial burden.

- KII Insight: *"We had to buy masks and sanitizers ourselves for self-protection"* (KII, Dispensary A).

iii. Reliance on external support and donations

With support from the private sector and stakeholders, many facilities relied on donations and support from the private sector to supplement their resources.

- II Insight: *"Most of the time, we were helped by the private sectors; they volunteered to provide us with PPEs"* (II, Dispensary P).
- KII Insight: *"Sometimes we were given support by stakeholders and the equipment ran out of stock in a very short time"* (KII, Hospital W).

iv. Adaptive measures and improvisation

Due to significant shortages in personal protective equipment (PPE), healthcare professionals were often forced to use fabric masks repeatedly when other essential PPE items were unavailable or too expensive. This reliance on fabric masks highlights critical gaps in PPE supply chain management and

the urgent need for better resource allocation to protect frontline healthcare workers.

- II Insight: *"A number of individuals began utilizing washable fabric masks"* (II, Hospital M).
- II Insight: *"We produced a significant number of fabric masks ourselves to ensure self-protection"* (II, Hospital F).

Improvised solutions, some facilities adopted improvised measures to manage the situation, including reusing disposable masks.

- KII Insight: *"There was a time when we were washing disposable masks and using them again"* (KII, Health Center V).

v. Variability in economic impact

The designation and prioritization of facilities reflected the economic circumstances associated with their explicit assignment for COVID-19 patients. Facilities designated specifically for this purpose frequently received enhanced resources.

- II Insight: *"Our facility was at least given priority by the government"* (II, Dispensary C)
- KII Insight: *"Our facility was designated to serve only COVID-19 patients, so at least they made sure PPEs were available"* (KII, Hospital M).

The economic landscape general overview of healthcare facilities during the COVID-19 outbreak presented substantial challenges, marked by significant variability in preparedness and resource allocation. Common issues included insufficient financial resources, inadequate provision of personal protective equipment (PPE), a lack of risk allowances, reliance on external support, and the necessity for adaptive measures. These factors collectively impeded healthcare workers' capacity to respond to the pandemic effectively.

2. Situation of PPE availability in healthcare facilities in fighting against the COVID-19 pandemic

From the individual interviews (IIs) and key informant interviews (KII) regarding the availability of PPE in healthcare facilities during the COVID-19 pandemic, five strong themes emerge:

i. Prioritization and inequality in PPE distribution

Healthcare workers directly dealing with COVID-19 patients were given more PPE, including frequent mask replacements, than other workers. Non-COVID-19 team members often resorted to using fabric masks or had to buy their own PPE, indicating a disparity in the allocation.

- II Insight: *"Healthcare workers in the COVID-19 team were given more priority than other workers; some used one mask a day, but those who served COVID-19 patients used at least more than one mask a day" (II, Health Center* D).
- KII Insight: *"The people in the COVID-19 team were more favored, but others were not given much priority"* (KII, Hospital W).

ii. Self-reliance and personal procurement of PPE

Due to shortages or inadequate provision by the facility, many healthcare workers had to purchase their own PPE, particularly fabric masks. Often self-made or purchased, fabric masks became a common alternative as supplies of N95 masks were inconsistent.

- II Insight: *"It was not very satisfying, we bought it for ourselves more often" (II, Health Center* T).
- KII Insight: *"Many people used their own self-made fabric masks because sometimes N95 masks were out of stock otherwise you can even use one mask for a whole week"* (KII, Dispensary B).

iii. Challenges and risks due to PPE shortages

The lack of adequate PPE led to significant challenges in service provision, where healthcare workers had to attend to patients without masks or gloves, which increased the risk of infection among healthcare workers and patients.

- II Insight: *"There was a time when healthcare workers were afraid to provide services due to the lack of PPEs, but we continued to provide services"* (II, Hospital F).
- KII Insight: *"There was a time when someone had to attend to a patient without gloves or a mask"* (KII, Health Center T).

iv. Inconsistent supply and management of PPE

PPE availability was inconsistent, with periods of adequate supply followed by shortages, affecting the continuity of safety protocols. Government policies and supply chain issues led to significant gaps in PPE provision, particularly after the initial wave of the pandemic subsided.

- II Insight: *"Masks were available to the extent that the facility leaders struggled to find masks, but sometimes we ran out of PPEs, and the services continued as usual"* (II, Dispensary E).
- II Insight: *"The masks provided by the government were very few, especially when the government said there is no COVID-19, it completely stopped bringing masks to healthcare facilities, although cases of COVID-19 were still reported"* (II, Hospital X).

v. Perception and trust issues with PPE

Some healthcare workers, like the general public, were skeptical about the safety of imported masks, believing they might be contaminated. As the perceived threat of COVID-19 decreased, the emphasis on wearing PPE also diminished within facilities.

- II Insight: *"Some health workers did not believe in imported masks, so the lack of faith in foreign masks was not only to the general society"* (II, Health Center S).
- KII Insight: *"After the first wave decreased, the emphasis on wearing masks decreased, and the issue of wearing masks became optional in our facility"* (KII, Hospital R).

