Tackling deadly diseases in Africa

DAI global health

institute of development studies

TACKLING DEADLY DISEASES IN AFRICA: KEY CONSIDERATIONS FOR EPIDEMIC RESPONSE AND PREPAREDNESS IN MALI

Mamadou Faramba Camara, Brahima Amara Diallo and Santiago Ripoll

EXECUTIVE SUMMARY AND KEY IMPLICATIONS

Despite some significant progress made in policy development and vaccination programmes, Mali is highly vulnerable to epidemics. Key overarching summary points and implications are presented below:

- Certain Malians are more vulnerable to disease than others, in particular: people living in remote rural regions with low physical access to healthcare, urban and rural poor, people with inadequate WASH infrastructure, refugees and Internally Displaced People and host populations, politically marginalised groups such as nomadic groups, people living in conflict areas of the North and Centre of the country, people with malnutrition, children not fully vaccinated, women and children who are less likely to be the decision-maker for their own healthcare or who may face discrimination in the clinic.
  - Address general vulnerabilities to disease in preparedness activities: expanding WASH coverage, tailoring health services to nomadic populations and so on. When an outbreak occurs, identify epidemic-specific vulnerable groups and engage with them in participatory ways. To enhance trust, vulnerable communities must be engaged early to design and adapt programmes, make decisions and lead activities whenever possible and relevant, and provide community feedback of ongoing response measures.
  - Ensure that response activities do not single out already marginalised communities, either through targeting or communications that may drive stigma or imposing restrictions that may exacerbate vulnerabilities.

- Health data across health and humanitarian systems is not fully shared for operational action: there is a lack of data sharing and coordination between the policy level and State health providers with the private biomedical sector, nor with alternative health providers. Data on epidemic surveillance, service provision, human and financial resource investments is not collected or shared between the alternative, private, or State sectors, nor do they guide data-driven decision-making processes at a policy level.
    - Ensure commitment of these health sectors to sustain their provision of relevant information to the system and integrate and share data through Integrated Health Information systems.
    - Create synergies between health and humanitarian stakeholders.
    - Harmonise the preparedness and response plans and mobilization of resources based on data emerging from the health information systems.
    - Invest in Malian-led social science research that highlights the importance of context in health outcomes and link it with context-adapted public health interventions.
- Health communication is more effective when trusted local leaders are engaged and local languages and frameworks are used. Traditional and religious leaders are the most trusted interlocutors in Mali. Other trusted actors in Mali include doctors and nurses, as well as alternative health providers. These are trusted actors at a national level, yet these dynamics of trust vary according to particular social groups and geographical contexts. There is a wide diversity of languages, local framings of disease and communications preferences.
    - Engage traditional leaders, religious leaders and trusted health workers early. These actors can ensure the response activities are culturally appropriate. Doctors and nurses can play an important role in communicating health messages and clarifying concerns and questions.
    - Build on the wealth of information on local taxonomies of disease, treatment and care in Mali and adapt messaging to local etymologies and cultural framings.
    - Local language and communication assessments should be carried out locally to identify the languages and media formats that are most appropriate for each social group.
    - Use community radio, and local spaces (like street theatre or town criers, *griots*) to clarify questions on disease and to gather community feedback.

- Create alliances with alternative health service providers. More than 80% of Malians rely on traditional medicine. The State has promoted the integration of *tradipraticiens* into policy but they operate largely outside the State health system.
    - Faith healers, *tradipraticiens*, drug sellers, diviners and others can receive basic epidemiological and risk communication training and should be enlisted in disease surveillance and response. These alternative health providers can also help in the provision of health information and treatments (e.g. oral rehydration solutions, mosquito nets, etc). They can also identify particular diseases and refer their patients to biomedical clinics when relevant. Collaboration between the Department of Traditional Medicine and local healer networks should be strengthened.
- Build on existing bottom-up responses to epidemic response as part of a holistic, community-led approach. Epidemic preparedness and response must rely on meaningful community engagement (particularly so with vulnerable populations) and rather than initiating response activities from scratch, humanitarian activities should build on and support existing initiatives and social networks.
    - Work with *relais communautaires* and other community-based health volunteers within communities to engage key influencers at a local level such as traditional and religious leaders, and relevant stakeholders in the trade, transport and education sectors. Build health volunteers' capacity to identify diseases with epidemic potential and establish systems for notification and referral of cases to health providers.

TABLE OF CONTENTS

INTRODUCTION

Figure 1. Map of Mali https://commons.wikimedia.org/w/index.php?curid=2964025

Mali is a landlocked country in West Africa, one of the largest in the region, with an area of 1,248,574 km^2. The total population of Mali in 2018 was close to 20 million inhabitants. The country is divided into three agroecological zones: the southern, cultivated Sudanese zone; the central, semiarid Sahelian zone; and the northern, arid Saharan zone. The great majority of the population lives in the southern part of the country. Around 23.3% of the population lives in urban areas.[1] The population is quickly growing, with a 3.6% growth rate. The fertility rate is high, with a ratio of 6.3 of children/woman, according to the EDSM 2018.[2] Young people under 15 years old represented almost half of Mali's population (49.8%) in 2018. This population growth represents significant challenges for the country in terms of health provision, education, employment and infrastructure. Mali is one of the poorest countries in the world, ranking 182nd in the list of countries globally in the Human Development Index, with a GDP per inhabitant of USD$901 in 2018. Mali's State health

system struggles to meet the population's needs due to chronic underinvestment in infrastructure and equipment, a lack of human resources and a bias of health provision and health workers towards urban areas.

This brief draws on a review of both academic and grey literature, as well as inputs from social scientists and other experts on Mali. It offers an overview of the pluralistic health systems of Mali, and past and current experiences in epidemic preparedness and response, highlighting the contextual factors that shape these dynamics.

It is structured as follows: 1) an overview of the country's health system, including both the public and private health sectors; 2) key issues related to infectious disease outbreaks, response, and preparedness and 3) a list of key actors with which early responders may want to engage in response activities. The brief closes with specific implications and recommendations for future epidemic preparedness and response in Mali. Annexes provide more in-depth discussion of basic context, history and political economy and social groups and organisation. This technical brief was prepared by the Institute of Development Studies to support the embedding of social science and anthropological perspectives in UK AID-supported Tackling Deadly Diseases in Africa (TDDA) programme technical assistance as well as its Early Response Mechanism.

HEALTH SYSTEM

BURDEN OF DISEASE

Mali is one of the countries with the highest burden of morbidity and premature mortality. Infectious, neonatal, maternal, and nutritional disease represent more than 70% of the disease burden in Mali.

In the past decade, the epidemiological profile has been dominated by infectious diseases such as malaria, lower respiratory tract infections and diarrheal diseases, as well as non-communicable diseases (NCDs) such as diabetes, hypertension, and sickle-cell disease. The burden of NCDs has increased in Mali, for example deaths due to ischemic heart disease increased by almost a third in the period 2009-2019.[3]

Malaria is the first cause for presentation at health clinics (39% of all causes) and 1 in 5 children under five had malaria in 2018. That year, there were over 2.6 million cases and 1,001 malaria deaths.[2]. Maternal mortality in the period 2011-2018 was 325 deaths per 100,000 live births.

The most affected populations by illness or injury are people over 60 (45.2% of the total) and children under five (29.8%). Illness or injury rates are slightly higher in urban areas

(25.7%) compared to rural areas (23.1%), and higher in men (25.3%) compared to women (22.2%).[4]

COVID-19 is now considered a public health crisis of major concern. However, at the time of writing the impact has been relatively low, with over 14,000 cases and almost 520 deaths since the pandemic began. However, these circumstances could change rapidly. As we will see below, Mali is affected by other epidemic outbreaks such as meningitis and cholera. The disruption in vaccination programmes and health provision caused by COVID-19 has triggered the emergence of diseases that seemed to be under control in the past few years, such as yellow fever, Rift Valley Fever, Crimean-Congo Haemorrhagic Fever, dengue and measles. [5]

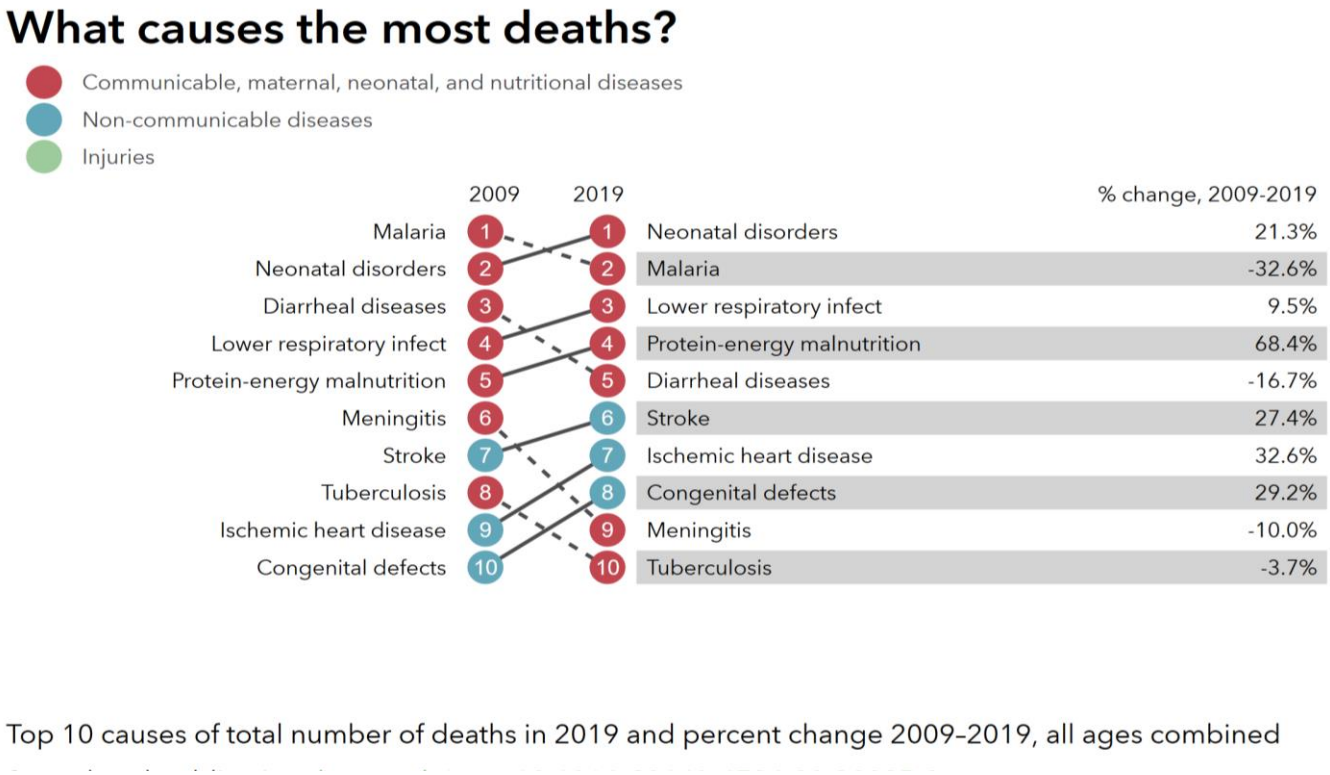

Figure 2 *Top 10 causes of total number of deaths in 2019 and percent change 2009-2019 in Mali, all ages combined*
Source: Institute for Health Metrics, 2019: http://www.healthdata.org/mali

PUBLIC HEALTH SYSTEM

The public health system in Mali has limited physical and human resources, and these are significantly maldistributed throughout the country. According to the Annual National Health Statistics (2019), 1270 General Practitioners and 591 specialists practiced in Mali.[6] There is a lack of health workers in poor, remote rural areas far away from Bamako. 31% of physicians and 53% of other health workers worked outside the capital. Over 50% of private health facilities are located in Bamako[7]. In 2018 there were 13 physicians/100,000

population, and in 2010 10 hospital beds/100,000 population on average.[8] In a broader sense of health professionals (including physicians, nurses and midwives), Mali has 65 health workers/100,000, significantly less than the WHO minimum standard of 230/100,000[9]. Some regions are better placed than others in terms of human resources. Kidal region has 13.3 health professionals per 100,000 population, Bamako region has 13.7, and Menaka region 12.1. The worse placed regions are Timbuktu and Taoudéni in the North of the country[9].

