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# A qualitative exploration of nurses' and midwives' experiences in designated COVID-19 healthcare facilities in rural and urban Tanzania

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**Abstract**

**Background:** Frontline healthcare providers, particularly nurses and midwives, are at higher risk of COVID-19 infection due to frequent patient contact. However, studies examining their experiences, particularly in low-income countries like Tanzania, are limited.
**Objective:** This study aimed to explore the experiences of nurses and midwives providing care in COVID-19-designated healthcare facilities in selected regions of Tanzania.
**Methods:** A qualitative descriptive approach was used to investigate the experiences of nurses and midwives in COVID-19 care. In-depth interviews were conducted with 20 purposefully selected participants from Dar es Salaam, Shinyanga, and Pwani regions. Data were coded with NVivo 12 software and analyzed using a descriptive phenomenology approach.
**Results:** Nurses and midwives in urban areas reported managing more patients and experiencing more deaths than peers in rural settings. Urban and rural participants demonstrated strong knowledge of COVID-19, including its symptoms, management, and preventive measures. Selection for COVID-19 care was based on Ministry of Health guidelines, prioritizing leadership and emergency care experience. Their roles included patient isolation, routine and specialized care, psychological support, health education, and post-mortem care. Despite this, most nurses and midwives reported feeling underprepared due to insufficient training, a lack of personal protective equipment, and limited medical supplies. Additionally, no risk allowances were provided. Nurses and midwives experienced key challenges such as patient stigmatization, abandonment by families, deaths resulting from oxygen shortages, burnout, and personal infection. Nurses and midwives recommended strengthening the healthcare system, providing ongoing training, offering risk allowances, and promoting community education and sensitization to improve future pandemic preparedness.
**Conclusion**: Nurses' and midwives' experiences in COVID-19 care facilities were surrounded by inadequate preparations, with health system deficiencies and societal fears significantly impacting their ability to provide effective care. Strengthening health sector readiness, including training and resource allocation, is essential for future pandemic and disaster response efforts.
***Keywords:*** Nurses, midwives, experiences, COVID-19, rural, Tanzania

## Background

Healthcare providers (HCPs) have been at the forefront of the COVID-19 pandemic, facing a wide range of challenges beyond the risk of infection. Evidence from high-income countries highlights the

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immense pressures faced by frontline HCPs during the COVID-19 pandemic, including inadequate protective equipment, excessive workloads, emotional exhaustion, and isolation, as well as having to manage patients experiencing heightened negative emotions (Kang *et al*., 2020; Olesen *et al*., 2020; Treibel *et al*., 2020; Mattsson *et al*., 2022). In addition to the physical and emotional toll, many frontline workers have expressed anxiety over insufficient protection despite using personal protective equipment (PPE), as reported in Denmark, for example(Olesen *et al.,* 2020). Literature also points to the heightened risk of mental health issues among those treating COVID-19 patients. In China, for instance, more than 3,000 HCPs were infected, with over 22 deaths reported (Adams & Walls, 2020), while in Italy, more than 10% of physicians and nurses contracted the virus (Thomas-Rüddel *et al*., 2021). These findings suggest that the pandemic has disproportionately impacted nurses and midwives, representing the largest proportion of the global health workforce. Despite the wealth of research from high-income countries, there remains a notable gap in studies exploring the experiences of HCPs in Sub-Saharan Africa.

The COVID-19 pandemic significantly burdened the healthcare system in Tanzania, with widespread infections affecting the population and HCPs (Shayo *et al*., 2023; Hamisi et al.,2023). Like many other low- and middle-income countries, Tanzania faced resource constraints, including limited access to personal protective equipment (PPE), testing supplies, and critical care facilities (Shayo *et al*., 2023; Isangula *et al*., 2023). The pandemic exacerbated existing challenges in the healthcare system, increasing strain on healthcare workers, especially nurses and midwives, who comprise a significant portion of the country's health workforce (Isangula *et al*., 2023).

These frontline workers were central to the government's COVID-19 response, providing essential care under difficult circumstances (Isangula *et al*., 2023). Initially, the Tanzanian government responded to the pandemic with minimal public health interventions, but over time, adopted more comprehensive measures (Hamisi, Dai, & Ibrahim,2023). These included establishing designated COVID-19 healthcare facilities for isolation, distributing PPE, and public health campaigns to raise awareness (Shayo *et al*., 2023; Hamisi et al.,2023). Vaccination efforts were eventually rolled out, prioritizing vulnerable populations and healthcare workers (Mfinanga *et al*., 2023).

However, despite these efforts, healthcare workers faced overwhelming challenges, particularly nurses and midwives. They not only bore the physical and emotional burden of managing patients but were also at heightened risk of infection due to shortages of PPE and inadequate workplace safety protocols (Isangula *et al*., 2023). Nevertheless, nurses and midwives played a critical role in the pandemic response, as they are the backbone of the primary healthcare system in Tanzania. Their responsibilities extended from providing direct care to patients, including those with COVID-19, to delivering maternal and child health services amidst the crisis (Tani *et al*., 2023).

There is a significant gap in the literature regarding their experiences. While studies have explored the general impact of COVID-19 on healthcare systems and the experience of HCPs on preventive and control measures (Tani *et al.,* 2023), there is limited evidence on the COVID-19 experiences and specific challenges faced by nurses and midwives in Tanzania. This lack of research leaves critical questions unanswered about the experiences and perspectives of nurses and midwives and their unique care experiences during the pandemic in the country.

Consequently, the findings from this study are expected to fill the gap and generate evidence to inform healthcare managers and policymakers on how best can the nurses and midwives at the frontline be prepared and supported to fulfil their professional role amid a crisis like COVID-19 or similar future disease outbreaks. The findings also identify the specific support-technical and psychosocial- that they need to better respond to epidemics. Finally, the study findings uplifted the nurses and midwives, allowing them to share their reality and have their voices heard.

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Lessons drawn from nurses' and midwives' unique experiences facilitated the generation of recommendations on how to prepare the healthcare system during the crisis best and establish a safer environment to protect both the nurses and patients in similar situations.

## Methods

### *Design*

This qualitative descriptive design ( Doyle, 2020) was used to explore the experiences of nurses and midwives who worked in COVID-19-designated healthcare facilities. This design was appropriate to answer a broad question about the lived experiences of COVID-19 patients during care provision in designated facilities.

### *Settings*

The study was conducted across selected COVID-19-designated health facilities in Dar es Salaam, Pwani, and Shinyanga regions. These regions were chosen purposively based on several specific criteria. Firstly, the selection was guided by well-established and accessible COVID-19-designated facilities, which were crucial for ensuring that we could access and effectively study the nurses and midwives who were the key personnel in these facilities during the pandemic, particularly in the initial wave. Secondly, we aimed to triangulate our settings to encompass a range of contexts. Dar es Salaam represents an urban environment with high population density and advanced healthcare infrastructure.

Pwani is categorized as semi-urban, providing a middle-ground context with intermediate access to healthcare services and resources. Shinyanga, representing a rural setting, offers insights into healthcare challenges in less accessible and resource-constrained environments. This diversity allowed for a comprehensive exploration of the different experiences and responses to COVID-19 across varying healthcare contexts. Lastly, the selected regions were chosen due to their reported variable incidence of COVID-19 cases. This criterion ensured that the study addressed areas with high, median and low significant pandemic impact, allowing for a more robust examination of the healthcare response and challenges. By incorporating these diverse settings, we aimed to enhance the richness of our findings, capturing a broad spectrum of experiences and responses to the pandemic.

### *Study population, Sample size and sampling method*

The participants were purposefully selected from COVID-19-designated healthcare facilities, with two facilities from each region included. The inclusion criteria for selecting nurses and midwives were: (i) Professional role: Participants needed to be registered nurses, midwives, or individuals holding both qualifications. This criterion was intended to ensure a focus on professionals directly involved in patient care and management within COVID-19-designated facilities. The inclusion was not limited by the level of education or gender, allowing for a diverse representation of clinical experiences and perspectives; (ii) Experience in COVID-19 care designated facilities: Participants had to have practical experience working in facilities designated for COVID-19 care.

Specifically, they needed to directly provide clinical care to patients with COVID-19 or manage such cases. This criterion was essential to gather insights from individuals with firsthand experience in handling the complexities and challenges posed by the pandemic, thereby enriching the study's understanding of the healthcare response. These criteria were designed to ensure that the study captures relevant and comprehensive insights from those actively engaged in frontline COVID-19 care, reflecting a broad range of experiences and professional backgrounds.

