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Conditions for health system resilience in the response to the COVID-19 pandemic in Mauritania

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ABSTRACT

Introduction A country's ability to manage a crisis depends on its level of resilience. Efforts are made to clarify the concept of health system resilience, but its operationalisation remains little studied. In the present research, we described the capacity of the local healthcare system in the Islamic Republic of Mauritania, in West Africa, to cope with the COVID-19 pandemic.

Methods We used a single case study with two health districts as units of analysis. A context analysis, a literature review and 33 semi-structured interviews were conducted. The data were analysed using a resilience conceptual framework.

Results The analysis indicates a certain capacity to manage the crisis, but significant gaps and challenges remain. The management of many uncertainties is largely dependent on the quality of the alignment of decision-makers at district level with the national level. Local management of COVID-19 in the context of Mauritania's fragile healthcare system has been skewed to awareness-raising and a surveillance system. Three other elements appear to be particularly important in building a resilient healthcare system: leadership capacity, community dynamics and the existence of a learning culture.

Conclusion The COVID-19 pandemic has put a great deal of pressure on healthcare systems. Our study has shown the relevance of an in-depth contextual analysis to better identify the enabling environment and the capacities required to develop a certain level of resilience. The translation into practice of the skills required to build a resilient healthcare system remains to be further developed.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Within the current literature, various definitions and several conceptual frameworks on resilience exist, but its operationalisation remains little studied. The focus is often on achieving measurable results, whereas the processes for doing so are of greater importance.

⇒ Capacities underpinning a resilient health system are often strongly influenced by poor alignment between district and central levels, the lack of access to necessary resources, and the highly centralised nature of a system.

⇒ These shortcomings severely limit the capacity to manage and anticipate uncertainties at district level. The weak legitimacy of decision-making is compounded by the fragility of the system and often creates a climate of fear and mistrust.

WHAT THIS STUDY ADDS

⇒ Three important conditions for the development of a resilient system at the health district level are added to the elements of Blanchet and colleagues' framework: the existence of a learning culture, a strong community dynamic and leadership capacity.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The level of resilience is often limited to the capacity to absorb shocks, whereas the capacity for change, which refers to a transformative response, is key. Transformation requires an enabling environment, a learning culture and a multi-sectoral approach.

⇒ The application of the concept of resilience in global health is often still generic and descriptive. Our study shows the relevance of an in-depth contextual analysis to better identify the enabling environment and the capacities required to develop this resilience.

INTRODUCTION

As elsewhere in the world, the Islamic Republic of Mauritania (IRM) had to face important challenges during the COVID-19 pandemic.[1] An initial assessment of the response to the pandemic in Mauritania shows several weaknesses in the response plan, and points to a series of systemic challenges.[2] It highlights the importance of operational support during the response, and the important socioeconomic consequences, especially for the most vulnerable populations.[1 3] Work overload and organisational challenges compromised access to essential health services.[4]

An appropriate response to epidemics is often hampered by the fragility of the healthcare system.[5–10] A literature review by Nuzzo *et al* showed that health systems that are not prepared for disasters are unable to

provide essential services.[11] In the case of the COVID-19 pandemic, the global economic crisis, social isolation and restrictive measures mainly affected the most vulnerable households.[12 13] In this perspective, the concept of resilience is particularly important.[10 14–20] The concept is part of the lexicon of several scientific disciplines, such as environmental science, engineering and psychology. In the field of ecology, Holling[21] defined it as 'the capacity to absorb change and disorder while maintaining existing relationships'. In the last decade, it has also been introduced into the field of public health, following the Ebola epidemic in West Africa.[22 23] Resilience was quickly adopted within the global health framework as a strategy for strengthening the health system, focusing mainly on acute shocks and the return to its previous state. However, this view was criticised as a technocratic approach. Moreover, maintaining the functions of a system could indicate a return to a suboptimal system.[24 25] Thus Kruk *et al*[26] defined resilience as 'the capacity of health actors, institutions and populations to prepare for and respond efficiently to crises; to maintain essential functions in the event of a crisis; and, informed by lessons learned, to adapt them if conditions require'. The resilience of a healthcare system can be conceptualised at three levels: the capacity to absorb, adapt and transform.[27] A resilient healthcare system therefore should ideally incorporate a transformative dimension, going beyond a 'simple' rebound.[28]

The operationalisation of the level of resilience of a healthcare system remains however little studied.[22 23] Several conceptual frameworks have been presented.[29–31] The focus is often on achieving measurable results, whereas the processes for doing so are of great importance: they are not always clear, linear or achievable in the short term.[18 27 32]

This research is part of the 'Institutional Support for the Health Sector Support Programme' (AI-PASS or 'Appui Institutionnel au Program d'Appui au Secteur de Santé').[29] It aims to support the Ministry of Health in implementing its national development plan through systemic support at several levels. One of the objectives is to build the capacity of local players through an action research (AR) approach. Another is to feed national policies 'from bottom up'.[33] The programme, funded by the European Commission and the French Development Agency for an initial 4-year period (11th FED), was launched in August 2017 and renewed in 2023 (AI-PASS Enabel, 2017). This article focused on the first period of the programme, and on the two local health districts (Moughataas), supported by the programme.