On average, less than half of the Malian population lives within a 5-km distance of a health facility, and close to 30% of the population are not within a 15-km reach of a health facility.[10] Due to low remuneration and inequalities within the system, the health services face a lack of stability in human resources[11]. Due to underinvestment in facilities and equipment and inadequate financial incentives, the most qualified workers move to the private sector rather than remaining in State-provided services.

In 1990, with the objective of responding to the health needs of the population, Mali adopted a sectorial health and population policy. Since the 1990s the emphasis has been to develop community health system, in which treatment and services are offered closer to the population, whilst maintaining a guarantee of service quality and affordability. Mali promoted the creation of Community Health Centres (*Centres de santé Communautaire-CSCom*). These non-profit facilities managed by community members through the Associations of Community Health (*Associations de Santé Communautaire -ASACO*) incorporate populations at the grassroots[12]. The *CSCom* are managed by a team of health professionals led by a doctor or nurse for a particular catchment area (*aire de santé)*. Its private status allows the centre to balance their own accounts and manage their human and financial resources based on user fees and subsidies they receive from the government. The *CSCom* also sign a *convention* with the State, committing to the delivery or particular services (minimum package of activities) in return for funding. The *CSCom* are accountable to the communities via the *ASACO*, in which community representatives establish the priorities of the clinics and monitor State-health priorities, as well as supervise the financial accounts and fee structure. The ASACO seeks out volunteers to work as community health workers called *relais communaitaires*.

In July 2002, the authorities of Mali adopted a law which defined the actions to improve population health, the development and expansion of health coverage and strengthening the health system. To achieve these objectives, Mali has designed a Decennial Plan for Health and Social Development (*Plan décennal de développement sanitaire et social-PDDSS*). The latest multi-sectorial decennial Plan PDDSS was adopted in 2014 for the period 2014-2023[5], outlining the State's population, health and social

strategies. The PDDSS is coordinated by the Ministry of Health, the Ministry of Social Affairs, the Ministry for the Promotion of Women, Family and Children, with the Planning and Statistical Agency (*Cellule de Planification et de Statistique, CPS*). The PDDSS emphasises the decentralisation of health-care and reliance on community-based healthcare through the establishment of *convention* agreements with *CSCom* described above. It also drives the promotion of women and child health, improving and expanding health provision, improving the quality of services, and improving financing and health information systems.[10] This plan is enacted through 5-year Health and Social Development Programmes (PRODESS). There have been 3 iterations of the PRODESS [13], the latest being PRODESS III for the period 2014-2018. The design of PRODESS IV was expected to be finalised in 2020.[14]

In the 1980s Mali was the birthplace of the Bamako Initiative. Under structural adjustment programmes of the era, user-fees were imposed in State-provided clinics, with the aim to increase their economic sustainability and efficiency. User-fees today make up almost half the revenue of primary health-care clinics.[10] The existence of user fees (rather than free healthcare) has had a particularly negative impact in terms of poor families' access to health care. People were confronted with underfunded low-quality State services, high user fees and non-functioning exemption mechanisms, and for that reason many families stopped using public health facilities.[15] Families rely on out-of-pocket expenditures to access healthcare: 46% of healthcare expenditures come out of households' pockets.[10] This means people forgo care for economic reasons: in 2017, 46% of the population in need of health care said they did not use health services because it was too expensive.[10] When they do need to access health care, it can push them below the poverty line.

This is likely to change in the coming years, with the announcement in 2019 of several reforms of the healthcare system. Mali is a good model on health sector reform on the continent, working towards the goal of Universal Health Care (UHC).[16] Under these reforms, starting in 2022, pregnant women, children under five, and elderly people over 70 will receive free primary and curative healthcare. Free contraceptives will be delivered, and thousands of health workers will be recruited within the community health-care system. The State will also ensure that medicines are more affordable.[17]

Public health system structure

The public health system is divided into a pyramidal structure (see Figure 2) with three levels: the central, intermediate and operational levels. The national or central level is the decision-making sphere, where political documents, norms and standards are designed. The central level is the initiator and the guarantor of the national health policy. This level

develops the policies, the standards and monitors the implementation of policy. Referral institutions at this level include 5 Public Hospital Establishments/University Hospital Centres (*Etablissement Public Hospitalier/Centre Hospitalier Universitaire- EPH/CHU*): Point "G", Gabriel TOURÉ, IOTA, CNOS, and Hôpital du Mali.[18] In terms of administration and management, the Ministry of Health operates through the National Health Directorate (*Direction Nationale de la Santé -DNS*), and the Regional Health Directorates (*Directions Régionales de la Santé -DRS*), who supervise the health districts.[19]

The intermediate or regional level oversees the coordination and the implementation of the health policies. The intermediate level gives technical and logistical support to the programmes and activities implemented at the operational level. It is the second level of patient referrals. It includes 9 Public Hospitals (*Etablissment Publique Hospitalier- EPH*), in the regions of Kayes, Koulikoro/Kati, Sikasso, Ségou, Mopti, Timbuktu, Gao, Kidal and the Mother and the Children's hospital of Bamako.

The operational level operates at the health district. This level includes (i) 1,368 Community Health Centres (Centres de Santé Communautaire- CSComs) (2018), which are the first point of access to health services and (ii) 62 Reference health centres (*Centres Centre de Santé de Référence-CSRèf*), the first level for referrals. The CSRef monitors the implementation of health policies and programmes at the community health centre level [20]. Additionally, in health districts one can also find other health structures delivering care including faith-led clinics, NGO clinics, health services of the army, dispensaries and other private health establishments. The 62 Reference Health Centres (CSRef) take responsibility of patients being referred from the community health centres.

CSComs deliver basic health services at the community level, including the prevention and treatment of disease. 200 physicians worked in *CSComs* in 2008.[21] Further, CSComs depend on volunteers from within the communities. Community health workers called *relais communautaires*. *Relais Communautaires* play a fundamental part in risk communication and behavioural change, as well as identifying infectious disease and ensuring appropriate referrals.[12]

Relais Communautaires are not the only health service providers at a grassroots level, there are also the Agents for Community Health (*Agents de Santé Communautaire-ASC*), which have been deployed since 2002 as part of the Community Essential Care (*Soins Essentiels dans la Communauté- SEC*). The ASC provide health services to the community, extending the reach of minimum health services (*paquet minimum d'activités-PMA*) within a catchment area under the supervision of the officer in charge of the *CSCom* [22].

Historically, the access to drugs by the medical system and the public has been a challenge. In the 1980s Mali created the Mali Popular Pharmacy (PPM), an institution in charge of stocking State services with drugs and other consumables. The PPM was eventually unable to respond to the increasing demand by State clinics. Mali progressively liberalised the Pharmaceutical sector, incorporating private actors such as pharmacies and NGOs, which were meant to facilitate access to essential drugs[23]. These measures, however, did not improve affordability, nor entirely resolve the dependency on imported medicines and the challenges in transport and logistics in such a large country.[21]

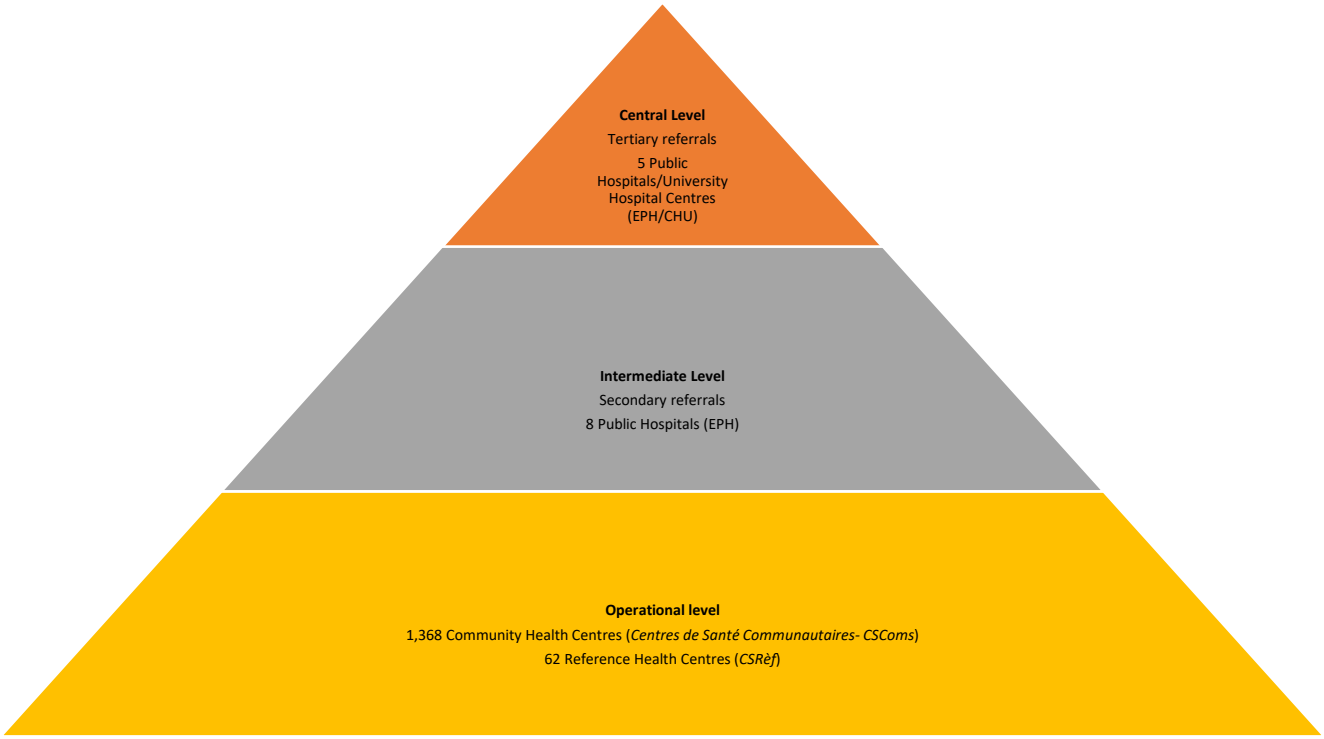

Figure 3. State health system structure

The COVID-19 associated health crisis has meant a significant decrease in the mobility of different health providers, particularly *relais communautaires*. In their household visits before the pandemic, *relais communautaires* were able to identify illnesses with epidemic potential in the community, and they would communicate this to the Community Health Centres (CSComs) to ensure a response and treatment of affected patients. However, this system became less effective due to the pandemic as household visits have been suspended as a result of government restrictions. Further, transport restrictions have made it difficult for people to access health centres. In other words, COVID-19 has shown the limitations of the State health system in Mali. The challenge for the Malian health authorities is to retrieve this capacity for disease prevention, and to ensure the continuation of health services to reduce mortality and morbidity amongst

the most vulnerable populations, and to create capacities to mitigate the impact of the pandemic. [24]