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A minimum of five nurses and midwives were selected from each facility, comprising 20 participants. However, the principle of data saturation was used to determine the final sample size, as recommended by Faulkner and Trotter (Faulkner & Trotter, 2017). The sampling strategy considered variations in terms of gender, work experience, age, and professional qualifications to capture diverse experiences.

***Data collection tools***

Individual in-depth interviews (face-to-face or phone) were employed to collect data from nurses and midwives who worked in selected COVID-19-designated facilities. A semi-structured interview guide was developed through a peer review process involving experts at the School of Nursing and Midwifery (SONAM) and was used to guide the interviews. The English version of the interview guide was translated into Swahili, then back-translated to English, and conceptual equivalence was checked. A broad question in the interview guide asked to open the discussion was: *What was it like to be a nurse or midwife caring for confirmed or suspected cases of coronavirus patients in your facility*? This was followed by open-ended probing questions to understand better the nurses' and midwives' lived experiences.

***Recruitment of participants***

The nurses and midwives to be included in the study were recruited through facility managers of facilities designed for COVID-19 care. A list and contact information of nurses and midwives who had provided or previously provided direct care to suspected or confirmed cases of COVID-19 in the designated COVID-19 facilities were obtained. Initial phone contacts were made, and participants were provided information regarding the study before their consent was requested. All nurses and midwives contacted agreed to participate in the study, and the interviews were scheduled afterwards, considering time, location, and modality preferences.

***Data Collection***

Face-to-face interviews took place at a location and time chosen by the participants. Likewise, phone interviews occurred at the time preferred by the participants. Data were collected between June 2022 to August 2022. Before the interviews, participants were informed about the study's details, the risks, and the benefits of participating (outlined in an information sheet that was part of the interviews). Consent for the interview and voice recording was obtained in advance. Interviews were conducted with only those who provided verbal or written consent. Subsequently, approximately 30 to 60 minutes of interview sessions were conducted. For precautionary measures due to COVID-19 infection, all participants and research assistants who participated in face-to-face interviews were equipped with face masks and provided with hand sanitisers throughout the interview sessions.

***Data management and analysis***

All interview transcripts were securely stored and anonymized. The transcripts were provided with a code/anonymous ID that ensured no direct linkage to participant information, and the information was stored in password-protected Word files. Hard copies of interview transcripts, consent forms, and demographic information were stored in a locked cupboard at the Aga Khan University (AKU), Salama house in Tanzania. Data were only accessed by the investigators in the research team.

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Research reports and publications only included quotes without identifying information for study participants. Data is kept and will be destroyed after five years, following Tanzania's standards that guide research conduct.

Data were analyzed using Colaizzi's descriptive phenomenology approach, as described by Morrow, Rodriguez, and King (2015). This approach followed the key seven (7) steps in data analysis using the NVIVO software as follows: (i) *Familiarization,* where the research team familiarized themselves with the data by individually reading through all the participant accounts several times; (ii) *Identification of significant statements;* the research team identified all statements in the accounts that were directly relevant to the phenomenon under investigation; (iii) *Formulating meanings;* the research team identified meanings relevant to the phenomenon that arose from a careful consideration of the significant statements while bracketing our pre-understanding to be able to examine the phenomenon as experienced by the informants closely; (iv) *Clustering of themes:* the research team clustered the identified meanings into themes that were common across all accounts.

A consensus-building session on the emerging themes among the research team members followed this. A consensus-driven method was employed to address arising conflicts and to determine whether to incorporate themes that diverged from the pre-established themes or dismiss them if they were subjectively or objectively deemed non-critical to the study; (v) *Developing an exhaustive description;* the research team jointly wrote a full and inclusive description of the phenomenon, incorporating all the themes produced in step four and the consensus building session; (vi) *Producing the fundamental structure;* The research team worked together to condense the exhaustive description down to short, dense statements that captured just those aspects relevant to the investigated phenomenon; (vii) *Seeking verifications of the fundamental structure*; the research team returned the key findings to a subset of few participants (two in each region) to ask whether these captured their lived experiences.

A broad consensus emerged among participants that the lived experiences were adequately captured. Subsequently, the data in Nvivo were transferred to Microsoft Word for analysis and report generation.

## Results

### Participants' demographics

Most participants were from rural (60%) of the female gender (80%), married (80%), worked at a hospital-level COVID-19 designated centre (75%), and had 1-2 children (50%). Table 1 summarizes these demographics.

**Table 1: Participants Demographics**

| Category | Number | % |
|---|---|---|
| **Geography** | | |
| **Urban** | **8** | **40** |
| **Rural** | **12** | **60** |
| **Gender** | | |
| Male | **4** | **20** |
| Female | **16** | **80** |
| **Age** | | |
| 30-39 | **7** | **35** |
| 40-49 | **8** | **40** |
| >50 | **5** | **25** |
| **Marital Status** | | |

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| | | |
|---|---|---|
| Single | **1** | **5** |
| Married | **17** | **85** |
| Widow | **2** | **10** |
| **Level of Facility** | | |
| Hospital | **15** | **75** |
| Health Centre | **5** | **25** |
| **Number of Children** | | |
| None | **1** | **5** |
| 1-2 | **10** | **50** |
| 3-4 | **9** | **45** |
| **Level of nursing license** | | |
| Enrolled Nurse | **7** | **35** |
| Registered Nurse | **13** | **65** |
| **Educational Qualification** | | |
| Certificate | **7** | **35** |
| Diploma | **8** | **40** |
| Bachelor's degree | **5** | **25** |

**Overview of the findings**

About four (4) key themes that emerged from the data analysis. These included (i) Nurses' and Midwives' understanding of COVID-19, (ii) COVID-19 Patient care practices, (iii) challenges and lessons from offering COVID-19 care, and (iv) suggestions for improvement of preparedness to respond to pandemics. Each of these themes is examined in detail below.

**Theme 1: Nurses' and Midwives' Understanding of COVID-19**

***Understanding of COVID-19 transmission, prevention and treatment***

There was a broad consensus among nurses and midwives in both urban and rural healthcare facilities that COVID-19 is a viral infection transmitted through the airways, particularly by sneezing or coughing and presenting with various symptoms including fever, body ache, headache, runny nose, loss of appetite and problems with breathing depending on individual factor.

While few nurses and midwives linked COVID-19 to its origin in Europe in 2019 and Arusha in 2020 (a tourist destination in Tanzania), many agreed that it originated in China in 2019. Prevention measures included handwashing/sanitization, social distancing, face masks, and vaccination.

The risk factors for severe COVID-19 infection cited by most nurses and midwives included low immunity, old age, and chronic infections. There was a consensus among many nurses that COVID-19 has no definitive treatment; instead, supportive and symptomatic treatment, including immune boosters, Antibiotics and Oxygen therapy, depending on the severity, emerged among some nurses. COVID-19 vaccine as a preventive measure emerged in the description of some nurses/midwives. Some nurses commented:

> *Corona is a viral infection that originated in China, and it can be transmitted through air drops when sneezing, coughing, or talking. Things that put someone at risk of a severe infection include having chronic diseases for example, diabetes, HIV, hypertension, and old age (Nurse/Midwife, Urban Hospital)*

> *There is no cure for COVID-19, but management depends on the severity of the disease because if one has a runny nose or cough, one manages the symptoms. If one has a cough, you give antibiotics, and if someone has difficulty breathing, you give Oxygen (Nurse/Midwife, Rural Hospital)*

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***Understanding of services needed by COVID-19 patients.***

The nursing and midwifery services needed by COVID-19 patients were threefold. First, *isolation from patients* suffering from non-COVID-19 infections. Some nurses indicated that nurses were responsible for moving patients to designated COVID1-19 rooms. Second, *offering general support services* for patients admitted to the wards. These included ensuring that patients take their prescribed medications promptly, providing assistance with feeding, giving oxygen therapy if needed, and checking and closely monitoring patient vitals.