As observed in other countries, the focus of the studies done in Mauritania was merely on the epidemiological perspective of the pandemic, and on measures taken at the central level of the health system or at the level of the hospitals.[34 35] The aim of our study was therefore to describe the response rather at the level of the local health system, with particular attention to the dimensions of resilience as defined by Blanchet *et al*.[29] We explore to what extend the local actors in the two identified Moughataas in the IRM, had the capacity to manage the pandemic.

METHODS

Study design

We opted for a single case study.[36] The case was defined as 'resilience at health district level'. The two units of analysis, purposively selected, were the two Moughataas (ie, health districts) of Dar Naim and Bababé. The purposive selection of the two districts was an opportunistic choice, as both were supported by the AI-PASS programme, and after consultation with the members of the AR team and MoH directorates.[37] This allowed us to have adequate prior knowledge and facilitated communication and data collection processes. The study period was approximately 1 year, from mid-March 2020, when the first cases of COVID-19 were detected in Mauritania, to February 2021.

Study setting

Mauritania covers an area of over 1 million km², with a population of around 4.2 million and a low population density (General Population and Housing Census (GPHC), National Statistical Office, MoH IRM, 2013). As a result of demographic changes amplified by a massive rural exodus, the capital of Nouakchott is currently home to more than a third of the country's population. Despite the government's various reforms and its desire to move towards Universal Health Coverage, the health system faces many challenges. Financial and geographical access remains a major problem (GPHC, National Statistical Office, MoH IRM, 2013; National Social Protection Strategy, MoH IRM, 2008), as does the availability of human resources and the quality of healthcare.[33] During the period studied, the country experienced two waves of COVID-19 cases, with an average of 129 cases per day in June and 186 cases per day in December 2020. By the end of February 2021, the country had recorded a total of 17 207 confirmed cases, including 441 deaths, giving a case-fatality rate of 2.56%. (The denominator is estimated to be larger, given the country's low screening capacity.)

The district of Dar Naim is located in the northern region of Nouakchott. It is a mixed urban and peri-urban area, with precarious neighbourhoods built on sand dunes. The district has a population of 173 663, with a high poverty rate. The health system is characterised by a plurality of public and private sector actors, with a poor level of coordination. The district of Bababé is a rural area in the south-western part of Mauritania, along the natural border of the Senegal River. The population is estimated at 37 494, with a high overall poverty rate.[33 38]

In Dar Naim, the first case of COVID-19 was recorded on 15 May and the first death on 18 May 2020. By the end of February 2021, there was a cumulative total of 1175 cases and 39 deaths. The first case in Bababé was not detected until 21 June 2020. Since then, the number of

Table 1 Type of consulted documents for the document review

Type of documents		Dates
Meeting minutes	Meetings AI-PASS team; follow-up meeting at operational level; meetings of DHT Community meetings; meeting AIPASS/MoH Workshop AI-PASS: COVID-19 and AR	03/2020–02/2021 10/2020
Directives and communications of central level and partners	Memos; COVID-19-response plans; protocols and algorithms; supervision reports; daily COVID-19-bulletin (Sitrep) COVID-19-response evaluation report Communications on website 'cridem.org'	03/2020–02/2021 04/2021
AR documentation on aspects of governance, offer of healthcare and COVID-19	Decisions taken and strategies developed Terms of reference for COVID-19 activities Communications (informal) in WhatsApp groups of key stakeholders government, AI-PASS team, AR team, community members	03/2020–02/2021
Reflections	WhatsApp messages of AI-PASS team Research notes Bababé Blog Bababé	03/2020–02/2021 03/2020–04/2020 04/2020–06/2020

AI-PASS, Appui Institutionnel au Programme d'Appui de Secteur de la Santé; AR, action research; DHT, District Health Team; MoH, Ministry of Health.

cases remained very low. During the study period, there were only 25 cases and no deaths in the district. Online supplemental files 3 and 4 provide a more detailed description of the situation in Dar Naim and Bababé, with a chronogram of the main activities implemented to manage the pandemic.

Conceptual framework

Our conceptual framework is based on the essential capacities for managing a healthcare system, as described by Blanchet *et al*,[29] who drew inspiration from the work of Lebel *et al*.[39] As mentioned in the introduction, most resilience frameworks do highlight technical performance aspects and/or (quantitative) outputs.[24 25] Blanchet *et al* consider resilience to be the result of a set of capacities: the cognitive capacity, the capacity to anticipate and manage uncertainty, the capacity to take interdependence into account and the capacity to ensure legitimate decision-making. Next, the level of capacity achieved in managing the health system can result in three levels of resilience: (1) absorptive capacity, which refers to the ability to resist and absorb the impacts of a crisis; (2) adaptive capacity, which refers to the ability to manage potential damage and seize opportunities as they arise; and (3) capacity for change, which refers to a transformative response to the system in place.