Supervision of activities at all levels of the health system is challenging due to a lack of adequate logistical means and financial resources. This problem of monitoring and coordination has been flagged as a limitation of the Malian Integrated Disease Surveillance and Response System (IDSR). There is a lack of coordination amongst government health structures to supervise lower levels of the system.[25] This is particularly challenging in the border regions where health information systems are underdeveloped, combined with an inadequate human resource capacity.[12] There is weak leadership and governance at the central level to control, supervise and coordinate the implementation of health policies. Further, the government tends to accept any aid, independently of the strategic priorities of the government. There are reports of corruption and diversion of funds, which has led some donors to take projects away from government and use civil society actors instead, or implement asset only projects that involve no cash transfers.[25]

Service delivery and experience of care

Some studies have signalled a need to improve inter-cultural and social skills between health providers and patients. For example, in the case of women seeking perinatal care, women have complained about "rude and sometimes bullying behaviours of health staff, both doctors and nurses", reporting that women are "frequently shouted at and insulted, and were often neglected". Women felt the reception was inadequate, and reported this as one of the reasons they avoided State health facilities to seek perinatal care.[26]

Nomadic populations in Mali, despite being spread over a third of the territory, are disproportionally affected by a lack of access to community health services. Lifestyle, constant mobility and socio-cultural differences makes them less likely to attend State health services. In a study conducted amongst the *Kel Tamasheq* Tuareg, Songhai, Arab, Fulani and Bozo peoples, the barriers identified were lack of transportation (79.4% of respondents), quality of services (39.2%) and high cost of services (35.7). More than 25% of respondents cited that health workers doing medical examination need to be of the same gender as the patient, otherwise they would not attend.[27] Working with Nomadic community health workers (CHWs) recruited within the communities has had positive effects in terms of utilisation, whilst there is a need for further training and support for health workers. Mobile clinic services have improved access, particularly when they are adapted to the material and cultural needs of each nomadic peoples they wish to cater for. This positive impact can be promoted when the design of these programmes is carried out in participatory ways, engaging the communities.

Conflict is severely curtailing access to health care, particularly in the North and Centre of the country (see more details about the conflict in the Annexes detailing the context of Mali). The presence of International, State and non-State armed groups in the central regions (around Mopti and Segou) and in the northern regions (around Timbuktu, Gao and Kidal), intercommunal violence as well as insecurity along the borders severely curtails the travel to health centres by patients, the sourcing of medicine and materials to remote clinics, and the humanitarian access of international organisations. In turn, the insecurity exacerbates the understaffing of these community health services.[28] A steady decrease in functional health facilities in Mali has occurred since 2012, following the insurgency in the north of the country. Government withdrawal due to targeted attacks meant 88% of State health facilities where functional in 2012, then 83% in 2017, and then the number decreased to 78% in 2019. The number of skilled health workers has reduced by 31%. The State-clinics have depended on humanitarian assistance funds to pay the remaining health workers. Further, there has been a blurring of humanitarian and military activities in conflict affected areas. The presence of the UN mission in Mali (MINUSMA), which is considered to be a party to the conflict, and their humanitarian activities to promote their own acceptance amongst the population, have been controversial as some of them have included health related activities. In some cases, this may cause confusion amongst the population, delegitimising the role of humanitarian work, and lead to a loss of trust in the population.[25]

PRIVATE HEALTH SECTOR

After the socialist period in which health care was determined to be solely the responsibility of the State, Mali has been liberalising the health sector since the mid-1980s. In 1985 Mali authorized the entrance of private actors into health and pharmaceutical provision, including for-profit and non-profit health providers, including faith-based and NGO clinics. The State thus promoted the opening of private clinics, treatment offices, consulting rooms, dispensaries and professional or corporate denominational infirmaries and pharmacies. This liberalisation of health provision was carried out in parallel to the State health service decentralisation efforts described above. The development of private for-profit or non-profit establishments have indeed facilitated access to quality health care and service for the population, according to the World Bank[10]. For-profit clinical practices and hospitals, and non-profit facilities, represent 64% of all clinical contacts between the population and the health system, while 24% of contacts are with for-profit facilities.[21] Half of the 2,546 physicians in Mali were practicing in private facilities in 2008. The size of the private health care system may be even larger, as many are informal unlicensed or unregistered providers.

There are, however, severe income and geographical inequalities in the access to these services. Most of the structures are located in large cities, particularly in Bamako, the capital. 2,343 private facilities existed in 2017, of which 56% were based in Bamako. Out of the 70 private hospitals in Mali, 49 were based in the capital.

As part of the 10-year Health and Social Development Plan, Mali is aiming to increase private sector provision and coordination between private and public providers. A 'health map' is to be updated and evaluated by the government every 5 years. However, there is poor coordination between public and private health services and little articulation with public health policy and governance, nor adequate financial, participatory and legal mechanisms to enhance provision to meet the goal of Universal Health Care.[21] Ministry rapporteurs highlight an anarchic development of these private establishments, the data of which are poorly taken into account in the Health Information System[29] and concerns about the quality of provision of unregulated actors.

Alternative health providers are key non-State and non-biomedical health providers, particularly in the rural areas. 80% of rural populations use traditional medicine. There is a wide diversity of *tradipraticiens*[30]*:*

- Herbalists, or *jiridonnaw*, who heal with plants, and their delivery is combined with prayers or incantations. For example, healers use a decoction or maceration roots which is consumed orally and used as a body wash for treating complicated malaria.[31] Herbalist knowledge is normally transmitted within families, e.g. from fathers to sons. Note that women, for example amongst the Bambara, can also be herbalists, both within the household for home remedies, but also in offering treatment for others, and in joining in traditional women's societies involved in preventing and treating disease (Imperato 1981).
- Traditional healers or féticheurs, *basitigi* or *tontigui*, who uses fetishes or charms and herbal remedies.
- Anti-sorcerers, antisorciers, *nyagauw* who can identify sorcerers and thwart their schemes, which can include the appearance of misfortune or disease.
- Divinators, devins, *filelikelaw*, who often use geomancy (*bougourida*) or shells (*kolonninfili*)- tossing objects on a surface and interpreting their distribution- or dream divination.
- Faith-healers or marabouts, *moriw*, who use the Koran to either protect or treat disease.
- Traditional midwives, who play a major role in their care for mothers and babies.

- Drug sellers or médico-droguistes, who sell remedies of mineral or animal origin.

There is a wide knowledge of traditional medicine in the country, both in terms of a compilation of local etymologies of disease, an engagement with traditional healers and herbalists, and an analysis of the pharmacological effect of herbs and roots. This work has been spearheaded by the Department of Traditional Medicine (DMT) within the Institut National de Recherche en Santé Publique (INRSP), Bamako, Mali. In turn, the DMT has created local organisations of traditional healers throughout the country, and facilitated the exchange of experiences between different regions.[31,32] This makes the DMT and those local organisation good interlocutors for epidemic preparedness and response. Studies with the DMT have explored traditional healing and treatments for wounds[33], malaria[31,33], jaundice[34] and schistosomiasis[35]. Others were focused on herbal treatment for pregnancy related issues (Nergard 2015). Another study was carried out linking different local etymologies of mental illness with bio-medical/psychotherapeutic framings.[36] Whilst the emphasis of the research is on the ethno-pharmaceutical aspects, these interlocutors are familiar also with non-natural and non-material explanations of disease in their engagement with traditional healers.

It is critical that any epidemic response engages with this wide array of health service providers to reach a broader proportion of the population. This is relevant in terms of logistics, given that such practitioners may be more numerous than government health workers, especially in rural areas. Further, in terms of trust, people may feel more comfortable receiving information, treatment and advice from these actors than from state health workers.

There is a large unregulated medicine trade in Mali, exacerbated by the lack of available health care services. The high cost of public services also frequently result in self-medication.[10] Medicine is often bought without any prescription on the streets. There is a production and trade of counterfeit drugs that are cheaper than those in drugstores and pose a real danger for consumers. This is because it is not clear what the exact substances prescribed are and if they match with the symptoms of the patient at all. The UN Office on Drugs and Crime has been supporting Malian institutions such as the Central Office for Narcotics and the Mobile Intervention Brigade to stop the trade in counterfeit drugs.[37]

HEALTH-SEEKING AND LOCAL EXPLANATIONS OF DISEASE

Despite the communication efforts deployed to promote the use of State-health services, attendance is low. Despite a very high maternal mortality, 80% of women attended antenatal care services offered by formal health professionals. 46% of women attended maternity clinics on four or more occasions.[2] Trained health workers only attend 67% of

births. [1] This lack of presentation to clinics is more frequent amongst rural women, who are nine times more likely to seek no prenatal care and four times more likely to deliver their babies at home.[38] These inequalities are exacerbated in the case of nomadic pastoralists such as the Tuareg, Moor and Fulani peoples which, due to their mobility, have reduced physical access to health services. Gender dimensions play an important role, as in some contexts women's autonomy to attend clinics or not are curtailed by the preferences of male spouses, family members or community leaders, which may lead to women only seeking assisted delivery when there are complications.[39]

As mentioned, when describing State-health facilities, lack of physical access to clinics, together with perceptions of low-quality provision and user fees make people less likely to attend them. The impact of user fees has been a decreased utilization of health services and a delayed presentation for care, or alternatively incomplete or inadequate care. In turn, when people have had to resort to State clinics and incur user fees, they faced food insecurity and financial hardship, particularly amongst the poor.[40] Distance to health posts and transportation barriers are key in determining people's willingness to present in State clinics. In the case of maternal health services in rural Mali, it is not only "where you live" that matters for the utilization of maternal health services; "who your neighbours are" is also important. Living in close proximity to other women who had utilized modern forms of prenatal care significantly increased the odds of seeking care in a State health clinic[41].

Whilst there is research on reproductive health access and health seeking practices amongst pregnant women, there is a dearth of updated literature on other health issues, both in terms of pathways and of local framings.

Understandings of illness and health

Diseases are framed in vernacular terms, and in the case of illness, people resort to home remedies, and the care of traditional healers within the community. In many cases people turn to health facilities after traditional family treatments have failed[42]. Malian traditional framings of illness include[a]:

- Illness and misfortune are closely interlinked, disease is understood as something that 'catches you' or an introduction of a 'foreign object' into the human body, amongst the Bambara.

[a] For an extensive review on health-seeking practices in Mali, see the edited volume by Brunet-Jailly (1996). [43] Most of the etymologies and aetiologies in this subsection refer to this resource.

- When speaking about illness people may refer to:
    - Localisation of the illness- e.g. *kònòdimi*, pain in the abdomen (*kònò*- abdomen, et *dimi,* pain)
    - Alteration of organs- e.g. *kònòtinyè*, spoiled belly (*kònò* meaning pregnancy belly and *tinyè*, destroyed or spoiled- used to describe miscarriages.
    - Disfunction of organ or a physiological function- e.g. *kònòboli*, leak from the belly (also called *kònòkari*) would be a generic term for diarrhoea.
    - Description of the illness by the organ it affects e.g. *kolo*, meaning tooth or bone, referring to all pathologies linked to dentition, including related diarrhoea.
    - The behaviour of the patient- e.g. *kilikilimasan* (*kilikili,* tremble, and *masan*, scratch), referring to epilepsy (also called binnibana or taakabibana).
    - The resemblance to something else, e.g. *nyònin* (*nyò*, millet, and *nin*, diminutive), referring to measles.