Washing and turning to avoid bed sores (unconscious and seriously ill), assistance with simple exercises, and changing clothes and bedsheets. Third and final, *counselling, psychological support and health education* to patients themselves, their families, and friends. Health education was also cited as being conducted in the patient waiting areas and communities. Some nurses commented:

> *A nurse is responsible for giving oxygen and other medications prescribed by doctors, changing the sleeping position, assistance with feeding and exercises and counselling and health education on preventive measures (Nurse/Midwife, Rural Hospital)*

> *A COVID-19 patient needs close monitoring because the situation may change anytime. So, the nurse needs to be close to monitor vitals, give medication, and provide psychological support because most who are dying are those with stress, and counselling helped a lot (Nurse/Midwife, Semi-urban Hospital)*

**Theme 2: COVID-19 Patient CarePractices**

***Criteria for being selected to offer care to COVID-19 patients.***

When COVID-19 designated centres were established in the country, some nurses and midwives were specifically selected to work there. Also, there was a broad consensus that most nurses and midwives feared caring for COVID-19 patients as it was a novel disease, and they had limited information. They feared taking the disease back home, and there were challenges with access to personal protective equipment (PPEs). We asked participants about why they were selected to join COVID-19 care teams.

Although few indicated being chosen just because they are nurses or midwives and have to offer care to any patient, the main reasons cited by many nurses and midwives were three. The first reason was a nurse or midwife who met the Ministry of Health's directives. Some indicated that the Ministry of Health stipulated directives on who should join COVID-19 care teams, including health nurses and midwives, not pregnant or breastfeeding, and not having chronic diseases such as Diabetes and Hypertension. The second reason was performing nursing or midwifery leadership roles or being members of pre-existing disaster response teams.

Some nursing and midwifery service leaders indicated being 'automatically selected' to coordinate nursing care services for COVID-19 patients because they are leaders. Some reported being selected because they have been members of facility district or regional disaster response teams. The third reason was having adequate work experience, particularly those engaged in hospital intensive care services. One nurse/midwife in a rural Hospital affirmed being selected because she has 10 years of work experience in the emergency care unit and intensive care department. For instance, citing the criteria for selection established by the Ministry of Health, one nurse commented:

> *There were directives from the Ministry that health care providers who are healthier and have no medical problems, for example, not being too old, pregnant, and not breastfeeding because they are required to take care of their children, and we worked in centres without*

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*going home for a long time. Also, people with no chronic diseases such as Diabetes, hypertension, and other diseases were selected (Nurse/Midwife, Rural Health Centre)*

***What a day looked like in a COVID-19 care facility.***

Daily responsibilities performed by nurses and midwives in COVID-19 care centres ranged from routine nursing and midwifery care, specialized care, documentation, and reporting to leadership duties, depending on whether one performs clinical nursing and midwifery duties or coordination and leadership roles.

On the one hand, a day for a clinical nurse involved handing over a report from a nurse who just finished the shift, quickly inspecting the needs of each patient, taking oxygen saturation measures and vital signs, checking the availability of medical supplies and functionality of equipment (oxygen tanks), giving prescribed medications timely, receiving food from family members and assisting with feeding, cleaning the patient, monitoring vital signs and maintaining hygienic environment through cleaning. The day also involved the preparation of dead bodies for them to be sent to the mortuary when death occurs.

A day for coordinators and nursing and midwifery leaders involved checking the number of patients and their health status, including deaths, checking available medical supplies and the deficit, roster planning, and ensuring each shift has a nurse and midwife available, bearing on standby for support when needed and communicating and reporting to higher authorities. Some of these can be seen in the following quotes:

*Upon changing the shift in the morning, I clean the room with my peers. Then, I would check each patient's vital signs, oxygen saturation, and temperature and give the prescribed medications. When the family members bring tea or food, I will receive it and take it to the patients and assist with feeding because family members were not allowed in. I would draw samples and send them where needed if an investigation is needed. These were some of my responsibilities before I handed over a shift to another nurse (Nurse/Midwife, Rural Health Centre)*

*In the morning, you must check how many COVID-19 patients there are, if there is any death, their progress, and whether they received medications. You check whether there is Oxygen and whether patients receive the correct dose. I checked the ledger for medical supplies used and what was missing. Afterwards, the doctor comes, and you review every patient together; then, I continue with other non-COVID-19 duties. Before leaving for home, I go there to check what happened, and if there is any challenge, I find a solution and report it to my supervisors. (Nurse/Midwife leader, Rural Hospital)*

***Preparedness for COVID-19 Patient care***

Most nurses and midwives described caring for 50 -100 patients on average during the COVID-19 pandemic, depending on the facility level. Urban and hospital facilities received more patients and deaths than rural health centres.

However, we asked them how they prepared to offer care to COVID-19 patients. Opposing responses emerged regarding training among nurses selected to work in COVID-19 care facilities. Almost half of the nurses and midwives affirmed being weekly prepared to offer care to COVID-19 patients. Some nurses and midwives used phrases such as 'we were just selected' or 'we were just chosen' when describing non-preparedness.

Descriptions of being selected to work in COVID-19 without relevant information or training dominated in both urban and rural settings. On the contrary, some nurses and midwives (particularly leaders) affirmed receiving or the existence of online/distance learning training on how to care for COVID-19 patients. However, they have not specifically focused on the pandemic.

Some cited a three-day training organized by the region, and some cited on-the-job training mainly from senior and experienced doctors. Some indicated reliance on information from social media, radio, and other intra-facility discussions and meetings. However, even those who affirmed receiving training regarded them as inadequate. A participant commented:

> *Honestly, we were not prepared…we were just selected without a choice that 'you go to work in Covid-19 care'. It was up to you to explain why you should not go, but I had no sound reason. Nevertheless, we had no education or preparation for what to do once we reached there. We just found ourselves there, and we were just lucky that there were experienced doctors who were instructing us what to do (Nurse/Midwife, Rural Health Centre)*

Furthermore, we asked about the support they receive from supervisors and employers, family, and communities. A consensus was that they received no tangible support from supervisors and employers after being appointed to serve in COVID-19 care centres. Some indicated receiving 'instructions' on what to do, and a few indicated receiving a meal (lunch) from employers and nothing else. All nurses indicated they received no special allowances, incentives, or treatment besides medical equipment such as oxygen tanks and PPEs. One indicated receiving encouragement and promises of allowance from the district manager, but the promises were not fulfilled even after writing a request letter as instructed. Few indicated receiving words of encouragement from family and community members.

Some indicated receiving no support from both family and community members. One nurse indicated that even her children were afraid of her because she was dealing directly with COVID-19 patients. The community members were described as being afraid of getting diseases from nurses who care for COVID-19 patients. This suggests that nurses who care for COVID-19 patients may have faced stigma in some communities. One participant commented:

> *The employer initially offered us food for those working at the COVID-19 care centres, but we received nothing else. Family members encouraged me because we used to tell them stories of deaths when we went home. So, they encouraged us and insisted on protecting ourselves from getting the disease. The community did not support us because they were shocked and afraid of getting the disease from us. In short, they were very afraid of us' (Nurse/Midwife, Rural Health Centre)*

***Memorable experiences when caring for COVID-19 patients.***

Most nurses described both negative and positive experiences in COVID-19 care facilities. On the one hand, negative experiences that were dominant in nurses' descriptions included (i) stigmatization *and abandonment of COVID-19 patients by family* members rooted in fears of infection.

A nurse in a rural hospital described a tendency of family members to 'run away' from patients, leaving the burden of carrying the patient and care to nurses. Some indicated fear of taking the patient home after getting relief because of fear of infection; (ii) *witnessing patients dying from COVID-19*. Some nurses described negative experiences associated with witnessing a person struggling with life to death on oxygen without knowing what to do to help relieve the struggles.

Some discussed negative experiences of witnessing multiple deaths in one day, with some describing experiences of witnessing the death of fellow HCPs from COVID-19. Another nurse described witnessing the unforgettable death of two HCWs 'in her hand' while on duty; (iii) *experiences of getting infected by COVID-19 due to failure to adhere to protective measures*. Few nurses described suffering from COVID-19 after forgetting to put on a face mask or washing their hands when or after taking care of a COVID-19 patient offering care, and (iv) although most nurses expressed thankfulness with the availability of PPEs, some described experiences of stock out of other essential medical supplies/equipment.