Lebel *et al* identified the following fundamental elements that can foster transformation: polycentric institutions, multi-level institutional arrangements and effective processes of accountability, public participation, deliberation and social justice. Applied at the level of the local health system, resilience requires an adaptive governance approach and the creation of conditions that facilitate policy dialogue at the decentralised level. These conditions include the empowerment of frontline health workers, and the development of social networks and collaborations within the local health system and beyond, which would lead to more legitimate, sustainable and socially acceptable policy decisions.[26 40 41] In addition, it requires a favourable environment: an atmosphere of learning, mentoring, accountability and a certain level of autonomy to test and adapt strategies at operational level.[42 43]

Table 2 Characteristics of interviewees

Characteristics	Interviews (n)
Ministry of Health—central level	5
Ministry of Health—regional level	4
Ministry of Health—local level (DHT+health work force)	9
Local level—local authorities	3 (+1)*
Local level—representatives of civil society and/or communities	7
Members of the AI-PASS team—central and local level	4
Financial and technical partners	1
Total	33

*One of the interviews was organised with two people at the same time.
AI-PASS, Appui Institutionnel au Programme d'Appui de Secteur de la Santé; DHT, District Health Team.

Data collection

Document review

We carried out a review of policy documents on the COVID-19 response at the level of the Ministry of Health and the AI-PASS programme. In addition, we analysed the main information disseminated via social media and unofficial channels (table 1).

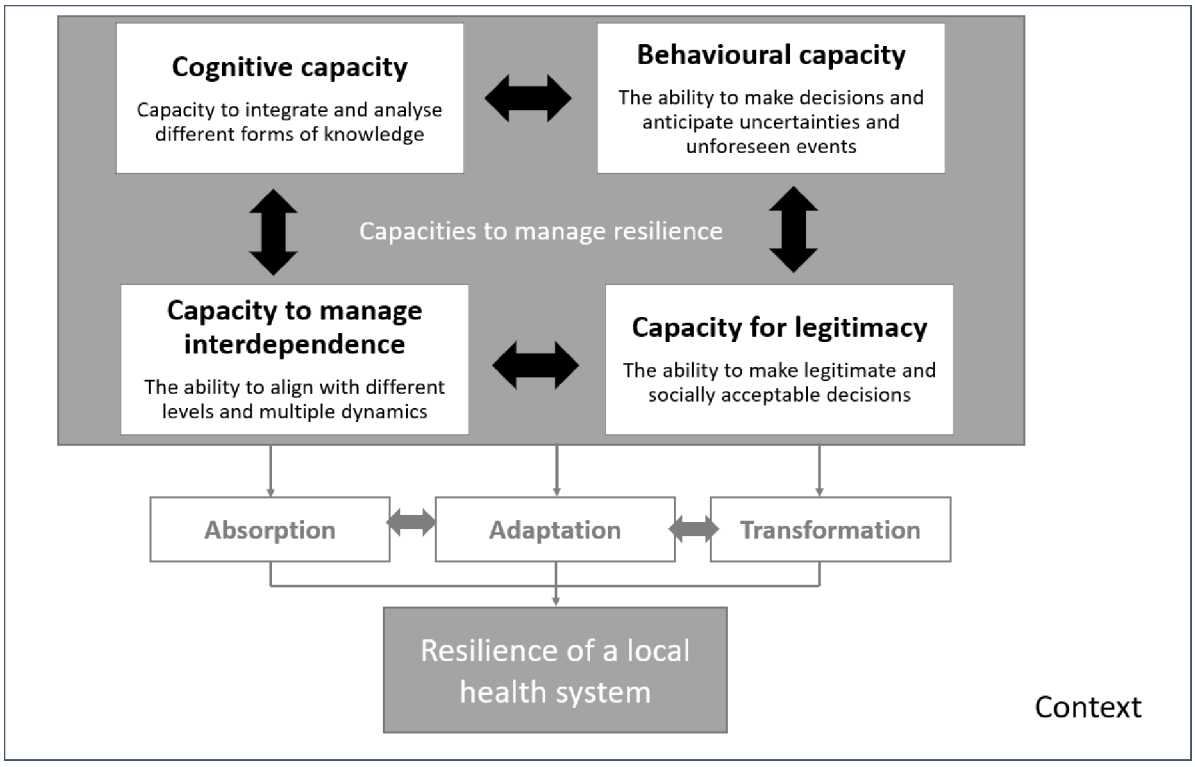

Figure 1 Conceptual framework of resilience. Adapted from conceptual framework of Blanchet *et al*, integrated in the context wherein the local system functions.

Interviews

We conducted semi-structured interviews with a selection of key informants from the management teams of the two Moughataas, representatives of communities and civil society, the AI-PASS team, the regional authorities supporting these two districts, the central authorities and key partners (table 2). A total of 33 interviews were carried out, until saturation was reached. Fifteen interviews were conducted online and eighteen face-to-face during a field visit in February 2020, following the COVID-19 pandemic rules of conduct. Before starting the interview, consent was obtained orally (online supplemental additional file 1). An interview guide (online supplemental additional file 2) was developed and adapted iteratively during the interview process. The interviews were audio recorded after consent had been obtained. The interviews lasted between 40 and 120 min. All interviews were conducted in French.

Data analysis

All interviews were transcribed verbatim and checked by the first author (KA). The interviews and studied documents were encoded in Nvivo V.12. A deductive analysis approach was guided by the conceptual framework mentioned earlier (figure 1). Amids the analysis process, the collected data was then presented to the members of the AR team and members of the MoH directorates during a workshop held in Mauritania in 2020, to enhance the analysis and further reflections.