Other ways of defining illness is in terms of the aetiology:

- Illness caused by birds, called *kònònyama*, curse of the bird (*kònò*, bird, and *nyama*, aggressive evil force). Amongst the Dogon and the Bambara some illnesses are attributed to a curse by a mythical bird. These illnesses are sometimes identified in modern medicine as neonatal tetanus or convulsions, for example due to malaria. It is important to note that these non-biomedical aetiologies do not necessarily discourage biomedical treatment. In the case of pregnant women, they must whistle when they hear the bird's cry to avoid that this one "takes" the foetus. Likewise, when this bird crosses her path, she must throw a stone in front of her. She would thus have chased away the *nyama* of the bird which could otherwise wait for the child to take it.[44]
- Disease by wildlife/game, *sogonyama*, game spell (from *sogo*, game, animal, meat, and *nyama*, aggressive evil force), designates the same signs the previous term, with the difference that here, in addition to convulsive syndromes, other manifestations are observed, in particular dermatological (e.g. oozing eczemas). It is attributed to hunting that has done without preliminary precautions, or by mothers having eaten particular animals.

Other disease terminology combines the cause and the symptoms. Some diseases are attributed to the transgression of prohibitions. For example, *tananyèdimi* (from *tana*, or tinè, prohibition, totem, and *nyèdimi*, eye disease) is an eye disease linked to the transgression of particular rules.

Finally, an illness terminology may link two types of classifications, one being the cause of the other. For example, *nyòninkònòboli*, is used to describe measles-related diarrhoea (from *nyònin*, measles, and *kònòboli*, diarrhoea). Another example would be *maranyèdimi*, an eye illness linked to mara (*mara*, polysymptomatic disease, probably onchocerciasis, and *nyèdimi,* disease)

Illness or misfortune at an individual or collective level always have a reason to emerge, a cause to identify, as things do not 'just happen'. It is the task of divination to identify the ultimate cause of misfortune and to recommend strategies to address it. Amongst the Bambara, the following aetiologies are determined:

- Natural, God-sent or fated illnesses. Natural illnesses are those that can be explained by external material factors (e.g. cold weather), and God-sent and fated illnesses (which can overlap) attribute it to destiny or the work of God.
- Humoral hot and cold theories of disease are common amongst the Kel Alhafra Tuareg and the Bambara. The balance of hot and cold forces is shaped by environment, living conditions, and nutrition. Certain diseases emerge when that balance is disturbed[1].
- Illnesses due to the breaking of prohibitions, which can be related to restrictions of sexual behaviour, dietary restrictions, or hunting (as indicated above).
- Illnesses due to evil doing, either directly, through fetishes or *tere* (an inner force within people who can cause misfortune or wellbeing independently of the person who hosts it). This includes the work of *maajuguw* ou *mògòjugu* (*maa* or *mògò*, person, and *jugu*, evil), people who are liable to hurt someone's health or wellbeing. The illness is defined to be the work of man: *maabolobana*, (*maa*, person, *bolo*, hand, et *bana*, illness). They cause normally acute or chronic haemorrhages, as well as accidents and brutal deaths, as these tend to elicit ulterior explanations. Sorcerers are believed to eat or consume their victims' bodies before death.
- Illnesses due to ancestors: ancestors coexist with the living upon the earth and are subject to offerings and sacrifices. When ancestors are discontent with the living, their wrath can create illness called *suminè* (*su,* death, and *minè*, catching). Sometimes this translates into agitation of the patient with delirium, headaches that can lead to death.
- Illness caused by *Jinni*, *jinèbana*. These are spirits from the bush that coexist with humans. They can be called *kungofènw* (things from the bush) or *sigijiènw* (things that settle within). *Jine* are often protectors of the community. Illnesses related to them include several mental health pathologies.

- Transmissible diseases. They are called *bana yèlèmataw* (from *bana*, illness, *yèlèma*, transmit, *taw*, which are affected), independently of the mode of transmission. They fall into the following categories:
    - *finyèbana*, wind disease generally refers to an infectious disease of an epidemic nature. This includes measles (nyònin- small millet), *keteketenin* or *ketekete* for whooping cough, or *kapasajabana*, for diseases that stiffen the neck such as meningitis. It is understood that these diseases are transmitted from patient to patient through wind or flies.
    - *bana yèlèmata* for hereditary or sexually transmitted disease

When determining the taxonomies, it is important to find the different use of language for illness in different languages and how it is attributed to different illnesses and aetiologies. For example, *sumaya* which means "slow down" is commonly used in Bambara, indicating intellectual and physical activity. Other Bambara healers will speak of *Nènèdimi* (fever) or *farigan* (hot body) (Diarra et al 2012). Malaria is normally attributed to ingestion of food, transmission through mosquitoes, dirty conditions or the rainy season. In the case of schistosomiasis two words were found to be used in Bambara to designate urinary schistosomiasis *sukunè/gnèguènè* (urine) *bleni* (red) and *damadialan* meaning literally infection of the urinary tract. The name used for intestinal schistosomiasis was *konona* (in the stomach) *damadialan* (schistosomiasis) that could be translated by the form of the disease in the stomach.

In the Bambara/Bamanan beliefs, the majority ethnic group in Mali, communities first seek to know the origin of the disease on a mystical level before seeking the appropriate treatment in the power of plants and ritual healer or traditional practitioner. On the etiological level, in the Bamanan environment, divination is a common practice to identify the cause of diseases and seek the cure.[45]

Decisions about health

Decisions about whether and which external health services are accessed, regardless of who they are for, are usually made by men within the family, either spouses or male elders. According to the 2018 DHS survey, approximately 37% of women participated in at least one household decision in general. A total of 28% of the women reported participating in deciding whether to visit their relatives and 20.5% participated in deciding their own healthcare.[46] Although gender roles are strict across the country and social groups, women from ethnic groups (e.g. Tuareg, Fulani), may have more autonomy in decisions about health and in other spheres. Responders need to find ways to engage both with men – who have more decision-making power and freedom to access information outside the home – as well as with women who, while less able to make decisions, are

keenly interested in the health of their families, and are more likely to undertake homecare.

INFECTIOUS DISEASE OUTBREAKS, RESPONSE AND PREPAREDNESS

DISEASE RISK, VULNERABILITY AND VACCINATION

Mali experiences regular and seasonal outbreaks of endemic infectious diseases. For example, in 2020 Mali experienced Crimean-Congo Haemorrhagic fever in Mopti and Douentzza, Yellow fever in Bougouni and Kati, vaccine-derived poliovirus, and an increase in malaria caseload in the north of the country. There were also over 400 cases of measles in the year.[47] Other notable diseases of lower prevalence are Tuberculosis (with an incidence of 55 cases/100,000 population), HIV/AIDS (with a prevalence of 1.2%, lower than most of Mali's neighbouring countries), schistosomiasis, onchocerciases, dracunculosis, lymphatic filariasis and soil-transmitted helminths.[5]

Preventable diseases: Rapid turnover of health personnel, and difficulties in having operational services in conflict areas in the centre and north of the country are impeding a widespread vaccination coverage against preventable diseases. For example, according to the DHS survey in 2018, only 69,8% of children are vaccinated against measles. This lack of vaccine coverage has led to outbreaks of measles and whooping cough (2018), and yellow fever (2019). The extremely centralised nature of the early warning systems has made vaccination programmes less responsive and adaptive. As a result of a low resourced community health system and limited humanitarian access, outbreaks of dengue, CCHF, Rift Valley Fever and vaccine-derived poliovirus have occurred.[47] The COVID-19 pandemic has disrupted routine immunization activities, through interruption of the services and making international trade in vaccines more difficult, exacerbating the emergence of these preventable diseases [5].

Meningitis cases are on the rise. In 2018, Mali experienced a 29.35% increase in meningitis cases (758) of suspected meningitis cases. Measles cases increased from 26 cases in 2017 to 476 cases in 2018, an increase of 20.35%. [6] Malaria prevalence varies across regions, from a minimum of 1% in Bamako to a maximum of 30% in Sikasso region. The disease prevalence in Mali among children under five years of age was 19% in 2018. Malaria is more prevalent in the south and central regions. The maximum prevalence rate (30%) of malaria is recorded in the region of Sikasso.[48]

The outbreak of yellow fever, following epidemiological surveillance, was then attributed to low vaccination coverage in the affected localities of Kati (80%) and Manakoro (88%). In response, Malian authorities carried out active search for cases and rolled out risk communication and community engagement activities.[49]

Despite the setbacks indicated above in terms of measles immunisation, vaccination is one of the strategies favoured by the health authorities in Mali and is one of the strengths Mali has in epidemic preparedness according to the Prevent Epidemics programme. The results obtained regarding the extension of immunization coverage are satisfactory, with the exception of the low measles vaccine coverage indicated above. The Ministry of Public Hygiene, states that they are meeting their vaccine targets: for example BCG: 99%; VAR / AAV: 90%; PENTA3: 95%; Td2: 90%; IPV / OPV: 95%; PCV13: 95%, ROTA: 95%. This result, examined by region and by type of vaccine, nevertheless reveals disparities.[50]

Measles cases. Measles vaccination occurs as part of the routine vaccination programmes for children in Mali. Together with the provision of items such as bednets to prevent malaria, these vaccinations through the State system take the form of campaigns that are rolled out vertically through the structure detailed above. The vertical nature of these campaigns, rather than a health-system approach, mean that instead of strengthening the health system, they disrupt the normal health services provided by the CSComs, and forego the possibility of offering an array of services rather than just one vaccination that may not be a priority for the population.[51] There is also emergency vaccination when there are spikes in cases, for example of measles, to avoid the occurrence of outbreaks. These emergency vaccinations are often a result of the collaboration of the Ministry of Health with international NGOs such as Doctors Without Borders (MSF).

Sanitation. A major driver of disease risk is a lack of sanitation and clean water. Nearly 7 in 10 households have access to an improved source of drinking water (95% of urban households, compared to 62% of rural households). More than half of households (55%) use improved sanitation, including improved shared and non-shared sanitation facilities. More than one-third of households (35%) use an unimproved facility, and 9% have no facility.[2] Rural areas are disproportionally affected by a lack of WASH infrastructure, with an open-air defecation rate of 15.4%.[52] This is exacerbated in conflict areas in the centre (Mopti and North Ségou) and the north (Gao/Ménaka, Timbuktu/Taoudénit and Kidal), which results in destruction of WASH infrastructure, and protracted internal displacement that puts pressure on existing facilities. For example, in Gao and Kidal the access to drinking water is 31% and 40% respectively, compared to the country average of 68%.[52] These pressures on WASH infrastructures enhance the risk of oro-faecal diseases

such as cholera. A key focus of preparedness should be to expand sustainable access to clean water and sanitation in affected areas.

Migration. There is seasonal and cross-border migration for business or employment purposes and cross-border movements of nomadic pastoralists seeking water points and pastures. People still use traditional routes from the north to the south of Mali, as well as to coastal countries in West Africa. These people on the move are facing growing insecurity at the border. In turn migrants can also inadvertently contribute to the spread of epidemics. For example, Rift Valley Fever was imported from Niger due to traffic connecting the Niamey-Gao road, popular with transport companies from Mali, Niger and Nigeria.