For example, some nurses described their experience of running out of oxygen concentrators with patients struggling without any support (detailed in challenges). On the other hand, positive experiences included *witnessing very sick patients getting well*. Some nurses described rewarding experiences of assisting patients who were seriously sick to recover from COVID-19. One nurse narrated the experience of having lost faith in recovery for one adult patient who later recovered after massive efforts, including sleepless nights of offering care. Some participants commented:

> *There were some heartbreaking events. Family members were abandoning patients at the hospital. Even when you inform them that s/he has a relief and need to go home, they refuse to come the pick them up because of fear" (Nurse/Midwife, Rural Health Centre)*

> *One event that I will never forget is when we got three deaths in a single day. I was preparing a dead patient, but suddenly, a patient who was speaking to me a while ago changed his condition and died. I still have these images in my head (Nurse/Midwife, Semi-urban Hospital)*

**Theme 3: Challenges and lessons from offering COVID-19 care.**

***Challenges encountered in COVID-19 care***

There was a broad consensus on the availability of PPEs, including gowns, boots, aprons, gloves, face masks, hand sanitisers and handwashing facilities in COVID-19 care centres mainly due to the support of many stakeholders. While some indicated facing no major challenges, some cited several health system and personal challenges. A common health system challenge in rural and urban centres was an *inadequate supply of oxygen concentrators*. Stock out of oxygen tanks was largely linked to many patients, creating congestion in COVID-19 care centres. Another health system challenge was the *inadequate health workforce* compared to the number of patients. This was partly linked to strict criteria used in selecting nurses to work in COVID-19 centres, excluding those with pre-existing conditions, pregnant and old age.

Other health system challenges were inadequate support from the management and the absence of allowance or other incentives for nurses working in COVID-19 centres. A final health system challenge *was the inadequate preparedness of regions, districts, and facilities* for COVID-19 response regarding technical capacity and resources, resulting in reliance on development partners. Personal challenges included unpreparedness and fears of infection, burnout, and exhaustion because of overworking (up to 12 hours a day) and feeling uncomfortable with PPEs such as face masks and gowns (suffocation and sweating). Personal challenges extended to patients were described as harsh and stigmatized by nurses. A participant described a tendency of patients to think that they are being stigmatized when nurses and midwives take precautions when taking care.

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Some nurses and midwives commented:

> *I faced burnout because of an inadequate supply of oxygen tanks. A patient comes with an oxygen saturation of 50 or 70; he is struggling, sweating, and shouting for help until he dies. You know you need to give oxygen, but no oxygen concentrators exist. This was very painful, and I will not forget it (Nurse/Midwife, Rural Hospital)*

> *My challenge was putting on PPEs, such as the gown, for a prolonged time. It was so suffocating. There is a gown that covers the whole body, and you add a face mask... after 20-30 minutes, you start sweating profusely, and you start facing problems with breathing (Nurse/Midwife, Rural Hospital)*

***Key lessons from offering COVID-19 care.***

Key lessons learnt from offering care to COVID-19 patients were closely related to the challenges encountered. For instance, a lesson that there is a need for disaster preparedness among nurses, midwives, and healthcare facilities. Preparedness was envisaged from the perspective of adequate training and resources, including human resources, medical supplies, and equipment. Another nurse described learning that pandemics and outbreaks require timely decision-making among healthcare leaders and HCPs so that patients receive timely care.

Given the experiences of witnessing HCPs dying from the disease, some nurses indicated learning about the need to adhere to infection prevention and control measures and standard operating procedures (SOPs) when offering nursing and midwifery care to patients. A nurse in a rural facility indicated that not taking things for granted or offering care without adhering to SOPs was a key learning from the pandemic. One nurse suggested that COVID-19 has strengthened the actions of disaster response and emergency teams and that response plans have been developed to be useful in future responses. A participant commented:

> *We learnt how to plan the response... disaster and emergency response teams have been strengthened through dealing with COVID-19; we now know what is needed, and we are now well-positioned to respond to future disasters (Nurse/Midwife, Urban Hospital)*

**Theme 4: Suggestions for improving the preparedness for future pandemic/disaster response.**

The sessions fell into three groups when asked about what could be done to improve preparedness for future pandemic responses. The first group is the health system strengthening, which includes improving the availability of resources. The dominant resources cited were medicines, medical equipment, PPEs, funds, and HCPs. PPEs emerged as particularly important as there were affirmations of nurses using facemasks for more than the recommended duration, for instance, 'more than two days' or using personal funds to purchase them (Nurse/Midwife, Rural Health Centre).

Rural participants indicated the absence of a specific building for emergencies and, therefore, recommended the construction of an emergency department. The need to strengthen existing disaster response teams at the facility, districts, and regions was cited, with an emphasis on technical capacity, composition, medical supplies, and financial resources. The second group involves building the capacity of nurses and other HCPs to respond to pandemics.

A dominant suggestion was to train HCPs through specific training on pandemics, on-the-job training, and continuous professional development on common pandemics. One participant suggested developing a special disaster response curriculum to be delivered in nursing schools and on the job.

There was also a suggestion for risk allowance for nurses and other providers who offer care to victims of pandemics. This was made amidst widespread concerns about not receiving any allowance when offering care to COVID-19 patients.

The third and final group was strengthening the preparedness of the communities. A dominant suggestion was continued community education on pandemics and disasters and what to do in case such events occur through multiple platforms with a greater focus on rural villages. Some participants commented:

> *There is a need to educate healthcare providers about disease outbreaks and ensure the availability of medical supplies, especially PPEs. It reached a point where we were putting on masks for more than two days as there were times when they were unavailable, or sometimes you had to use personal funds to buy them. The government needs to ensure there is money to buy an adequate quantity of PPEs, medical equipment, and supplies (Nurse/Midwife, Rural Hospital)*

> *They need to consider the risks we are facing. When I offer care, they must remember that I have a family and am usually here at the centre. The Government must realize that we risk our lives to offer care to community members. Therefore, risk allowance needs to be provided (Nurse/Midwife, Urban Hospital)*

> *To be honest, the community has inadequate education on disasters and epidemics. There is a need to continue educating the community through Radio, Television, newspapers, and even social media. They need to be educated on what to do, for example, putting on a face mask, washing their hands, etc. A focus should be on the rural villages where most still believe the disease [COVDI-19] only affects people in urban areas (Nurse/Midwife, Rural Hospital)*

## Discussion

The current study explored the lived experiences of nurses and midwives providing care in COVID-19-designated healthcare facilities in Tanzania's Shinyanga, Dar es Salaam, and Pwani regions. Participants included healthcare professionals (HCPs) from rural and urban settings, with a majority being female. This aligns with a systematic review of 46 qualitative studies that found female dominance among HCPs and patients during the COVID-19 pandemic (Billings *et al*., 2021). This highlights the crucial role female HCPs played during the pandemic and the predominance of women in the nursing and midwifery professions.

Our study reveals that nurses and midwives demonstrated commendable knowledge about COVID-19, which is consistent with findings from studies in Africa and other countries that also reported adequate understanding of transmission, symptoms, and preventive measures such as hand hygiene, social distancing, and PPE use (Adejumo *et al*., 2021; Jemal *et al*., 2021; Aryan & Ahmad, 2022; Panda *et al*., 2023). However, some participants incorrectly believed in the efficacy of immune boosters for treatment, which contradicts WHO guidelines due to insufficient evidence supporting their effectiveness (WHO, 2019).

While this study aligns with research from India and Ethiopia, showing satisfactory knowledge among healthcare professionals (Jemal *et al.,* 2021), it also highlights persistent gaps in understanding disease management. These findings underscore the importance of continuous education and updates on evidence-based COVID-19 guidelines to ensure that healthcare professionals have the most current knowledge for optimal patient care.

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An emphasis needs to be placed on implementing regular training sessions for healthcare workers to update their knowledge of emerging evidence and guidelines and developing and enforcing protocols based on the latest evidence to address misconceptions, such as the use of immune boosters.

Therefore, we recommend regularly revising and disseminating updated guidelines to healthcare professionals to reflect the latest research and best practices, establish mechanisms to monitor adherence to guidelines, and address any knowledge gaps identified in healthcare settings. These recommendations aim to enhance preparedness and response capabilities in future pandemics and ensure that healthcare practices remain aligned with current scientific evidence.

Several studies globally have underscored the multifaceted roles of nurses and midwives as frontline healthcare professionals (Küçüktürkmen et al., 2022; George et al., 2021; Clari et al., 2021; Fawaz et al., 2020; Bradfield *et al*., 2021; Bolina et al., 2020; Tani *et al*., 2023). Our findings align with these studies, revealing that their roles encompass three critical domains. The first domain involves patient isolation, which is crucial for minimizing cross-infection. Nurses and midwives have been pivotal in managing patient transfers to COVID-19 isolation areas, a role highlighted in previous research in other countries (Küçüktürkmen et al., 2022; George et al., 2021). This underscores their essential function in the initial management of COVID-19 cases and highlights the ongoing support needed to bolster their resilience in practice.