A reflexivity statement on the process and the involvement of local actors can be found in online supplemental additional file 6.

RESULTS

Our results show that the main focus of the response in the two Moughataas was on the set-up of a case detection and monitoring system, as in the rest of the country. Some attempts in terms of coordination and consultation were made, but these were often organised on an ad hoc basis. Many activities, such as supervision and management team meetings, were put on hold at the beginning, due to the workload. With the support of partners, some service *delivery activities* were reorganised, and a triage system was put in place. Our analysis shows that the capacity to manage the pandemic differed between Dar Naim and Bababé: the capacity to manage and anticipate uncertainties, coordinate with key players and respond to community needs was more developed in Bababé. online supplemental table 1 summarises the main differences between the two districts in terms of crisis management.

Capacities to manage resilience

Cognitive capacity

Blanchet *et al*[29] define cognitive capacity as: 'The ability to integrate different forms of knowledge, which must extend beyond the sphere of the healthcare system'.

In terms of information gathering by the district management teams (DMT), the focus was on epidemiological

data. Minutes of the meetings (MM) of the two DMT's show that discussions focused mainly on case detection and follow-up, and the challenges in terms of equipment and triage. The creation of WhatsApp groups made it easier to share information, but some interviewees noted that there was little information about people's own experiences of the pandemic.

> As far as information is concerned, apart from considering the symptoms of potential contact cases, there is nothing collected about their experiences, on what they think, of social nature in relation to Covid, which could teach us something. For example, to tell us how vulnerable the community is when Covid or other events occur; these are not considered. (interview 11, Dar Naim)

In addition, due to the high workload, supervision of the management teams in the two Moughataas was irregular, making it difficult to gather information (WhatsApp 12/2020).

The interviews indicate that information analysis was largely absent. The focus was rather on completing data and passing it on quickly to the next level, without drawing any lessons for the local level (interview 11, Dar Naim).

> Now there are people who are asking these kind of questions, but the system as it is designed does not facilitate this process. It's a reflection of what's happening at all levels. There are no questions from the central level to the RHD (regional health directorate), such as: have you thought about why you have so many cases? There's never any of such kind of reflections. (interview 26, central level)

Respondents recognised the lack of analysis as a weakness at all levels of the system, despite some attempts. In Bababé, the team tried to develop situation reports. Discussions within the management team and with the departmental committee made it possible to analyse certain problems related to pandemic control (interview 5, Bababé). In Dar Naim, the management team decided to organise a vaccination campaign after assessing the vaccination coverage (interview 2, Dar Naim). At one of the DHT meetings, the members stressed the importance of going beyond simply raising awareness of barrier methods, but also to take action to ensure that people were able to comply with the containment measures. For example, it was proposed that chiefs of the communities, civil society organisations, imams and the municipality should be involved, and that support should be given to families who had been put in quarantine (MM of DHT 06/2020, Dar Naim).

Capacity to manage uncertainties

Blanchet *et al*[29] define behavioural capacity as: 'the ability to anticipate and manage uncertainties and unexpected events. Even when we have the relevant knowledge and flexible systems to anticipate uncertainties or react to shocks, decision-making remains complex'.

The document review and the analysis of the interviews indicate that the lack of resources is one of the greatest constraints in the management of uncertainties. The District Medical Officers have only a modest operating budget. The fight against COVID-19 was unforeseen, and any request for an additional budget to deal with the pandemic would have to be made via a complex hierarchical circuit (interview 12, Bababé). In practice, therefore, most activities were organised and funded by national governmental organisations and technical and financial partners.

> When you're working in a centralised health system, you don't have the flexibility to take initiatives to use the health budget for other reasons than previously defined; that's at central level and at operational level … Everything is managed at the ministry of finances, which has set up a covid fund, managed directly by an inter-ministerial committee. This means that at operational level, people are very far from the centre of decision-making. (interview 17, central level)

Only with the support of the partners it was possible to set up a triage system and a training on the control and prevention of COVID-19 in Dar Naim (MM 06/2020, Dar Naim). The same was observed in terms of epidemiological support: when the WHO withdrew, there was no longer a possibility to continue carrying out outreach activities (MM 11/2020, Dar Naim).

> I have the impression that everything came from somewhere else. So, if there weren't any partners who were able to mobilise certain resources, it would have been difficult because the staff were working in conditions with no means of protection and so on …. (interview 2, Dar Naim)

Despite this lack of resources, the document review and analysis of the interviews indicate a certain ability to anticipate, especially in terms of organising the COVID-19 response. At Dar Naim, the management team adapted the annual planning to ensure continuity of activities. At Bababé, the management team focused on continuity of care for chronic patients. A coordination platform was set up to ensure dialogue between stakeholders, raise awareness and control the flow of traders from Senegal.

However, some interviewees pointed out the difference in adaptive capacity between the two districts. In Bababé, numerous community activities were organised, and its management team met regularly to adapt its strategies. Possible reasons were that Dar Naim was more likely to follow hierarchical instructions and decisions (given its geographical proximity to the central level and the strong involvement of the regional level), but also because the community dynamic was much less tangible (interview 6, central level). The participants noted that through the support of the diaspora, associations and municipality, several receptions of equipment and donations had ensured that the Moughataa of Bababé could react more quickly and effectively (interview 18 and 25, Bababé).