Zoonotic disease. Similarly to other Sahelian countries, Mali depends heavily on livestock for rural livelihoods and the national accounts. Mali has the second largest number of livestock in the ECOWAS region (with over 10 million cattle, 36 million sheep and goats and 1 million camels). These animals are likely to cross-borders seeking pasture and arriving to market, making regional spread of zoonoses possible. The most important zoonoses in Mali (in terms of their economic and public health impact) are: anthrax, bovine tuberculosis, rabies, viral hemorrhagic fevers (Crimean-Congo hemorrhagic fever, Ebola, Lassa, Marburg, Rift Valley fever, yellow fever), and zoonotic influenza.[53]

Table 1 Notable disease outbreaks in Mali 2000-2021

Disease	Notable outbreak years	Context
Meningitis	1996-1997, 2009-2010,2014	During the dry season between December to June, dust winds, cold nights and upper respiratory tract infections, increasing the risk. Transmission of *N. meningitidis* may be facilitated by overcrowding and displacement.
Cholera	2003, 2004, 2005, 2011, 2002	Outbreaks spread along the Niger River in Mali (in Bamako, Segou, Mopti, Timbuktu and Gao) and in the Senegal River in Kayes, and where access to clean water and sanitation is limited, such as among displaced communities.[54]
Measles	2003, 2015, 2019 2020, 2021	Outbreaks of measles occur nearly every year across the country. While coverage has increased over the years, immunisation levels (currently at 68%) remain insufficient for herd immunity. Outbreaks linked to conflict areas, e.g. in the Timbuktu area.
Polio	2020, 2021	Small-scale vaccine-derived poliovirus outbreaks, linked to insufficient coverage of polio vaccination. Mass oral vaccine campaigns have been rolled out in 2021.
Yellow fever	2005, 2006, 2018, 2019	Linked to the rainy season and low vaccine coverage. Transmitted via mosquitoes, hence insecticide bednet provision campaigns important. Present currently in Bougouni and Kati.

Source: authors (compiled from various source)

VULNERABLE POPULATIONS

Women and children are most exposed to disease and the consequences of disease. This segment of the population is characterized by high morbidity and mortality. In Mali, women are slightly more affected than men due to constraints in their mobility, for physical, economic and cultural reasons (see above). Women are less able to access information about health, are less likely to manage their own finances, and are less likely to be able to make decisions autonomously about seeking healthcare.[55] Children are more likely to have life-threatening health outcomes, for example if infected with malaria, and are particularly vulnerable to preventable diseases when vaccination coverages are inadequate, as is the case with measles vaccination.

Migrants, Internally Displaced People and refugees: populations that are living in conflict regions or displaced by conflicts are the most vulnerable. Inadequate housing, lack of adequate (or overstretched) WASH infrastructure, constant population movements make both host communities and internally displaced people vulnerable to infection. Camp dwellers and those living with host families are particularly vulnerable. There are almost 50,000 refugees and 350,000 Internally Displaced People in the country. State violence, international foreign military, armed groups and inter-ethnic strife is displacing people and making them vulnerable to disease. Populations within institutions with overcrowding such as prisons are also vulnerable to disease, such as COVID-19.[24]

Nomadic pastoralists: peoples like the Tuareg, Moor and Fulani are vulnerable due to their mobility, as they have reduced physical access to health services. Barriers to health care included these difficulties in transport, and perceptions of low quality and high costs of fees. Nomadic populations do not have access to community-based health interventions. Mobile health clinics have proven useful to reach nomadic pastoralists, who have perceived them as suiting their needs, whilst at the same time advocating for more community ownership of the services.[27]

Poverty and pre-existing conditions: COVID-19 has highlighted how pre-existing conditions, often linked to poverty and discrimination, make particular social groups more vulnerable to infection and the health impact of the disease. People with chronic diseases (such as NCDs like hypertension or diabetes) or malnutrition are more likely to be adversely impacted by other infectious diseases like COVID-19. [56] HIV/AIDS also plays an important role in vulnerability to disease, with prevalence highest amongst women (particularly sex workers) and young people.[57]

EPIDEMIC AND OUTBREAK RESPONSE GOVERNANCE

The Malian State has structures in place for disease surveillance and epidemic response. Mali has a department responsible for epidemiological surveillance, which draws up policy documents, strategies and coordinates the implementation of activities. This department works with a national unit and crisis committees.

The operational aspects are handled by the major research institutes under the guidance of the Ministry of Health. In August 2001, Mali created the National Center for the Fight against Disease (*Centre national d'appui à la lutte contre la maladie -CNAM*), dedicated to epidemic preparedness and response. The Centre would carry out continuing medical training, promote research on endemic and epidemic disease and to carry out and disseminate research on leprosy, malaria, TB, HIV/AIDS, onchocerciasis, trypanosomiasis and other pathologies such as avian flu [58].

In order to make its epidemiological surveillance efforts more effective, Mali decided in July 2019 to create a single research institute called the National Institute for Public Health (*Institut National de Recherche en Santé publique INSP*) by merging: it merged the CNAM (mentioned above), the National Institute for Public Health Research; the Center for Research, Studies and Documentation for Child Survival, the National Food Safety Agency, the Vaccine Development Center, the National Influenza Center, the Pharmacovigilance Center, the Operations Department of Public Health Emergencies of the National Center for Support to the Fight Against Disease.

The governance of the response to epidemics and outbreaks is the prerogative of the State and its technical and financial partners. In response to a major pandemic like COVID-19, the prime Ministers' office oversees the Technical Coordination Committee (TCC) and the Scientific Advisory Committee (SAC). The TCC provides strategic orientation and evidence-based guidelines for the management of the pandemic. It coordinates multisectoral activities across the country e.g. police, border security, veterinary services, national communications, academia and civil society.

The COVID-19 response

The TCC is codirected by the Coordinator of the National COVID-19 Response Committee and the Coordinator of the National Platform for Risk Management (led by the Ministry of Homeland Security and Civilian protection). TCC recommendations are reviewed and adopted during inter-ministerial meetings led by the Prime Minister.[59]

The SAC's remit is scientific management. The SAC is composed of scientists and clinical researchers who meet weekly to assess the status of the epidemic and make recommendations to the MoH on COVID-19 operational issues, including local standards of care and research priorities. SAC representatives participate at the Higher Council of National Defense to advise the President of Mali on strategic decisions regarding COVID-19, including curfew, school closures and lockdowns. Within the MoH, a complementary committee of subject matter experts from different MoH departments was created to oversee control and surveillance.[59]

The government put in place a crisis committee (Comité de Crise COVID-19) to roll out an emergency response plan for the pandemic. This committee serves as the point of contact and advice for both administrative authorities and the population; it holds regular meetings to take stock of developments in the situation, ensures with the medical teams the imposition of quarantines, tracks suspected cases manages positive cases; and ensures that epidemic care unit is functional.

In the regions and districts, the *Comité de Crise COVID-19* coordinates preparedness and response activities. Across the country, rapid intervention teams were mobilised at all levels of the health pyramid, strengthening epidemiological surveillance, ensuring provision of adequate inputs to health establishments, the development of guidelines and protocols, case documentation and logistics. The committee also supports the operational capacities of border entry points.[60]

Surveillance

Mali's epidemiological surveillance is built on the premise of building on communities to detect and confirm cases to enhance the response. The strategy is called Community-Based Epidemiological Surveillance (Surveillance Epidémiologique à Base Communautaire (SEBAC) inspired by One Health.[61] In line with the pyramidal structure, epidemiological data is fed back from the community level to the central level through the District Health Information System 2 (DHIS 2). Community-based epidemiological surveillance relies on Community Health Workers (CHW), *relais communautaires* and traditional healers at the level of community health structures. [62] There Is still room for improvement in community surveillance in terms of reaching all *CSComs* and the capacity at all levels to produce and share reliable data. Further, Mali carries out other forms of surveillance in accordance with WHO standards: routine surveillance, sentinel surveillance, active surveillance/ad hoc surveys, case-by-case surveillance, etc. Mali follows the WHO technical guide for integrated disease and response surveillance (surveillance intégrée de la maladie et la riposte (SIMR).[63] It is unclear in the literature whether the adherence to these guidelines has led to improved epidemic surveillance. This tool will

make it possible to follow the evolution of diseases, prioritise public health investments, detect emerging infectious threats and evaluate the impact of response interventions. [64] The surveillance system also takes into account the movement of people, controlling air, land and river entry points with health workers deployed to detect suspected cases. [65]

Mali's health information system has undergone several changes and reforms from independence to the present day,. Originally health information was fragmented as different systems were siloed, with data management divided amongst different partners. In turn there was a lack of coordination in the management of limited resources (e.g. finance, or human resources). This led to a situation in which health data were not placed to be able to influence decision-making. Mali, like other countries in sub-Saharan Africa, has adopted DHIS2 (funded by USAID), to standardize the collection and feedback of information from the operational level to the central level. DHIS2 now makes it possible to enter and feedback data in real time on all the chains of the health pyramid, to analyze them and produce reports in real time. DHIS2 now makes it possible to adequately monitor the evolution of diseases.[66]

Both the implementation of SIMR and the consolidation of DHS2 in Mali is a work in progress, with Mali currently in the process of orchestrating this system that integrates improved disease surveillance, human resource management, logistics and stock management. The consolidation of the health information system for disease response is being curtailed by lack of human resources, lack of coordination between the different players, under-investment and a lack of capacity in the border regions.

Another challenge is that the private sector is not integrated within the national health information system. The private sector rarely provides reliable and updated data to national authorities. This lack of public-private coordination had consequences in epidemic response. For example, during the Ebola response, the presentation of Ebola patients in a private clinic were not notified to the National Crisis Community until several health professionals in the clinic had already been infected [23].

OUTBREAK RESPONSE AND PREPAREDNESS EXPERIENCE

The experience of Ebola during the West African pandemic of 2014-2016 showed a successful response governance that has been a model for other countries[b].[67] Mali avoided the spillover of Ebola into its border, containing the outbreak to 8 cases and 6

[b] For a detailed description of the multi-level governance and the successful eradication of Ebola in Mali see https://www.afro.who.int/news/government-mali-and-who-announce-end-ebola-outbreak-mali

deaths. In October 2014 Mali detected the first case in the Kayes region bordering Guinea Conakry. Mali had already ramped up surveillance, active case finding and preparedness activities, strengthening border crossings with affected countries. This included temperature screening, hand washing, information gathering and providing health information to travelers. Mali also trained staff and exchanged information with neighbouring countries. The Kayes hospital successfully informed regional and national health authorities, ensured isolation of patients, and ensured handwashing. The SEREFO laboratory already had trained staff and equipment given their experience with TB and HIV/AIDS for the identification of Ebola (confirmed by the CDC), producing timely results for appropriate contact tracing. There was good coordination in the Ebola response coordination group, including national, regional and international partners (UN Agencies like UNMEER, civil society, NGOs, etc.). The Emergency Operation Centre at the Ministry of Health managed the response, CDC supported contact tracing and MSF supported Ebola Treatment Centres. Technical communication and social mobilisation were supported by UNICEF. The success of interventions depended on the collaboration of official authorities with these agencies, and most importantly, through extensive work with religious, community and family leaders and in the schools. Community dialogue was implemented door-to-door and at community level. The collaboration of families in Mali was decisive to the success of the response. Religious communities (mosques, Islamic associations) played a massive role, raising awareness (e.g. around handwashing) and drew attention to facilities and health services.