Generally, the availability of personal protective equipment (PPE) during the COVID-19 pandemic in healthcare facilities was marked by significant disparities and challenges. Frontline workers caring for COVID-19 patients received prioritized access to PPE, while others often resorted to using fabric masks or self-procured gear, highlighting inequality in resource distribution. Many healthcare professionals faced shortages, leading to risks where some had to provide care without essential protective items. The supply of PPE fluctuated inconsistently, compounded by policy changes and supply chain issues, which further complicated safety protocols. Additionally, skepticism regarding the quality of imported masks grew among healthcare workers, and as the perceived threat of COVID-19 lessened, adherence to safety measures waned, necessitating enhanced strategies for resource management and communication within healthcare settings.

DISCUSSION

Regarding the economic conditions within healthcare facilities in combating COVID-19, most participants reported that the situation was inadequate, while only a minority characterized it as satisfactory. Regarding the availability of personal protective equipment (PPE), nearly all HCWs expressed dissatisfaction, particularly concerning the supply of masks, which were identified as critical for self-protection in the fight against COVID-19. Masks were discussed more because they were mainly used PPEs for self-prevention in combating COVID-19.

The economic downturn caused by COVID-19 has impacted the availability of PPEs in healthcare facilities, affecting many countries worldwide, not Tanzania alone. The health sector is cited as the most affected sector in the fight against the pandemic due to its role in ensuring the well-being of public health [14]. The findings of this study are similar to other Tanzanian studies, which revealed that HCWs in Tanzania experienced significant stress and anxiety related to insufficient PPE, which affected the mental well-being of HCWs and influenced their job performance and willingness to work in high-risk environments [12,15]. The studies further align with findings from Martínez-López et al. who highlighted that inadequate PPE can increase stress and burnout among healthcare professionals [16]. The lack of preparation and shortage of PPE for healthcare workers became a significant factor in the global struggle that hit healthcare facilities. A study revealed that in Pakistan, only a small percentage of HCWs had access to N95 respirators, gloves, face shields or goggles, and full suits/gowns [17]. In Jordan, the numbers were even lower with only 18.5% of doctors reportedly getting all the required PPE [18].

Even in the United States (US), there were shortages of PPE, around 15% of doctors did not have access to N95 masks/respirators, over 20% lacked gloves, approximately 12% did not have face shields, and about 50% did not have full suits/gowns [9]. Nearly 7% of doctors in the US said they were required to treat COVID-19 patients without adequate PPE, and over 80% mentioned that they had to reuse PPE components [17]. Many healthcare facilities across the country decided to call for PPE donations from the community to ensure the availability of PPE improves, and creative citizens devised creative ways to create PPE from household materials. Similarly, healthcare facilities worldwide experienced severe shortages of Intensive Care Units (ICU), beds, and ventilators [19].

Conversely, research conducted in Singapore indicated that HCWs found PPE to be readily available and sufficient for all personnel within their healthcare settings, thereby enabling them to safeguard themselves against the disease effectively [20]. Notably, the findings suggested that HCWs who reported issues regarding PPE availability may potentially overestimate the amount of PPE needed in low-risk environments [20]. The study by Coto et al. supported that a significant majority (87.2%) of allied health professionals surveyed in the United

States had access to PPE, with only a small percentage relying on non-medical grade PPE [21].

The challenges highlighted by the COVID-19 pandemic have prompted healthcare facilities worldwide, including those in Tanzania, to develop innovative strategies to ensure the uninterrupted delivery of essential healthcare services during this crisis and in future emergencies. Additionally, maintaining a state of full preparedness for emerging diseases will be crucial in alleviating the burden experienced during outbreaks, such as COVID-19, as the severity of future diseases remains uncertain.

LIMITATIONS OF THE STUDY

The qualitative approach may be subject to biases based on the participant's perceptions and experiences. While thematic analysis provided valuable insights, it might not capture the full complexity of the economic challenges and PPE availability in healthcare settings. Participants were asked to reflect on their experiences during the pandemic, which may lead to recall bias. Their current circumstances or perceptions could influence their responses rather than their experiences during the height of the pandemic. As a cross-sectional study, it provides a snapshot of the conditions at one time rather than insights into how the situation has changed over time or in response to interventions. These limitations suggest further research with a broader scope and methodology to capture more multifaceted challenges faced by healthcare facilities in Tanzania.

CONCLUSIONS

The qualitative analysis highlighted significant economic challenges faced by healthcare facilities in Tanzania during the COVID-19 pandemic. The findings underscored widespread dissatisfaction among healthcare workers regarding the economic conditions of their facilities, which directly impacted the availability of PPE. The shortage of essential items, particularly masks and sanitizers, compromised the ability of healthcare professionals to protect themselves and manage the health crisis effectively. This situation not only waned the confidence of medical staff but also posed a broader threat to public health in Tanzania as the pandemic unfolded.

RECOMMENDATIONS

- Healthcare facilities need increased government financial support to procure necessary PPE and equipment and address the economic challenges highlighted in this study.
- The Tanzanian government should collaborate with local manufacturers to strengthen local supply chains for PPE and essential medical supplies and reduce import dependency.
- Policymakers must also develop healthcare resilience policies and robust emergency preparedness plans to effectively respond to future public health crises.
- Build trust in healthcare workers, involve them in resource allocation decisions, and address their concerns to enhance good healthcare delivery.

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