> The municipality of Bababé anticipated this even before the Mauritanian government, even before the department of Bababé. The mayor of Bababé engaged the local people, nationals living here or elsewhere, to help raise awareness

and deal with the COVID-19 pandemic. That was before the state set up committees to manage the COVID-19 epidemic. (interview 25, Bababé)

The lack of preparedness was evident at every level of the health system. The team of Dar Naim only reacted when the first case of COVID-19 was detected in the district, without an emergency stockpile being put in place (interview 4 and 24, Dar Naim and Bababé). A contact at central level made the same reflection:

I've always had the impression that it's a lack of reflection about how to solve the problem … It's as if they're just going along with the way things are and acting as if they couldn't do anything else to make changes. (interview 26, central level)

Capacity to manage interdependence

Blanchet *et al*[29] define the capacity to manage interdependence as follows: 'the capacity to engage in and efficiently manage multiple and/or multisectoral dynamics. Health systems are integrated into complex structures at different levels, often affected by factors not directly related to public health'.

Interviewees noted that the management team did not have a proper overview of actors nor activities going on.

The problem was that they had regular meetings, but the weakness was that it didn't reach the grass roots. We had no information … They didn't ask for our opinions, initiatives, the problems we have. (interview 2, Dar Naim)

Respondents also noted the lack of coordination at central and regional level, and with local partners. Guidelines changed from one moment to the next and the national response plan lacked clear instructions and guidelines (MMs). The regional level lacked autonomy and capacity to support the Moughataas. In addition, the focus was on COVID-19 response, case detection and follow-up; little or no attention was given to the organisation, triage or continuity of services.

So, it created a problem of availability of practical information … At the level of the Regional Health Departments (RHD), who received from time-to-time algorithms that were modified or that did not consider the reality … It was much more the coordination that posed a problem … for a long time, many RHD's did not know to which God to turn to… (interview 6, central level)

The response at district level was heavily influenced by the 'top-down' culture that dominates the Mauritanian health system. This culture did not allow the local level to tackle the weaknesses of the COVID-19-response nor to propose alternatives.

Well, we're really stuck with algorithms and central directives. At our level we can do something, but we don't have enough autonomy to really do what we see we really need to do. (interview 5, Bababé)

There was also a fear that decisions taken at central level would hamper local dynamics (MM April 2020, AI-PASS): for example, the decision by UNICEF to recruit external community workers for the COVID-19-response, when in Bababé there were already well-committed community members. Or the fact that the triage protocols put in place by the Department of Hospital Medicine were not adapted to the primary healthcare level.

But it's clearly the lack of decentralisation of the Moughataas. Is it a problem of lack of capacity on their behalf? Is it because they're used to that everything is done and decided at central level? So, is it about lack of capacity or lack of empowerment to act …? (interview 33, central level)

The weak capacity of the operational and regional levels is partly explained by the influence of the Ministry of Interior, the power of the regional governor and that of the district prefect in a highly hierarchical context. This had a serious impact on the level of autonomy at district level (interview 30, central level).

The DHO will only be able to make decisions with the support of the local administrative authority. Even if he takes certain decisions and they don't have the support of the local authority, it won't have any favourable results. (interview 8, Bababé)

However, from mid-2020 onwards and during the second wave, the local authorities, especially in Bababé, began to play a more important role in quarantine management, distribution of food and hygiene kits, and border surveillance (MMs; interview 22, regional level). In the absence of an effective formal body, spontaneous efforts to coordinate with local partners to organise trainings, distribute equipment and maintain health services emerged.

Capacity to ensure legitimacy

Blanchet *et al*[29] define the capacity to ensure legitimacy as: 'the capacity to develop institutions and norms that are contextualised and accepted by society; this is linked to the need to create a climate of trust and facilitate appropriation by the community'.

Our analysis shows that the local population had little or no involvement in the decision-making process. The measures put in place were generally very strict at the outset, replicating those put in place in the rest of the world. In the two Moughataas, awareness-raising campaigns were organised by a wide range of actors to convey key messages. At Bababé, along the border with Senegal, security posts were set up to minimise river crossings by people living on the south bank. Significantly, respondents commented that little attention was paid to the sociocultural, socioeconomic and psychosocial dimensions of the pandemic. The importance of supporting the most vulnerable was mentioned, but this was not assumed as a responsibility of the management team (interview 21, regional level). The document review showed that no coordination process had been initiated to ensure that other actors fulfilled this role. At Dar Naim, for example, the minutes of a meeting showed that there had been discussions about supporting cases in quarantine, but no concrete action had been taken.

Analysis of the interviews showed that most of the measures were little or not at all accepted by the population. Cultural ceremonies, buying and selling goods at the market, attending prayers in the mosque, sharing tea, etc: all continued, without necessarily keeping their distance or wearing masks. For the poorest households, failure to comply with the measures, announced by the authorities, was a matter of survival.

> It's very difficult, given the social constraints, because in our society in particular, we pray together, we eat together, we travel together; everything is done in community, so it's not easy to follow these measures. (interview 25, Bababé)

This focus on control had a considerable impact. It created a climate of fear and panic, and affected people's trust (interview 33, central level).