Hundreds of health workers were trained in Disease Prevention and Control, Epidemiology and Contact tracing. Trainings were done at the Emergency Operations Centre and to journalists for data management and mapping, and to enhance coordination of activities. Rapid Response Team from the Ebola Coordination Centre worked quickly in the field when there was a suspect case, taking samples, taking people to the ETC, but this would only follow when appropriate sensitisation of communities was carried out. The Emergency Operations Centre also gathered information about rumours and community feedback to shape messaging within the communications policy.

Mali was declared Ebola free in 2015. The threat of Ebola strengthened Mali's surveillance and preparedness measures and monitoring of borders and keeping contact tracing and community engagement. This pre-experience has been positive in mobilising resources to subsequent emerging epidemics such as COVID-19 (see below). Mali also participated in a vaccine trial of the cAd3 Ebola vaccine, being the first country in the world to test the first monovalent Ebola vaccine, in which 91 Health workers were vaccinated.

The fight against HIV/AIDS is also an important public health experience in Mali, particularly in terms of political commitment. Political and health authorities made important commitments towards combating the HIV/AIDS pandemic, as illustrated by the adoption of Law N°06-028 of June 29, 2006, relating to the provisions for prevention, care, control of the epidemic and the protection of people living with the disease. The government of Mali has made ARV therapy free of charge, with the support of international donors. Thanks to its sustained efforts over several decades, Mali has managed to drastically reduce the incidence of this epidemic [57].

COVID-19

After the confirmation of the first case of COVID-19 in Mali in March 2020, Mali's health authorities, led by the Ministry of Health, set up a COVID-19 crisis unit and rapidly developed an action plan. The crisis committee meet daily to coordinate and update information gathering and response activities, and they communicate with the public on the evolution of the pandemic. Response activities have included the strengthening of epidemiological surveillance, in particular the surveillance of entry points, the collection and feedback of information in real time, and building the capacities of stakeholders. The response has also invested in the analytical capacities of laboratories. Health centres have been provided with stocks of drugs and protective equipment for case management as well as products to disinfect surfaces. It Is still unclear whether these activities will lead to containment or mitigation of future waves of COVID-19.

Mali is also carrying out sociological surveys to readjust the interventions deployed (Ministère de la Santé et des & Affaires Sociales du Mali, 2020). The COVID-19 response needs to use this knowledge around biological, cultural and social dimensions of vulnerability to protect populations at risk such as "homeless people and individuals with endemic and chronic diseases, especially people living with HIV". [68] These people are also being affected by the disruption of care and treatment due to COVID-19. [68] As mentioned above, people in conflict areas are particularly vulnerable. Risk communication and community engagement activities have been rolled out to protect the most vulnerable populations. For example, in Mopti region, the COVID-19 cluster has supported displaced people from the Koro community. Catholic Relief Services and their partners have distributed COVID-19 prevention kits (facemasks, hand sanitiser, soap and buckets) as part of a sensitisation campaign on COVID-19 health prevention. [56]

COMMUNICATION AND TRANSPORT

This section explores the media, communication and logistic aspects relevant to epidemic response. The importance of mobile phones and social media platforms is

growing in Mali, and these have been used for risk communication and community engagement in the past. Mobile phone coverage has increased rapidly in Mali, doubling in the last ten years. There were 116 mobile subscriptions per 100 people in 2019, and is highest among urban males.[1] Internet access is relatively low, with an internet penetration of 24% in January 2020, with 4.85 million users. The number of internet users is constantly increasing, for example there was a 7.5% increase between 2019 and 2020. People tend to connect to the internet on their mobile phones (68% of internet users). 1.7 million Malians use social media, an 8.5% penetration rate[70].

Malians who use social media rely on Facebook and WhatsApp. Social media plays an important role in mobilising civil society, and is a vehicle for dissent with the government. The state restricts social media access to clamp down on dissent. Social media has also been used for community engagement in Mali, for instance as part of the UN system embracing virtual meeting and technology during COVID-19, the use of Whatsapp for engagement with local partners has been expanded. For example, MINUSMA (UN Multidimensional Integrated Stabilization Mission in Mali) launched 'MINUSMA Kounafoni Blon' (MINUSMA info hut), offering different regions in their local languages open discussions with the public about specific themes[71].

Communication with communities must be established in local languages. Mali is linguistically diverse, with different languages corresponding to different ethnic groups (see Annexe). The most spoken language is Bambara, spoken by 50.2% of the population. This is followed by Fulah (7.46%), Dogon (5.84%), and Soninke (5.19%). Other important languages are Minianka (3.36%), Tamashek (spoken by the Tuareg- 2.8%), Marka (2.09%) and Senoufo (1.82%). Other minority languages include Bozo, Xasongxango, Hassaniya, and Bankagooma.[72] French is the official language, but only 5-10% of the population speak it. Only 35.5% of Malians over 15 are literate, with great gender disparities (46.2 of men are literate vs. 25.7% of women). Amongst young people the gender gap has closed with a 57.8% of literate young men and 43.4% of young women.[73]

Health communication is best delivered when relying on popular and trusted channels. Radio is still the media channel with the widest outreach, reaching over 90% of the population. There are hundreds of stations, operated by private and community broadcasters, non-commercial radios, and by the state-run Office de Radiodiffusion-Television du Mali (ORTM). Community radios broadcast in local languages in rural areas and are important sources of information with a high level of legitimacy.[74] The Malian authorities and the UN system are concerned about the infodemic in the country, which requires countering misinformation and providing reliable information. For example, MINUSMA is broadcasting a myth-busting programme in Mikado FM, where listeners can

ask questions and receive reliable information about COVID-19, as well as receive prevention messages in local languages.[71]

Knowledge of the transportation networks is important to determine the vulnerability of geographical transmission of infectious disease and to predict the appearance of new clusters. Although paved roads have increased in recent decades, a significant area of the country remains inaccessible by car, especially during rainy season. Mali's transportation systems are concentrated in the Sudanic and Sahelian regions. Mali's road network links Bamako with ports in nearby countries (as Mali is landlocked). It links to Abidjan in Côte d'Ivoire, Dakar in Senegal, Kankan in Guinea, Monrovia in Liberia, and Banjul in The Gambia. An important corridor is the one to Dakar, and road (and train) trade with Senegal has been most important in recent years. Other roads link Bamako and the regional capitals. An all-weather road connects Gao and Sévaré (Mali) and is part of the Trans-Sahara Highway that links Algeria and Nigeria. The train (also affected in the rainy season) tracks run from Koulikoro, northwest to Kayes and Kidira and then to Dakar. River transportation occurs along the Niger and the Senegal, the main river port being Koulikoro.[75] The conflict in the centre and north makes transport difficult, both in terms of road safety, and because of bans on the use of motor vehicles: for example, humanitarian agencies are having to deliver vaccines by donkey as motorcycle transport has been banned.[76]

GOVERNANCE AND KEY ACTORS

Mali has experienced a turbulent political history following independence, including several coup d'états, periods of military rule, rebellions by the Tuareg, as well as jihadist and French foreign interventions. (see Annexe).[77]

In the context of epidemiological surveillance, Mali is supported by several technical and financial partners. These partners can be classified into two groups. Partners who support policy initiatives and those who support the implementation of interventions. Policy initiatives are supported by partners such as WHO, USAID, World Bank, UNICEF, UNFPA, OCHA etc. USAID is supporting Mali through the Regional Directorate of Health (DRS) in the design and implementation of a surveillance and data management system relating to epidemiology in Mali. At the level of implementation, Catholic Relief Services, the Red Cross, the ICRC, the CDC support the implementation of activities in the field. In the COVID-19 response, United Nations Humanitarian Affairs (OCHA) and a dozen partners support health services of Mali at a technical level, ensuring the implementation of the response plan across the country: these humanitarian actors include Mercy Corps, DRH – Gao, NGO Global Charity Mali, *Secours Islamique* France, International Relief Committee,

Solidaridad Internacional, International Medical Corps, ACTED, DEDI-NGO (from Burkina Faso), World Vision, Action Against Hunger, Terre des Hommes, UNICEF, IOM, Norwegian Refugee Centre, Welthungerhilfe (WHH), and the International Committee of the Red Cross. [56] The National Malaria Control Program is supported by USAID, implementation at the operational level was supported by Population Services International (PSI), the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) [78].

Table 2 outlines various administrative, traditional and religious leadership structures in the country which epidemic responders should be aware of as well as make efforts to collaborate with in the event of an epidemic.

Table 2 Political, traditional and religious leaders in Mali, by administrative level

Administrative Level	Political Leaders	Religious Leaders	Traditional Leaders
National	President of the Republic, President of the National Assembly, Prime Minister Ministère de la Santé et de l'Hygiène Publique Haut Conseil des Collectivités Territoriales (H.C.C.T)	Haut Conseil islamique malien (HCIM) Ligue malienne des musulmans et érudits du Mali (Limama) Eglise catholique du Mali Eglise Evangélique protestante du Mali	Réseau des Communicateurs Traditionnels pour le développement (RECOTRADE) Confédération des associations de tradipraticiens et herboristes du Mali (Cathema), Confrérie des Chasseurs du Mali
Regions (n= 8)	Governors, Presidents of regional councils President of Regional Assembly Regional Health Directorate	Regional body of Haut Conseil islamique malien (HCIM) Regional body of Ligue malienne des musulmans et érudits du Mali (Limama)	The same organisations are represented in this level
Departments (n=49)	Préfets President of Cercle Council Chief Medical Officer of the District	Local body of Haut Conseil islamique malien (HCIM) Local body of Ligue malienne des musulmans et érudits du Mali (Limama)	
Communes (n=703)	Mayors Sub-préfect		

Villages (n=11,540), Neighbourhoods (*quartiers*)		Imams	Village Chiefs Tribal Chiefs

Source: authors (compiled from various sources)

COMMUNITY RESPONSES TO OUTBREAKS AND OFFICIAL RESPONSES

Infectious disease risk communication in Mali: The Ministry of Health hosts a department specialised in health communication, the National Centre for Information, Education and Communication for Health (*Centre national d'information de l'éducation et de communication pour la santé- CNIECS*). The CNIECS designs and implements policies for social mobilisation for public health. It also produces and shares health information, education and communication (IEC) resources. It designs and implements communication and messaging in health campaigns, it disseminates health promotion education topics in different channels and monitors and evaluates the impact of their communication activities. As mentioned above, the CNIECS played a significant role in addressing misinformation during the Ebola epidemic, and provided reliable and trustworthy information about the virus, facilitating people's adherence to prevention measures. The CNIECS carries out communication for social behavior change in tandem with epidemiological surveillance, whilst involving relevant stakeholders depending on the epidemic.