The second domain covers comprehensive support within hospital wards, including medication administration, oxygen therapy, and vital sign monitoring. This study confirms findings from earlier research (George et al., 2021; Bradfield *et al*., 2021), which shows that nurses and midwives extended their roles to provide holistic care, such as skincare and physical exercises, demonstrating their broader impact beyond mere medical interventions. The third domain focuses on psychological and educational support. Our research found that nurses and midwives provided vital counselling and health education, extending their efforts to waiting for areas and communities, unlike some previous studies (George et al., 2021; Bradfield *et al*., 2021).

This highlights a significant aspect of their role in addressing anxiety and information deficits among patients and their families, emphasizing the importance of community outreach during the pandemic. These findings underscore the need for robust support systems for nurses and midwives to enhance their resilience and effectiveness in managing pandemics. Recognizing and supporting their diverse roles in patient care, including isolation, comprehensive ward support, and community education, is essential. This could be achieved through regularly updating the training programs to address the evolving needs of nurses and midwives in patient management and community outreach and developing support systems to help healthcare professionals cope with the psychological and physical demands of the pandemic response.

We, therefore, recommend ensuring adequate resources and support are allocated to nursing and midwifery services to strengthen their roles during crises and incorporating comprehensive support roles into pandemic preparedness guidelines to ensure a holistic approach to healthcare delivery. These recommendations aim to strengthen nurses' and midwives' preparedness and response capabilities, ensuring they are well-supported in managing the multifaceted challenges of future pandemics.

Participants in our study reported that the selection of nurses and midwives for COVID-19 designated centres was primarily guided by Ministry of Health directives. Selection criteria included health status (free from chronic diseases such as hypertension and diabetes), years of work experience, leadership roles, disaster management experience, and critical care background.

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This approach, which excluded vulnerable groups like pregnant, breastfeeding, and older healthcare professionals due to higher infection risks, is consistent with previous studies that highlight similar criteria for selecting healthcare workers (Fawaz et al., 2020; Aksoy & Koçak, 2020; Jackson *et al*., 2020; Han *et al*., 2023).

Most participants expressed significant fear of contracting COVID-19 and transmitting it to their families, a concern echoed in other studies (George et al., 2021; Clari *et al*., 2021; Jackson *et al*., 2020; Afshan *et al*., 2022). This fear was exacerbated by a lack of prior preparation, contrasting with recommendations by Shahil Feroz *et al*. (2021), emphasising the importance of training and preparedness for effective care provision. Only a few participants were positive about the opportunity to serve (Bradfield *et al*., 2021).

As noted in similar research (Fawaz et al., 2020; Han et al., 2023), the lack of preparatory training and the assumption that selected HCPs were fully prepared and willing may have negatively impacted patient care and worker morale. These findings underscore the critical need for comprehensive training and preparation for healthcare workers selected for pandemic response roles. Assumptions about their readiness and willingness, without adequate support, can undermine both patient care and worker safety.

Implementing robust training programs to prepare healthcare workers for pandemic situations is recommended. These programs should address clinical skills and psychological preparedness and allow healthcare professionals to volunteer for pandemic roles to ensure their willingness and readiness, enhancing their effectiveness and well-being.

Comprehensive preparatory protocols, including health assessments and readiness evaluations, must also be developed and mandated for healthcare workers assigned to pandemic response roles. The health sector must establish support systems to address healthcare workers' psychological and familial concerns, ensuring they are adequately prepared and supported before deployment. These measures aim to improve healthcare professionals' selection process and preparedness, enhancing their ability to provide effective care during pandemics.

Our research illuminates the diverse and multifaceted roles of clinical nurses and midwives in COVID-19 care facilities, encompassing direct patient care and supervisory/administrative duties. Key direct care responsibilities included conducting needs assessments, monitoring vital signs, administering medication, ensuring patient well-being, assisting with daily activities, and maintaining cleanliness.

Unlike other studies that focused primarily on these core roles (Billings *et al*., 2021; Bolina, Bomfim & Lopes-Júnior, 2020; Hosseini Moghaddam, Mohebbi & Tehranineshat, 2022; González-Timoneda *et al.,* 2021), our findings also revealed that nurses and midwives were involved in post-mortem care and body transfers—tasks that many found particularly challenging and uncomfortable. In their supervisory and administrative capacities, they coordinated patient care, compiled reports, tracked patient progress, documented incidents, addressed patient deaths, managed medical supplies, and ensured the functionality of critical equipment, consistent with previous studies (Clari *et al.,* 2021; Bolina et al., 2020).

These findings highlight the comprehensive and often uncomfortable nature of roles undertaken by nurses and midwives, which extends beyond what has been reported in other research. Including post-mortem care and body transfers underscores the need for targeted support and training for these challenging aspects of care. The diverse responsibilities affirm the critical role of nurses and midwives in managing both patient care and operational aspects of disaster response.

We, therefore, recommend implementing specialized training programs that include handling challenging tasks such as post-mortem care and body transfers to better prepare nurses and midwives for these roles and providing robust emotional and psychological support services to help healthcare workers manage the stress associated with their comprehensive roles.

There is a need to clearly define and support the diverse roles of nurses and midwives in disaster response, ensuring they receive adequate training and resources for all aspects of their responsibilities and ensuring sufficient resources and support systems are in place to address the physical and emotional demands of healthcare professionals during pandemics and other emergencies. These measures aim to enhance the preparedness and support for healthcare professionals, ensuring they are equipped to manage the full spectrum of responsibilities during future public health crises.

Our study revealed mixed responses regarding preparedness among healthcare professionals (HCPs) for COVID-19 patients. Approximately half of the participants felt unprepared, expressing sentiments of being "just selected" or "just chosen," indicating a lack of organization and readiness in COVID-19 patient care. This finding contrasts with a survey of nursing homes in the USA, where almost all nurses and midwives reported being well-prepared for COVID-19 patient care (Quigley *et al*., 2020). However, nurses with less than five years of experience or lower educational attainment in China felt less prepared (Han *et al*., 2023).

Some nurses and midwives in this study, particularly leaders, mentioned receiving online or distance learning training on COVID-19 patient care, though they found it insufficient. Others cited short training sessions organized by health authorities or on-the-job training from experienced doctors, yet still felt unprepared. Additionally, some HCPs sought information from informal sources like social media and intra-facility discussions. While these sources may offer some knowledge, they cannot replace structured, evidence-based training programs.

The lack of preparedness may impact the quality of care and HCPs' safety, affecting confidence, competence, and patient outcomes (Isangula *et al*., 2023). These findings align with a meta-synthesis involving 46 qualitative studies on frontline HCPs' experiences during pandemics, highlighting critical issues in preparedness, support, and social challenges faced during the COVID-19 pandemic ( Billings *et al*., 2021). This may partly explain why Shahil Feroz *et al*.( (2021) consider proactive measures as essential to support and protect HCPs during public health crises like COVID-19, enabling them to cope and provide quality care.

The experiences of nurses and midwives caring for COVID-19 patients in our study reflected a blend of positive and negative aspects, consistent with findings from various studies. Positive experiences included witnessing critically ill patients recover and being discharged, which were rewarding and motivating for the healthcare workers. They also valued the experience gained, which allowed them to extend care to their families and communities. Similar positive sentiments have been reported in other studies (Fawaz et al., 2020; Bradfield *et al*., 2021; Jackson *et al*., 2020; Ahmadidarrehsima *et al*., 2022), indicating a shared sense of fulfilment across different settings. This aligns with Clari *et al*. (2021), highlighting that nurses and midwives remain committed to achieving positive health outcomes for their patients despite the challenges.

Additionally, some healthcare workers expressed increased confidence in managing COVID-19, reflecting the learning opportunities presented by the pandemic (Aksoy & Koçak, 2020). Conversely, negative experiences included dealing with patient stigmatization and abandonment, which exacerbated emotional distress.

Witnessing patients suffer without adequate resources contributed to significant psychological strain, aligning with findings from other studies in low- and middle-income countries (Bolina, Bomfim & Lopes-Júnior, 2020; González-Timoneda *et al.,* 2021; Yörük & Güler, 2021).

Midwives, in particular, reported heightened fear, anxiety, and loneliness while caring for pregnant women with COVID-19, revealing gaps in emotional and psychosocial support. This correlates with reports of depression among nurses and midwives involved in COVID-19 care (Yörük & Güler, 2021). These mixed experiences underline the critical need for comprehensive support systems for healthcare workers.