> That's what scared them. You know if you're positive, the police will come, people are escorted, doctors are escorted. It frightened people, and people still aren't aware of the seriousness of the disease. If the police come to someone's house, everyone says that they have it … That's why they won't even accept the (covid) tests. (interview 23, Bababé)

However, especially in Bababé, several factors helped to reinforce the legitimacy of the decisions taken and the development of a climate of trust. The prior dynamics, put in place well before the COVID-19 period, proved to be crucial. The relationship of trust between health workers and community representatives, and the various mechanisms for coordination and dialogue were invaluable.

> The first reaction I noticed was that the village chiefs already knew these community volunteers from previous occasions. So, there was a certain level of trust in these people who came to share key information … There was the added value of the AR approach, because people automatically got together and thought about the strategies to be implemented without waiting for instructions from the central level. (interview 12, Bababé)

Community dynamics and 'the knowledge how to communicate' were key to maintaining trust and strengthening understanding of the rationale behind the measures.

> It's not easy to talk to the committee. It's dialogue that brings us together. But if you can't get your committees to understand or communicate with you, you won't be able to work with them. (…) So being a facilitator means listening and understanding what people are saying. (interview 20, Bababé)

The health workers did not see dialogue as their own responsibility and tended to delegate this role to civil society organisations and the town hall, or even to outsiders.

> The fact that there isn't really a relationship between health workers or the management team and the communities, that people only see cars passing by, giving out a few messages, but that there isn't a more personalised dialogue, probably also increases the lack of trust. Especially when you say that it's the state that's providing the propaganda and they see these beautiful cars …. (interview 3, Dar Naim)

Factors facilitating resilience

Three other forms of capacity emerge from our analysis: first, the leadership capacity; second, the individual capacities of DHT members; and third, the capacity and resilience of the communities themselves.

In terms of leadership, four characteristics were identified by the participants: (1) the ability to manage a team, (2) the ability to maintain a systemic vision, (3) proactivity and initiative-taking and (4) the ability to coordinate.

There are notable differences between the two districts of Dar Naim and Bababé, with Bababé appearing to perform better.

> Even if the DHO isn't there, it's a member of the management team who attends these meetings … The first decision we made was to respect each other's tasks. Everyone collects information from the other, which means that everyone now respects each other, there are no discussions. (interview 5, Bababé)

The work culture, such as the lack of monitoring and training for managers, was identified by some participants as a determining factor in this leadership role.

> It's the professional work culture that is not yet very well known or mastered by the members of the management team, or even by the health workers. The whole team are hard-core technicians, they're not planners. (interview 12, Bababé)

While the reflections of the DHO's were valid, the workload during the peaks of the pandemic was a constraint. At Bababé, the coordination mechanisms put in place well before the COVID-19 pandemic showed their relevance but were not fully exploited. Management in Dar Naim was more characterised by a wait-and-see attitude (interview 4, 14 and 27, Dar Naim).

> The ideal situation would have been for us to have a coordination forum so that we could exploit synergies … but unfortunately so far that hasn't been possible. (interview 12, Bababé)

> The first time, they didn't even invite us. It was during the last (sensibilisation) activity that they invited us to attend the launch. I think that the municipality should have coordinated this activity with us to try and come up with ideas or try to improve this activity, give them the necessary training, etc. (interview 4, Dar Naim)

The interviewees also noted weaknesses in terms of individual capacity of the members of the young management teams in the two districts: relevant analyses were not always followed up by action (interview 14, Dar Naim). The management team was also little known by health workers and the general population, which didn't facilitate the take-up of their role (interview 1 and 3, Dar Naim).

In terms of community resilience, our results indicate that in Bababé the communities were quicker to respond

than the central level itself. This was not the case in Dar Naim.

> We shouldn't say that the state has disengaged, we know that it's a very long circuit. In any case, we prefer to do what we can, unless we have to inform them beforehand. That's why we've done a lot of things here, at least to put people at ease, because we know that the state doesn't provide many resources at the moment, that's the reality. (interview 18, Bababé)

A great dynamic of solidarity emerged: financial support, food and hygiene products were provided (interviews 8, 12, 20 and 25, Bababé). Associations were mobilised to raise awareness and take action to deal with domestic violence and support mothers in their education during the school closures (interviews 15 and 18, Dar Naim and Bababé).

Assessing resilience: absorptive, adaptive and transformative capacity

Overall, our results indicate that the level of resilience of the health systems in our two study districts to manage the COVID-19 pandemic was largely limited to well-intentioned attempts to absorb the shock.

The pre-existing fragility of the health system and the high level of dependence on partners limited the ability of management teams to go beyond absorption. For example, catch-up vaccination campaigns and supervisions were put on hold due to a lack of resources.

> Given the fact that we have no logistical resources, no ambulance at Moughataa level, this poses a huge problem for us. We ask left and right, sometimes we ask the RHD, and so these are problems we have every day, but we try to live with it. (interview 4, Dar Naim)

> We only work within our means, depending on the staff we have, it's difficult for them to do a shift every 3 days, but we don't have any other means. (interview 7, Bababé)

The lack of an existing operational response plan also forced the teams to find temporary solutions.