When an outbreak occurs, the health authorities run awareness campaigns using a variety of communication channels, including traditional media such as TV and radio, the internet, sketches, street theaters, town criers/*griots*, and even sharing information on television screens in airports. The response focuses particularly on television and community radio stations. Civil society also plays an important role in awareness campaigns, however, with a lesser impact in raising awareness, as it has relatively less resources than the State. There is a lack of engagement with law enforcement and security forces in awareness programs, which can help in promoting compliance with public order measures.[61] Communication strategies in response to COVID-19 have focused on disseminating messages, raising awareness in parallel to the distribution of hygiene kits.[56] In the context of the fight against malaria, three strategies are employed by humanitarian actors: advocacy towards political leaders and their partners, social mobilisation of humanitarian agencies involved in malaria response and behavioural health communication at different levels. [78] In Mali the exchange of information between

relevant humanitarian actors and stakeholder has been promoted through the creation of a daily newsletter. [79]

Working with *relais communautaires* and civil society*:* The presence of *relais communautaires* and, more recently, the *Agents de Santé Communautaires* (see section above on Public Health-Care) has been a major asset in epidemic response. Although there are not enough of them for such a large territory, these actors have been key in reducing morbidity and mortality. The community-based Epidemiological Surveillance Strategy of Mali (*Stratégie de Surveillance Epidémiologique à Base Communautaire-SEBAC*) relies heavily on civil society organisations and these relais communautaires (similar to community health workers), who play a key role in the peripheries of the system to implement health interventions, to carry out awareness raising and to ensure early detection of epidemic threats.[80] Volunteers are recruited within the communities when outbreaks occur and are trained in contact tracing. For example, during the Ebola pandemic, State health authorities with the collaboration of the CDC, WHO and the Red Cross trained and equipped 60 volunteers in contact tracing, and deployed them in the Kayes region and in key areas of Bamako.[81] Epidemic response also relies on civil society networks for community mobilisation. The most important networks include: The National Federation of Community Health Associations of Mali (FENASCOM), the Network of Traditional Communicators for Development (RECOTRADE), the Confederation of associations of traditional healers and herbalists of Mali (*Confédération des associations de tradipraticiens et herboristes du Mali- Cathema), the Confederation of Hunters of Mali (Confrérie des Chasseurs du Mali*), community and religious leaders, and women's and youth groups. These organizations help to raise awareness and mobilize communities.

Vaccine acceptance:

There are very few studies carried out in Mali on vaccine acceptance, even when several vaccines trials have occurred in the country, including Ebola, Flu, or Malaria. There is more social science information related to HPV vaccines. In this case the response was relatively positive, with 80% accepting vaccination after they received information, and indicating the decision-making (as seen above) was shaped by the priorities of fathers and husband[82], with men being much more likely to make autonomous decisions. This means men should be involved in community mobilisation efforts in vaccination (as well as in health issues around contraception, pregnancy, and childbirth) to ensure better women and girls health outcomes[83]. The PREVAC programme trialling an Ebola vaccine indicated the importance of community engagement. Community mobilisers were recruited, including community workers and community champions, as well as people who were role models in their area (soccer coaches, nurses, etc.). These community mobilisers were involved in the recruitment and follow-up of trial participants.[84]

The Wellcome Trust report carried out telephone interviews in Mali to reflect on trust in vaccination.[85] Due to the small sample, the results should be considered with caution, and understanding that there will be wide differences between social groups and geographies in Mali. According to the survey, 66% of respondents said they thought vaccines were safe, and only 12% percent said that science disagrees with their religion. When asked if they would choose religion when it disagrees with science, 78% said they would choose religion. This highlights the importance of bringing religious leaders on board in vaccination campaigns. The survey also highlights that families prioritise children's vaccination, with 93% of households with children saying that they have vaccinated their children at least once.

Whilst this data of general acceptance of vaccines is congruent with reports of high potential acceptance of vaccines from the WHO COVAX scheme in Africa, the LSHTM, for example, reported in one of their studies that 78% of respondents in Africa would take a COVID-19 vaccine 'if deemed safe and effective'. However, there needs to be a fine-grained survey across social groups and geographical areas in the country. For example, some light surveys have highlighted potential vaccine hesitance amongst mining employees, with only 25% considering vaccination. This hesitancy is, however, likely to change as the number of vaccinated people increase and reports of no serious side effects continue.

Positive vaccine mobilisation efforts have included: (i) mobile vaccination clinics reaching the most remote populations (particularly important in conflict settings), (ii) broadcasting information on the vaccine using trusted channels and interlocutors, such as religious leaders, traditional leaders and health workers; (3) supporting the production of information material tailored to the literacy, cultural and linguistic need of communities.

Trust, inclusion and local forms of social organisation and authority

Social and political histories define the trust relationships between citizens and state actors in relation to health interventions. In the post-colonial era, the centralised and the coercive nature of the State led communities to distrust State administrators. The emergence of local government since 1999 changed the landscape. Although there are local and regional variations, local government is closer to and more approachable by the population, and it is taken into account by state administrators (e.g. préfet, sous-préfet etc), or by its technical services staff. In places were state authorities and local authorities have worked together involving local actors, trust relations have been successfully generated.[86]

Some social groups have had more explicitly fraught relations with the state in the past (e.g. the nomadic Tuareg). The Bambara (in the Centre and South along the Niger valley), and to a lesser extent Malinké (in the Southwest and West), have dominated the political life of Mali through their geographical presence around the capital Bamako and their Western education.[87]

The general population also is concerned about corruption and lack of democracy, exacerbated by the coup d'état led by the military in 2020. According to the Afrobarometer, people perceived the previous government to be plagued by corruption, poor services, and economic failure. Most people supported the military (82%), yet their expectations after the coup is a return to democratic process. Trust in the military is common even among opposition supporters (78%) and in regions affected by the jihadist insurgency (69% of respondents in Gao and 64% in Mopti said they trust the military). Trust in political actors is really low: very few in the months preceding the coup trusted the president (47%), legislators (37%), the ruling coalition (38%) or opposition political parties (36%).[88]

Traditional and religious leaders are greatly trusted in Mali, with 83% of respondents trusting traditional leaders, and 78% trusting religious leaders. Local authorities, such as local councils, are trusted by over half of the respondents (55%). Communities, particularly in rural areas, feel on average better represented by customary authorities than by elected State authorities.[89]

According to the Wellcome Trust Survey, only 30% have some trust or a lot of trust in national authorities. However, over half of respondents (53%) trust national authorities when they provide health information, as opposed to 21% who do not trust government provided health information.[85]

The people most trusted for health information in Mali are doctors and nurses (61%), followed by traditional healers (12%), religious leaders (8%) and family and friends (6%). Almost two-thirds of respondents (63%) reported they trust doctors and nurses for medical and health advice, as opposed to 21% who do not. A great majority (77%) had confidence in hospitals and clinics in the country, as opposed to 19% who do not.

Traditional healers are widely trusted in Mali, with over 80% of people attending alternative health providers.[90] According to the Wellcome Trust survey, 65% of people trust health advice coming from traditional healers.

Civil society. Civil society organisations have been crucial in representing local needs and pushing for changes. Civil society played a major role in bringing warring parties together for the peace agreement between the State and the Tuareg insurgency.[91] In the area of health, civil society is integrated in the work of CSComs, shaping local implementation of health services. Local and international NGOs play a significant role in emergency provision of health services including epidemic response. 57% of people have confidence in non-profit organisations, whereas 21% do not trust them. Just over half of respondents (55%) trusted journalists to communicate reliable health messages. Please note that different NGO and media organisations will be trusted differently, hence a local fine-grained assessment of trusted interlocutors is necessary.

Community-led strategies

Community-driven strategies are more effective and improve the trust and acceptance of national health programmes. Although Mali started to implement community-managed healthcare in the 1990s, very little is known about community-led strategies in the context of epidemic preparedness and response. The key actors remain the *relais communautaires*. They are embedded in the national health system and are tasked with providing basic health services (e.g. drug provision) and disseminating health information within their community. However, there is a lack of functional community level surveillance and response structures.

There has been some recent progress in building bottom-up preparedness and response. The government of Mali and the Malian Red Cross, funded by USAID, launched the 'Community Epidemic and Pandemic Preparedness Program (CP3) in 2017. This programme focused on Koulikoro and Kayes regions. The programme sought to involve communities in the early detection of outbreaks with epidemic potential and activated the transmission of information in real time to prevent the spread of disease. Over 16,000 community-based volunteers were trained to sensitize communities on the prevention of measles, yellow fever, viral haemorrhagic fevers, rabies, and anthrax. These volunteers organized sensitisation sessions around epidemic preparedness with community leaders, imams, traditional healers, and engaged with stakeholders in the trade, transportation and education sectors. These health volunteers would be able to identify diseases and refer patients to health facilities.[81] Other agencies like UNICEF value the importance of community-based epidemic preparedness. For example, in response to the Ebola outbreak in 2015-17, UNICEF trained 3,000 community leaders and over 600 community health workers in the Sikasso region on risk prevention and control of epidemics in parallel to a WASH intervention.[92]

ONGOING CHALLENGES, LESSONS AND RECOMMENDATIONS

In 2018 the think-tank Prevent Epidemics conducted a global assessment of the readiness of different countries to face pandemics, measuring 20 indicators, from legislation and financing, laboratory capacity, surveillance, capacity of the workforce, to risk communication and deployment. Mali received a score of 35/100, in line with other Central African countries. It concluded that Mali was 'not ready' for an epidemic.[93] Prevent Epidemics found there was political willingness for preparation, for example by finishing the preparedness plan, and that positive advances had been made in childhood immunisation. The main gaps identified were lack of appropriate legislation, policy and financing, lack of International Health Regulations (IHR) Coordination, Communication and Advocacy, low capacity to roll out emergency response operations, lack of human resources and lastly, lack of a strong national laboratory system[93] - this last finding which contradicts other literature pointing to the strengths of the Malian laboratory system.[59,94] According to the Global Health Security Index in 2019, Mali has a score of 29/100, and had done relatively well in adhering to International Norms, but failed in terms of the actual capacity within the health system to detect epidemics and to respond effectively to them.[95]

Epidemic preparedness and response is also hampered by complex humanitarian emergencies in the Centre and North of the country, in which health emergencies, food security crises, environmental emergencies (droughts and floods) and conflict overlap with multiplier effects.

In order to prevent epidemics, Mali's health system still needs to improve vaccination coverage, early detection of outbreaks, and ensure early presentation of patients (for early detection and treatment). This report shows that health workers and stakeholders from the private, non-private and religious sectors are not sufficiently involved in the response to epidemics. In the context of the response to the yellow fever epidemic, there have been shortcomings in the collection, delivery and availability of results. [49] In the fight against malaria, there is a lack of trained staff at different levels of the health pyramid in order to ramp up the implementation of activities, a weak capacity for coordination and management of activities, and a lack of guidelines for stakeholders. [12] In the fight against HIV/AIDS epidemic, challenges include expanding the coverage of services and treatment to the entire population, in particular the most vulnerable groups, and strengthening measures to combat stigmatization and discrimination. This will require improvements in resource management and coordination. [57]

Under-equipped, with insufficient and unevenly distributed human resources, Mali's health system is currently severely affected by the COVID-19 pandemic and the response measures. The disruption of services and supply chains due to prioritisation of COVID-19 and the impact of transport restrictions has made access to healthcare even more difficult. This situation may risk reversing progress in the reduction of infant and maternal mortality and the goal of strengthening reproductive health services. COVID-19 is highlighting the importance of a health-system approach to ensure the continuity of health services (e.g. sexual and reproductive health services) whilst implementing epidemic response. Horizontal approaches that strengthen the health system should replace vertical one-disease interventions or campaigns. It is necessary to put in place social safety nets targeting the most vulnerable populations to ensure their access to health services. [24]

KEY IMPLICATIONS FOR EPIDEMIC PREPAREDNESS AND RESPONSE

The Malian government, through the Ministry of Health and Social Affairs, is adopting an action plan to fight against epidemics because of the COVID-19 pandemic. The plan revolves around five main strategies: prevention, case management and contact tracing, multisectoral response, health and communication.[96] As indicated above, the Malian government set up a multisectoral Crisis Management Unit as a response to COVID-19. This unit is under the direction of the National Institute of Public Health (INSP), and it coordinates health actors as well as actors from other sectors, such as international transit centres such as airports.[97]

Key implications for epidemic preparedness and response in Mali include:

- Strengthening Surveillance and Health Information Systems: The lessons learned in relation to Health Information Systems within epidemics is to create synergies between stakeholders, and to harmonise the preparedness and response plan and mobilisation of resources. It is important to ensure commitment of partners and to sustain their provision of relevant information to the system.[79] Information should flow to and from the policy sphere to both the private and public health providers to relay an adequate picture of the whole health system. Further investment in social science research that highlights the importance of context in health outcomes, and links it with public health interventions, is crucial to understand vulnerabilities and to tailor epidemic preparedness and response to the specific needs of different communities.