Positive outcomes should be leveraged to bolster confidence and commitment while addressing the negative experiences is crucial for maintaining mental well-being and ensuring effective care. We, therefore, recommend implementing robust mental health and emotional support programs for healthcare professionals to manage stress and prevent burnout and developing training that includes psychological support and coping strategies to prepare healthcare workers for the emotional challenges of pandemic care.

There is also a need to establish policies integrating psychological support into the healthcare response, addressing both the emotional needs of healthcare workers and patients and developing initiatives to mitigate stigma and support patients and their families, reducing the emotional burden on healthcare professionals and improving overall care quality. These recommendations aim to enhance the resilience and effectiveness of healthcare workers during pandemics, ensuring that they are supported professionally and emotionally.

The COVID-19 pandemic has underscored various challenges in global healthcare systems, emphasizing the necessity of preparedness and responsiveness to manage infectious disease outbreaks effectively. Challenges faced by HCPs during the COVID-19 pandemic include insufficient PPE supply in Indonesia (Setiawan & Fitrianto, 2021) and oxygen shortages in Nepal (Bhatt *et al*., 2021). Common personal challenges include long working hours, burnout, exhaustion (De Leo *et al*., 2021; Youssef *et al*., 2022), fear of infection, and inadequate preparedness (Parthasarathy & Murthy, 2021; Hawari *et al*., 2021; De Kock *et al*., 2021).

However, the diverse challenges HCPs face are often influenced by local contexts and healthcare systems. Chen *et al*. (2022) noted inadequate training in China, while Greenberg *et al*. (2020) highlighted communication issues in the UK. Despite variations, challenges appear consistent, and they emphasize the need for preparedness, resource allocation, and effective communication from healthcare authorities to support HCPs and enhance patient care quality (Lamberti-Castronuovo *et al*., 2022).

Numerous studies have examined lessons learned from caring for COVID-19 patients, highlighting critical aspects such as disaster preparedness, infection prevention, and healthcare system adaptability (Lamberti-Castronuovo *et al*., 2022; Ezzati et al., 2023; Liu & Liu, 2020; Hick *et al*., 2020). Research conducted in Italy and the United States emphasized the importance of disaster preparedness in ensuring healthcare professionals' safety and effective response to outbreaks (Lamberti-Castronuovo *et al.,* 2022; Liu & Liu, 2020; Hick *et al*., 2020; Kaye *et al.*, 2021). Similarly, studies from China highlighted the significance of infection prevention strategies in reducing virus transmission (Yang *et al*., 2020; Yang *et al.*, 2021).

Moreover, the pandemic underscored the need for healthcare systems to be flexible and adaptive to respond promptly to evolving circumstances and surges in patient numbers (Wyatt *et al*., 2021; Flynn *et al*., 2020; Henry Akintobi *et al*., 2020). Lessons learned from caring for COVID-19 patients are essential for policymakers and healthcare professionals in developing effective strategies for future pandemics. Additionally, studies have identified gaps in global pandemic preparedness,

emphasizing the importance of health system strengthening, healthcare worker capacity building, community engagement, and financial incentives (Jackson *et al*., 2020; Shahil Feroz *et al*., 2021; Isangula *et al.,* 2023).

Strengthening health systems, enhancing healthcare worker training, fostering community resilience, and providing financial incentives are crucial components of pandemic preparedness and disaster response efforts (Tumpey et al., 2019; Joo & Liu, 2021). For example, Joo & Liu (2021) suggested providing continuous education and training to healthcare professionals on emerging infectious diseases and pandemic preparedness, while Billings *et al*. (2021) and Shahil Feroz *et al*. (2021) emphasized the importance of risk allowances for healthcare professionals to encourage them to work in high-risk environments.

However, further exploration and consideration are needed before implementing such measures. Ultimately, the lessons learned from caring for COVID-19 patients offer valuable insights into effective pandemic and outbreak management, highlighting the need for proactive measures and ongoing improvements in healthcare systems globally to enhance preparedness and response capabilities for future pandemics and outbreaks.

***Limitations***

This study has several limitations. Firstly, the findings are presented when the global and Tanzanian burden of COVID-19 has decreased, potentially affecting their immediate applicability. However, we argue that these findings remain relevant for informing future pandemic responses, especially for frontline healthcare workers. Secondly, we focused solely on nurses and midwives, although other healthcare professionals were involved in COVID-19 care.

While this focus aligns with our institution's primary scope, the insights gained may have broader implications across the healthcare sector. Thirdly, our study targeted COVID-19-designated facilities, overlooking interactions with multidisciplinary teams in various healthcare settings before patients reached these facilities. Exploring experiences among diverse healthcare providers in different clinical settings could yield additional insights. Fourth, this study was conducted by healthcare workers, including a doctor and two nurses, actively involved in clinical responses during the COVID-19 pandemic.

Their professional experiences may have shaped the selection and interpretation of themes during the thematic analysis. As practitioners on the front lines, their proximity to the subject matter could have introduced both conscious and unconscious biases, potentially influencing the emphasis placed on certain themes, such as the pandemic's emotional toll or resource scarcity challenges. While their insider perspective provides valuable context and depth, it also necessitates a reflexive approach to ensure their personal experiences do not overshadow the broader findings.

To mitigate this, we engaged in regular reflexive discussions throughout the analysis process, critically examining how our roles as healthcare providers may have influenced our interpretation of the data. Despite these limitations, as the first study examining the lived experiences of nurses and midwives in Tanzanian COVID-19 care, we believe our findings could offer valuable insights applicable to diverse clinical contexts. Future research could broaden its scope beyond designated pandemic facilities to encompass broader healthcare settings.

***Conclusion***

In conclusion, our findings highlight the need for health system strengthening, capacity building for healthcare professionals, and community engagement as critical components of pandemic preparedness and disaster response.

Governments, public health organizations, and healthcare institutions must collaborate to implement proactive measures to enhance pandemic preparedness and disaster response. These findings may serve as a foundation for policy and practice improvements in healthcare systems to better prepare for future public health crises.

## Declarations

***Ethics approval and consent to participate.***

The study received ethics clearance from the Aga Khan University Ethics and Review Committee and the National Institute for Medical Research (Certificate No: NIMR/HQ/R.8a/Vol. IX/3748), local approval from the regional and municipal medical officers in Dar Es Salaam, Pwani and Shinyanga.

***Data Availability Statement***

The data that support the findings of this study are available from the School of Nursing and Midwifery at Aga Khan University. However, restrictions apply to the availability of these data under the current study, and so are not publicly available. Data are, however, available from the corresponding author upon reasonable request and with permission of the School of Nursing and Midwifery at the Aga Khan University.

***Conflict of interest***

None declared.

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***Author contribution***

K.I. participated in the study design and fund application and developed the initial draft of the manuscript. L.K. and L.M. participated in the data collection and management. All authors critically reviewed the manuscript and provided input for improvement.

## References

Adams, J.G., & Walls, R.M. (2020). Supporting the Health Care Workforce During the COVID-19 Global Epidemic. *JAMA,* 323(15), 1439-1440. https://doi.org/10.1001/jama.2020.3972

Adejumo, O.A., Ogundele, O.A., Madubuko, C.R., Oluwafemi, R.O., Okoye, O.C et al.(2021). Perceptions of the COVID-19 vaccine and willingness to receive vaccination among health workers in Nigeria. *Osong Public Health Res Perspect,* 12(4):236-243. https://doi.org/10.24171/j.phrp.2021.0023

Afshan, G., Ahmed, F., Answer, N., Shahid, S., Khuhro, M.A. (2022). COVID-19 stress and wellbeing: A phenomenological qualitative study of Pakistani Medical Doctors. *Front Psychol*, 13:920192. https://doi.org/10.3389/fpsyg.2022.920192.