> And so that's how we operated, despite the little training we received, because there was no organisation at ministry level that enabled us to manage better. (interview 4, Dar Naim)

> Things happened a bit quickly and then there was an overload of work, not many people came for consultation, the health workers weren't trained … We tried to deal with it, but at the same time we tried to carry on … (interview 1, Dar Naim).

The following comments from some interviewees illustrate the low level of adaptive capacity, but also the efforts made to go beyond:

> Now (during the 2nd wave), they haven't prepared any stock. They're not even prepared to do more tests. They're not prepared for many things, for bringing new materials to primary health centres to protect themselves. What did you observe in the health centres, the triage system, all that doesn't exist any more … (interview 26, central level)

> But as the days went by, once we began to understand that this pandemic was like any other, coordination improved, and at this level everyone was involved … We've had some very convincing results, people have understood their role, everyone was working in ideal conditions, and we've achieved some results. So, despite the resources, despite the handicaps …, we've still managed to stabilise the situation. (interview 13, central level)

Documentary analysis (reports of management team meetings) also demonstrated a certain adaptability. During the workshop in October 2020, the added value of AR was recognised, as it had equipped the management team to act. For example, working with local actors in Bababé through the departmental committee had made it possible to manage the pandemic and adapt strategies. In Dar Naim, the team decided to reorganise services to ensure continuity of care and plan activities to fill gaps in vaccination coverage. In Bababé, the team adapted the triage system on several occasions and tried to find solutions for the poor acceptability of the COVID-19 test.

The transformative capacity proved to be in its infancy but was nonetheless present. For example, COVID-19 had better demonstrated the weaknesses of the health system, such as the importance of coordination with partners and dialogue with communities.

> Well, it's true that we need to do a better job of dealing with the community to get their approval … In other words, to get the population's consent, to be able to respond better to the population's requests, rather than proposing things they sometimes don't agree with, and which therefore won't do much good. It's really something that needs to be developed in the near future. (interview 4, Dar Naim)

However, it was noted that documentation and knowledge management, which could facilitate transformation, was timid.

> This culture of learning … doing research, having results and producing knowledge, comparing one with another … is absent. Around the Ministry of Health, there are no partners interested in knowledge … I like evaluation, but I'm cautious because I've often seen evaluations that produce descriptive reports. (interview 30, central level)

However, the potential for developing a capacity for change is real: this is illustrated by the dynamic of the network of community volunteers and the departmental committee in Bababé.

> This (departmental) committee is going to help us a lot … Maybe after Covid, we can continue the meetings, discuss things together and the WhatsApp group is still working. Every time we talk to the others to see how we can sort things out. I think that's one of the lessons learned from Covid. (interview 5, Bababé)

DISCUSSION

The aim of this study was to describe the capacity of the two Moughataas to manage the pandemic using the conceptual framework of Blanchet *et al*.[29] Our analysis

showed that the two Moughataas had a certain capacity to absorb the crisis, but that they faced major shortcomings. The limited capacity to manage uncertainty was strongly influenced by the poor alignment of the Moughataas with the central level, and the lack of access to resources. The legitimacy of decision-making was affected by the fragility of the system. Our analysis also identified three important conditions for the development of a resilient system at district level that do not feature in the Blanchet *et al* framework: the existence of a learning culture, a strong community dynamic, and leadership capacity.

Learning culture

One of the characteristics of a resilient system is its capacity to learn[18 28]: the challenges posed by a systemic crisis become opportunities to learn and adapt responses accordingly.[32] Our results are in line with the literature review by Fridell *et al*,[23] who indicates that most studies on resilience focus on the relatively short-term absorption of systemic shocks, rather than on longer-term learning and transformation of the system. Indeed, the operational teams in our two study districts did not design or develop a response beyond the immediate medical response. A study based on a series of reports from research, evaluation and technical assistance projects in 11 countries in sub-Saharan Africa and South Asia points in the same direction. Coordination structures often become dormant after an emergency response. A lack of leadership to act on learning is often at the root.[43]

Community dynamics and resilience

Community responses show real potential for transforming the system. In Bababé, for example, the dynamics initiated as part of the AR contributed to management that is more adapted to local realities and facilitate building of a climate of trust. In Dar Naim, the lack of coordination between stakeholders hampered the development of such a dynamic. Additionally, the lack of organisation of the various communities living in Dar Naim along the lines of ethnicity, hampered social cohesion. Hofferth and Iceland[44] argue in their report that differences in social dynamics have been demonstrated: rural populations are often perceived as more receptive to community participation initiatives as they, traditionally, have greater social ties. Literature indicates that social networking can facilitate the development of more sustainable and transformative organisational functionality, if key conditions are met.[12 28 45 46] Transparent communication and a climate of reflexivity and accountability facilitate the creation of a climate of trust and allows for greater efficiency and coherence in responses.[15] Thu *et al*, in a literature review of responses to shocks in fragile contexts, showed that the ability and willingness of governments to receive (and use) feedback from communities and health workers on the ground was essential for transformative change.[47] What is needed is 'a response centred on social capital that takes account of the limits of centralised policy and that values social networks', as described by Wong and Kohler.[48] According to Wilkinson *et al*,[45] real control by local players is essential. If not, there is an important risk of damaging existing relationships and undermining local community structures.