Ahmadidarrehsima, S., Salari, N., Dastyar, N., Rafati, F.(2022). Exploring the experiences of nurses caring for patients with COVID-19: a qualitative study in Iran. *BMC Nurs,* 21(1):16. https://doi.org/10.1186/s12912-022-00805-5

Aksoy, Y.E., Koçak, V. (2020). Psychological effects of nurses and midwives due to COVID-19 outbreak: The case of Turkey. *Arch Psychiatr Nurs*, 34(5):427-433. https://doi.org/10.1016/j.apnu.2020.07.011

Aryan, F., & Ahmad, M. (2022). Nursing knowledge and perceptions of COVID-19 pandemic in Jordanian intensive care units. *Applied nursing research : ANR*, *67*, 151628. https://doi.org/10.1016/j.apnr.2022.151628

Bhatt, A.S., Jering, K.S., Vaduganathan, M., Claggett, B.L., Cunningham, J.W., Rosenthal, N., Signorovitch, J., Thune, J.J., Vardeny, O., Solomon, S.D. (2021). Clinical Outcomes in Patients With Heart Failure Hospitalized With COVID-19. *JACC Heart Fail*, 9(1):65-73. https://doi.org/10.1016/j.jchf.2020.11.003

Billings, J., Ching, B.C.F., Gkofa, V *et al.* (2021). Experiences of frontline healthcare workers and their views about support during COVID-19 and previous pandemics: a systematic review and qualitative meta-synthesis. *BMC Health Serv Res,* 21, 923. https://doi.org/10.1186/s12913-021-06917-z

Bolina, A.F., Bomfim, E., Lopes-Júnior, L.C. (2020). Frontline Nursing Care: The COVID-19 Pandemic and the Brazilian Health System. *SAGE Open Nurs*, 6:2377960820963771. https://doi.org/10.1177/2377960820963771

Bradfield, Z., Wynter, K., Hauck, Y., Vasilevski, V., Kuliukas, L., Wilson, A.N., Szabo, R.A., Homer, C.S.E., Sweet, L.(2021). Experiences of receiving and providing maternity care during the COVID-19 pandemic in Australia: A five-cohort cross-sectional comparison. *PLoS One,* 16(3):e0248488. https://doi.org/10.1371/journal.pone.0248488

Chen, C., Haupert, S.R., Zimmermann, L., Shi, X., Fritsche, L.G., Mukherjee, B.(2022). Global Prevalence of Post-Coronavirus Disease 2019 (COVID-19) Condition or Long COVID: A Meta-Analysis and Systematic Review. *J Infect Dis,* 226(9):1593-1607. https://doi.org/10.1093/infdis/jiac136

Clari, M., Luciani, M., Conti, A., SciannameoM, V., Berchialla, P., Di Giulio, P., Campagna, S., Dimonte, V. (2021). The Impact of the COVID-19 Pandemic on Nursing Care: A Cross-Sectional Survey-Based Study. *J Pers Med,* 11(10):945. https://doi.org/10.3390/jpm11100945

De Kock, J.H., Latham, H.A., Leslie, S.J., Grindle, M., Munoz, S.A., Ellis, L., Polson, R., O'Malley, C.M. (2021).A rapid review of the impact of COVID-19 on the mental health of healthcare workers: implications for supporting psychological well-being. *BMC Public Health,* 21(1):104. https://doi.org/10.1186/s12889-020-10070-3

De Leo, A., Bayes, S., Butt, J., Bloxsome, D., Geraghty, S.(2021). Midwifery leaders' views on the factors considered crucial to implementing evidence-based practice in clinical areas. *Women Birth,* 34(1):22-29. https://doi.org/10.1016/j.wombi.2020.08.013

Doyle, L., McCabe, C., Keogh, B., Brady, A., & McCann, M. (2020). An overview of the qualitative descriptive design within nursing research. *Journal of research in nursing : JRN*, *25*(5), 443–455. https://doi.org/10.1177/1744987119880234

Ezzati, F., Mosadeghrad, A. M., & Jaafaripooyan, E. (2023). Resiliency of the Iranian healthcare facilities against the Covid-19 pandemic: challenges and solutions. *BMC health services research*, *23*(1), 207. https://doi.org/10.1186/s12913-023-09180-6

Faulkner, S.L., & Trotter, S.P. (2017). Data Saturation. *The International Encyclopedia of Communication Research Methods*, 1-2. https://doi.org/10.1002/9781118901731.iecrm0060

Fawaz, M., Anshasi, H., Samaha, A. (2020). Nurses at the Front Line of COVID-19: Roles, Responsibilities, Risks, and Rights. *Am J Trop Med Hyg*, 103(4):1341-1342. https://doi.org/10.4269/ajtmh.20-0650

Flynn, D., Moloney, E., Bhattarai, N., Scott, J., Breckons, M., Avery, L., Moy, N. (2020). COVID-19 pandemic in the United Kingdom. *Health Policy Technol,* 9(4):673-691. https://doi.org/10.1016/j.hlpt.2020.08.003

George, E.K., Weiseth, A., Edmonds, J.K. (2021). Roles and Experiences of Registered Nurses on Labor and Delivery Units in the United States During the COVID-19 Pandemic. *J Obstet Gynecol Neonatal Nurs,* 50(6):742-752. https://doi.org/10.1016/j.jogn.2021.08.096

González-Timoneda, A., Hernández Hernández, V., Pardo Moya, S., Alfaro Blazquez, R. (2021). Experiences and attitudes of midwives during the birth of a pregnant woman with COVID-19 infection: A qualitative study. *Women Birth,* 34(5):465-472. https://doi.org/10.1016/j.wombi.2020.12.001

Greenberg, N., Docherty, M., Gnanapragasam, S., & Wessely, S. (2020). Managing mental health challenges faced by healthcare workers during covid-19 pandemic. BMJ (Clinical research ed.), 368, m1211. https://doi.org/10.1136/bmj.m1211

Hamisi, N.M., Dai, B. & Ibrahim, M. (2023). Global Health Security amid COVID-19: Tanzanian government's response to the COVID-19 Pandemic. *BMC Public Health* **23**, 205. https://doi.org/10.1186/s12889-023-14991-7

Han, J., Liu, Y., Gu, F., Li, J., Wang, D., Zhang, Y., Tang, R., Zhang, L. (2023). Nurses' preparedness to respond to COVID-19 and associated factors after the outbreak in China. *Nurs Open*, 10(9):6320-6325. https://doi.org/10.1002/nop2.1879

Hawari, F.I., Obeidat, N.A., Dodin, Y.I., Albtoosh, A.S., Manasrah, R.M., Alaqeel, I.O., Mansour, A.H. (2021).The inevitability of Covid-19 related distress among healthcare workers: Findings from a low caseload country under lockdown. PLoS One. 2021 Apr 1;16(4):e0248741. https://doi.org/10.1371/journal.pone.0248741

Henry Akintobi, T., Jacobs, T., Sabbs, D., Holden, K., Braithwaite, R., Johnson, L.N., Dawes, D., Hoffman, L. (2020). Community Engagement of African Americans in the Era of COVID-19: Considerations, Challenges, Implications, and Recommendations for Public Health. *Prev Chronic Dis,* 17:E83. https://doi.org/10.5888/pcd17.200255

Hick, J., Hick, J.L., Hanfling, D., Wynia, M.K., Pavia, A.T.(2020). Duty to Plan: Health Care, Crisis Standards of Care, and Novel Coronavirus SARS-CoV-2. *NAM Perspect*, 2020:10.31478/202003b. https://doi.org/10.31478/202003b

Hosseini Moghaddam, M., Mohebbi, Z., Tehranineshat, B. (2022). Stress management in nurses caring for COVID-19 patients: a qualitative content analysis. *BMC Psychol,* 10(1):124. https://doi.org/10.1186/s40359-022-00834-4

Isangula, K.G., Lyimo, M., Ndungile, Y., Robert, E. (2023). Nurses' preparedness for disaster response in rural and urban primary healthcare settings in Tanzania. *Rural Remote Health,* 23(2):7547. https://doi.org/10.22605/RRH7547

Jackson, D., Bradbury-Jones, C., Baptiste, D., Gelling, L., Morin, K., Neville, S., Smith, G. D. (2020). Life in the pandemic: Some reflections on nursing in the context of COVID-19. *J Clin Nurs*, 29(13-14):2041-2043. https://doi.org/10.1111/jocn.15257

Jemal, B., Aweke, Z., Mola, S., Hailu, S., Abiy, S., Dendir, G., Tilahun, A., Tesfaye, B., Asichale, A., Neme, D., Regasa, T., Mulugeta, H., Moges, K., Bedru, M., Ahmed, S., Teshome, D.