Loewenson *et al*[49] state that community engagement requires time, empathy and consideration for sociocultural diversity. In their review of community responses to the COVID-19 pandemic, the authors indicate that the coproduction of responses, the valuing of commitments, solidarity and alliances with the diaspora facilitated the development of a sustainable and global response, going beyond health alone. Relationships with state structures were crucial, as observed in our own study. It is up to the state to create an environment conducive to the emergence and recognition of local dynamics, as observed in South Africa.[50] In our study, the community strategy developed in Bababé had a clear impact and was able to put more pressure on the state. The same phenomenon was observed during the Ebola epidemic in West Africa.[51]

Leadership capacity

Support to the DMT's, as part of the AI-PASS programme, seems to have facilitated a more coherent response to the COVID-19 pandemic. Several respondents expressed the importance of leadership. We defined it as the ability to manage a team, to have a systemic vision, to be proactive and to coordinate with key actors. This is in line with the concept of 'everyday resilience', as described by Barasa *et al*.[28] Access to resources ('the hardware') is of course important, but so is access to 'the software'.[14 32 47 52] Strengthening skills (such as the ability to make sense of events and take a systemic view) and facilitating environmental factors (such as social support from superiors) are key.[28 53–55] This implies the importance of managers acting as role models to guide and encourage the team (ie, distributive leadership).[55] The fact that, in the Mauritanian context, managers have worked for a long time in a fragile system often prevents them from being the role models that health workers aspire.

Our analysis has shown that on several occasions opportunities have not been seized. The lack of autonomy of management teams operating in a highly hierarchical environment means that there is only limited room for manoeuvre. This type of constraint has also been observed in research carried out in Cambodia[56] and Uganda.[40] In a study of the decision-making process in local health systems in Ghana, Malawi and Uganda, Bulthuis *et al* indicate that the different power dynamics associated with a dysfunctional decentralised system often led to limited decision-making space and feelings of disempowerment.[57] An enabling environment, characterised by an atmosphere of mentoring and empowerment, is therefore essential.[32 42] These essential conditions are factors that facilitate bottom-up dynamics and the emergence of adaptive solutions. The results of our analysis in Bababé are in the same line.

Conceptual framework

Finally, the application of the conceptual framework allowed for a structured analysis beyond a technocratic approach. However, it has also indicated that many of the concepts used in the literature on resilience remain generic and descriptive. Finetuning of these concepts and developing a more specific and discriminate use of terms is therefore needed. One way forward could be to identify key attributes or markers of progress in the context of resilience.[58] Additionally, as highlighted by Béné *et al*,[25] resilience does not necessarily always lead to positive outcomes. It may revert to a status quo or even lead to vulnerable systems. The following questions therefore arise: resilience of whom, to what exactly and who will/can decide?

Limitations

Our study has certain limitations. The study in the two Moughataas was spread over a period of 1 year. It is possible that this time was too short to be able to assess any evolution towards a more transformative form of resilience. We are aware that the position of external researchers in this study, as well as the inclusion of the partner Enabel, may have influenced data collection and analysis. To reduce potential bias in the selection of interviewees, we adopted a reflexive and iterative attitude through systematic and rigorous documentation of the data collection and analysis process, as well as regular discussions with members of the AI-PASS programme team and ITM experts. Data triangulation and the use of different sources mitigated the risk of bias. Finally, conducting the interviews online was not always easy, but enabled us to overcome the practical constraints of the COVID-19 pandemic. However, a field visit enabled us to conduct the interviews that could not be carried out remotely.

CONCLUSION

The COVID-19 pandemic has put a great deal of pressure on healthcare systems throughout the world, but particularly in *fragile* contexts. Our study has shown the relevance of an in-depth contextual analysis to better identify the enabling environment and the capacities required to develop *a certain level of* resilience. In the case of Mauritania, the poor alignment between district and central levels, the lack of access to the necessary resources, and the highly centralised nature of the system proved to be major constraints. We also noted the crucial importance of leadership and the great potential of community dynamics in the management of systemic crises. While our case study has helped to clarify—and somewhat 'demystify'—the key skills and conditions underpinning a resilient system, more research is needed to allow for practical operationalisation.

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Contributors KA led the primary data collection and analysis. BC and BM contributed to the design and development of the study and facilitated the analysis of secondary data. KA, BC, BM, MAAA and VTB participated in the drafting of the manuscript and its revisions. All authors read and approved the final manuscript. All authors agree to be responsible for all aspects of the work and to ensure that questions about the accuracy or integrity of any part of the work are properly investigated and resolved. KA acts as guarantor and takes full responsibility for the final work of the study, had access to the data, and controlled the decision to publish.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Consent obtained directly from patient(s).

Ethics approval This study involves human participants and this study was part of a wider evaluation and documentation process of the AI-PASS programme in Mauritania. We obtained ethical approval from the Institutional Review Board of the Institute of Tropical Medicine (ITM) (Ref N° 1280/19) and from the Mauritanian Ministry of Health (Ref N° 003/2019). Participants gave informed consent to participate in the study before taking part.

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