(2021).Knowledge, attitude, and practice of healthcare workers toward COVID-19 and its prevention in Ethiopia: A multicenter study. *SAGE Open Med*, 29;9:20503121211034389. https://doi.org/10.1177/20503121211034389

Joo, J.Y., Liu, M.F. (2021). Nurses' barriers to caring for patients with COVID-19: a qualitative systematic review. *Int Nurs Rev,* 68(2):202-213. https://doi.org/10.1111/inr.12648

Kang, L., Li, Y., Hu, S., Chen, M *et al*. (2020). The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *The Lancet Psychiatry,* 7(3), e14. https://doi.org/10.1016/S2215-0366(20)30047-X

Kaye, A.D., Okeagu, C.N., Pham, A.D., Silva, R.A., Hurley, J.J., Arron, B.L., Sarfraz, N., Lee, H.N., Ghali, G.E., Gamble, J.W., Liu, H., Urman, R.D., Cornett, E.M.(2021). Economic impact of COVID-19 pandemic on healthcare facilities and systems: International perspectives. *Best Pract Res Clin Anaesthesiol*, 35(3):293-306. https://doi.org/10.1016/j.bpa.2020.11.009

Küçüktürkmen, B., Baskaya, Y., Özdemir, K. (2022). A qualitative study of Turkish midwives' experience of providing care to pregnant women infected with COVID-19. *Midwifery,* 105:103206. https://doi.org/10.1016/j.midw.2021.103206

Lamberti-Castronuovo, A., Parotto, E., Della Corte, F., Hubloue, I., Ragazzoni, L., Valente, M. (2022). The COVID-19 pandemic response and its impact on post-corona health emergency and disaster risk management in Italy. *Front. Public Health*, 10:1034196. https://doi.org/10.3389/fpubh.2022.1034196

Liu, J., Liu, S. (2020).The management of coronavirus disease 2019 (COVID-19). *J Med Virol,* 92(9):1484-1490. https://doi.org/10.1002/jmv.25965

Mattsson, J., Hedlund, E., George-Svahn, L., Scheers-Andersson, E., Mazaheri, M., & Björling, G. (2022). Nurses' Experiences of Caring for Patients With Suspected or Confirmed COVID-19 in the Initial Stage of the Pandemic. *SAGE open nursing*, *8*, 23779608221114981. https://doi.org/10.1177/23779608221114981

Mfinanga, S. G., Gatei, W., Tinuga, F., Mwengee, W. M. P., Yoti, Z., Kapologwe, N., Nagu, T., Swaminathan, M., & Makubi, A. (2023). Tanzania's COVID-19 vaccination strategy: lessons, learning, and execution. *Lancet (London, England)*, *401*(10389), 1649. https://doi.org/10.1016/S0140-6736(23)00723-7

Morrow, R., Rodriguez, A., & King, N.(2015). Colaizzi's descriptive phenomenological method. *The psychologist,* 28(8), 643-644. ISSN 0952-82. http://eprints.hud.ac.uk/id/eprint/26984/ [Accessed January 10, 2024]

Olesen, B., Gyrup, H. B., Troelstrup, M. W., Marloth, T., & Mølmer, M. (2020). Infection prevention partners up with psychology in a Danish Hospital successfully addressing staffs fear during the COVID-19 pandemic. *The Journal of hospital infection*, *105*(2), 377–378. https://doi.org/10.1016/j.jhin.2020.04.033

Panda, S., Dash, M., Mishra, R., Shettigar, S. A., Gurav, D. M., Kuppan, S., & Mohan, S. (2023). Voice from the frontline and learning for the future: A qualitative descriptive study on wider perspectives of frontline nurses in India during the COVID 19 global pandemic. *Clinical epidemiology and global health*, *21*, 101298. https://doi.org/10.1016/j.cegh.2023.101298

Parthasarathy, R., Ts J, K .T., Murthy, P. (2021). Mental health issues among health care workers during the COVID-19 pandemic - A study from India. Asian J Psychiatr, 58:102626. https://doi.org/10.1016/j.ajp.2021.102626

Quigley, D.D., Dick, A., Agarwal, M., Jones, K.M., Mody, L., Stone, P.W. (2020). COVID-19 Preparedness in Nursing Homes in the Midst of the Pandemic. *J Am Geriatr Soc*, 68(6):1164-1166. https://doi.org/10.1111/jgs.16520

Shahil Feroz, A., Pradhan, N.A., Hussain Ahmed, Z., Shah, M.M., Asad, N., Saleem, S., Siddiqi, S. (2021). Perceptions and experiences of healthcare providers during COVID-19 pandemic in Karachi, Pakistan: an exploratory qualitative study. *BMJ Open,* 11(8):e048984. https://doi.org/10.1136/bmjopen-2021-048984

Shayo, E. H., Nassor, N. K., Mboera, L. E. G., Ngadaya, E., Mangesho, P., Bakari, M., Urassa, M., Seif, M., Tarimo, C., Masemo, A., Mmbaga, B. T., O'Sullivan, N., McCoy, D., & Russo, G. (2023). The impacts of COVID-19 and its policy response on access and utilization of maternal and child health services in Tanzania: A mixed methods study. *PLOS global public health*, *3*(5), e0001549. https://doi.org/10.1371/journal.pgph.0001549

Setiawan, N.S., Fitrianto, A.R. (2021). Pengaruh Work From Home (WFH) terhadap Kinerja Karyawan pada Masa Pandemi COVID-19. *Edukatif: Jurnal Ilmu Pendidikan,* 3(5):3229-42. https://edukatif.org/index.php/edukatif/article/view/1224 [Accessed February 10, 2024]

Tani, K., Osetinsky, B., Mhalu, G., Mtenga, S., Fink, G., & Tediosi, F. (2023). Healthcare workers' experiences with COVID-19-related prevention and control measures in Tanzania. *PLOS global public health*, *3*(12), e0002678. https://doi.org/10.1371/journal.pgph.0002678

Thomas-Rüddel, D., Winning, J., Dickmann, P., Ouart, D., Kortgen, A., Janssens, U., & Bauer, M. (2021). Coronavirus disease 2019 (COVID-19): update for anesthesiologists and intensivists March 2020. „Coronavirus disease 2019“ (COVID-19): update für Anästhesisten und Intensivmediziner März 2020. *Der Anaesthesist*, *70*(Suppl 1), 1–10. https://doi.org/10.1007/s00101-020-00760-3

Treibel, T. A., Manisty, C., Burton, M., McKnight, Á., Lambourne, J., Augusto, J. B., Couto-Parada, X., Cutino-Moguel, T., Noursadeghi, M., & Moon, J. C. (2020). COVID-19: PCR screening of asymptomatic health-care workers at London hospital. *Lancet (London, England)*, *395*(10237), 1608–1610. https://doi.org/10.1016/S0140-6736(20)31100-4

Tumpey, A., Daigle, D., Nowak, G. (2019).*Communicating During an Outbreak or Public Health Investigation*. p. 243-60. https://www.cdc.gov/eis/field-epi-manual/chapters/Communicating-Investigation.html [ Accessed on June 12, 2024]

Wyatt, D., Faulkner-Gurstein, R., Cowan, H., Wolfe, C.D.A. (2021). Impacts of COVID-19 on clinical research in the UK: A multi-method qualitative case study. *PLoS One,* 16(8):e0256871. https://doi.org/10.1371/journal.pone.0256871

WHO.(2020). *Coronavirus disease 2019 (COVID-19) Situation Report – 125*. World Health Organization, Geneva. https://www.who.int/docs/default-source/corona viruse/20200312-sitrep-52-covid-19.pdf?sfvrsn=e2bfc9c0_2 [ Accessed on March 24, 2024]

Yang, L., Liu, Y., Han, L., Ao, Y., Yang, H. (2021). Impact of COVID-19 on Mental Health of Chinese Residents in Its Initial Stage. *Front Psychol,* 12:722093. https://doi.org/10.3389/fpsyg.2021.722093

Yang, L., Liu, S., Liu, J. *et al.* (2020). COVID-19: immunopathogenesis and Immunotherapeutics. *Sig Transduct Target Ther* **5**, 128. https://doi.org/10.1038/s41392-020-00243-2

Yörük, S., Güler, D. (2021). The relationship between psychological resilience, burnout, stress, and sociodemographic factors with depression in nurses and midwives during the COVID-19 pandemic: A cross-sectional study in Turkey. *Perspect Psychiatr Care,* 57(1):390-398. https://doi.org/10.1111/ppc.12659

Youssef, D., Abou-Abbas, L., Berry, A., Youssef, J., Hassan, H. (2022). Determinants of acceptance of Coronavirus disease-2019 (COVID-19) vaccine among Lebanese health care workers using health belief model. *PLoS One*, 17(2):e0264128. https://doi.org/10.1371/journal.pone.0264128