The uptake of local context research should be promoted in decision-making mechanisms in State and humanitarian agencies.

- Reducing vulnerabilities: A reflection on local social and political history of the target region will signal social groups that have been marginalised. Efforts should be made to meaningfully engage with groups that have been historically, geographically or economically disadvantaged. Representatives and community members from these groups should be included in planning and decision-making in epidemic preparedness and response.
- Addressing structural constraints. Investments in WASH (both emergency and long term) are key to reducing the incidence of diseases such as cholera. Appropriate social safety net mechanisms should be in place for poor Malians to be able to afford healthcare and, if restrictions of movement due to an epidemic such as COVID-19 are considered, it is important that their livelihoods are sustained.
- Prioritising and adapting response towards vulnerable populations: People on the move are likely to be vulnerable to epidemic disease. Refugees and IDP should be supported as they are likely to live in crowded conditions. Through participatory mapping, the epidemic response can understand the drivers and directions of travel to prevent disease spreading and to deliver timely services. In the case of nomadic communities, health services and epidemic response activities should be tailored for their needs. Volunteer CHW should be recruited from communities. Mobile clinic services adapted to local needs should be designed by communities in participatory ways.
- Ensuring health and epidemic response activities use a gender and age lens: Women and girls have less access to health services and are more likely to suffer discrimination. Services should be adapted to specific gender needs, and men should be engaged in the design and roll-out of the activities as in many communities fathers and husbands make decisions whether and where to seek healthcare.
- Coordinating Health Policy and the work of State and non-State health services providers: There is a disconnect between public health services and the private sector. In turn, State policy and management levels engage solely with the public sector. Many private provisions are carried out informally. To reduce this gap, Mali must strengthen the accreditation system for establishments in the public and private sector for-profit as well as non-profit, to develop public-private partnerships (PPP), to involve the private health sector in the national health financing policy, and to strengthen the synergy of action for the collection of data from the public and private health sectors. [23]

- Taking a Health-systems approach for service delivery in the context of epidemics: the continuity of health services (e.g. sexual and reproductive health services, Non-Communicable Diseases, etc.) should be guaranteed whilst implementing epidemic response. Vertical responses that disrupt services should be replaced by health systems strengthening, ensuring holistic interventions that address the epidemic at hand as part of an integrated package of health services, treatment and health communication. Health priorities needs to be shaped bottom-up by communities.
- Ensuring adequate funding, capacity building of health staff: Support health workers in State-provided and non-profit clinics, building their capacity, ensuring their livelihoods and recognizing their work, particularly those in remote areas. Build skills for interpersonal communication and socio-cultural understanding to curtail discrimination in the health system. Ensure health facilities and health workers, especially nurses and Community Health Workers, have the supplies, funds and training they need to provide quality, consistent care to improve trust in prevention, preparedness and response activities.
- Working with alternative health providers: faith healers, *tradipraticiens*, drug sellers, diviners and others. Provide basic epidemiological and risk communication training and enlist them in disease surveillance, the provision of health information, delivery of particular treatments (e.g. oral rehydration solutions in the case of diarrhoea, mosquito nets, etc.) and to identify particular diseases and how to make referrals of their patients to biomedical clinics when relevant.
- Working with trusted interlocutors using trusted channels of communication. The most trusted actors in Mali are traditional and religious authorities. These interlocutors should be mobilised early to design preparedness and response plans and to support the response activities. These actors can ensure the response activities are culturally appropriate. Doctors and nurses can play an important role in communicating health messages and clarifying concerns and questions. Use community radios, and local spaces (like street theatre or town criers) to clarify questions on disease and to gather community feedback. Note that communities are not singular nor static, hence mediators, language and channels should be chosen (and reassessed periodically), understanding communities as diverse, and it is important to unpick the variety of different stakeholders in a community and recognize that they will represent different opinions and concerns, that then need to be worked with.
- Working within local language and framings. There is a wealth of information on local taxonomies of disease, treatment and care in Mali. Communication campaigns should build on this knowledge to adapt messaging. Local language and communication assessments should be carried out locally to identify the languages, meanings and symbols and media formats that are most appropriate for each social group.

Whatsapp and other social media platforms are increasing in importance and could be used for surveillance, providing information on available services and giving reliable information. Whatsapp and other media must be monitored to avoid misperceptions of the disease and to reply with adequate information.

- Building on existing bottom-up responses to epidemic response as part of a holistic, community-led approach. Epidemic preparedness and response must rely on meaningful community engagement (particularly so with vulnerable populations) and rather than initiating response activities from scratch, humanitarian activities should build on and support existing initiatives and social networks.

KEY ACTORS

This section presents a list of key actors identified in the process of researching for this brief with whom early responders may want to engage with.

MALIAN RESEARCH ORGANISATIONS

- Point Sud Institute. Centre de recherche sur le savoir local. International research centre with a focus on local knowledge. Wide connections with development, humanitarian and research actors. http://pointsud.org/?lang=en
- Faculté de Médecine Odonto Stomatologie (FMPOS). The research by their PHD students has brought very interesting social science dimensions to health-seeking practices.
- Faculté des sciences humaines de l'université de Bamako.
- Département de *Médecine Traditionnelle*, Bamako, Mali
- l'Alliance malienne pour refonder la gouvernance en Afrique
- le Réseau ouest-africain pour l'édification de la paix
- Malian Institue of Action-Research for Peace (l'Institut malien de recherche-action pour la paix);
- Center for Analysis and Research of the Sahelo-Saharan Space (le Centre d'analyse et de recherche de l'espace sahélo-saharien) ;
- L'Institut des Sciences Humaines (ISH) de Bamako ;
- Miseli, l'anthropologie dans le développement, http://www.miselimali.org/.

ASSOCIATIONS/NETWORKS

- Association Malienne pour le Suivi et l'Orientation des Pratiques Traditionnelles (AMSOPT)
- Conseil national de la société civile du Mali
- Forum des organisations de la société civile du Mali
- Convergence des femmes du Mali
- Conseil national de la jeunesse du Mali
- Coalition des alternatives africaines dettes et développement

- Cercle de Réflexion et d'information pour la consolidation de la démocratie au Mali, (Cri-2002).
- Confédération Syndicale des Travailleurs du Mali (CSTM)
- Union Nationale des Travailleurs du Mali (UNTM)
- Union nationale des Journalistes du Mali (UNAJOM)
- Association des Médecins Libéraux du MALI (AMLM)
- Malian Rural Doctors' Association (Association des Médecins de Campagne, AMC)
- National Federation of Community Health Associations (Fédération Nationale des Associations de Santé Communautaire, FENASCOM),
- Local Federation of Community Health Associations (Fédération local d'associations de santé communautaire, FELASCOM)
- L'association faîtière des communicateurs traditionnels, le ReCoTraDe
- Groupe Pivot Santé Population, UTM
- Haut conseil islamique du Mali (HCIM) (Muslim council)
- Conference episcopale du Mali (Catholic church)
- Association des Groupements d'Eglises et Mission Protestantes Evangéliques au Mali (AGEMPEM). (Evangelical church)
- *Fédération Malienne des Associations des Tradithérapeutes et Herboristes* (FEMATH)

MALIAN DEVELOPMENT AND HUMANITARIAN NGOS

Association Citoyenne pour la Defense des Droits des Enfants et des Femmes Albarka	ACIDEF Albarka	Kayes Mopti	Ouest Centre
Association Malienne pour le Developpement Communautaire	AMADECOM	Kayes	Ouest
Association Malienne pour la Protection et la Promotion de la Famille	AMPPF	Kayes	Ouest
Association Malienne pour le Suivi et l'Orientation des Pratiques Traditionnelles	AMSOPT	Kayes	Ouest
Association pour la Promotion du Monde Rural au Sahel	APROMORS	Timbuktu	Nord
Association pour la Promotion du Monde Rural au Sahel	APROMORS	Timbuktu	Nord

Association de Recherche, de Commununication et d'Accompagnement à Domicile des Personnes vivant avec le VIH et le SIDA	ARCAD-SIDA	Kayes	Ouest
Action Recherches pour le Developpement des Initiatives Locales	ARDIL	Timbuktu	Nord
Amélioration de l'environnement sanitaire pour les mères et les enfants	BECEYA	Kayes	Ouest
Developpement Durable pour la région de Kidal	DDRK	Kidal	Nord
Debo Alafia	Debo Alafia	Mopti	Centre
Keneya Djemu Kan	KJK	Kayes	Ouest
Keneya Djemu Kan	KJK	Kayes	Ouest
Mouso	Mouso	Mopti	Centre
Mouvement pour la paix le désarment et la liberté	MPDL	Kayes	Ouest
Pogramme d'Appui au developpement Sanitaire et Social II	PADSS II	Mopti	Centre
Projet d'appui au Système de Santé Décentralisé	PASSD	Kayes	Ouest
SADEV	SADEV	Timbuktu	Nord
SANTE SUD	SANTE SUD	Timbuktu	Nord
Solidarité Pour Le Sahel	SOLISA	Kidal	Nord
Yam Giribolo Tumo	YA-G-TU	Mopti	Centre

For an exhaustive list of humanitarian actors in Mali (last updated in May 2020) see UN OCHA's directory and mapping: https://data.humdata.org/dataset/mali-operational-presence .

ACKNOWLEDGMENTS

This briefing was reviewed by: Hayley McGregor, DAI, and Isabelle Lange

Suggested citation: Camara, Mamadou Faramba; Diallo, Brahima Amara, and Ripoll, Santiago (2021) Tackling Deadly diseases in Africa: Key Considerations for Epidemic Response and Preparedness in Mali, *Briefing*

Published June 2021

ANNEXE: ADDITIONAL HISTORY AND CONTEXT

This annexe provides additional contextual information on aspects presented in the brief, as well as additional issues which responders may want to know about.

GEOGRAPHY AND POPULATION

Mali is a landlocked country in West Africa, one of the largest in the region, with an area of 1,248,574 km^2. The total population of Mali in 2018 was close to 20 million inhabitants. The country is divided into three agroecological zones: the southern, cultivated Sudanese zone; the central, semiarid Sahelian zone; and the northern, arid Saharan zone. The great majority of the population lives in the southern part of the country. Around 23.3% of the population lives in urban areas.[1] The population is quickly growing, with a 3.6% growth rate. The fertility rate is relatively high: 5.8 births per woman in 2018. Mali is a young population, with children under 15 years old amounting to almost half of the population.

Mali is a country of emigration and transit, as well as immigration. Migration is not only outward, but also circular and seasonal, particularly so for communities whose social networks and livelihoods straddle both sides of Mali's borders, such as nomadic pastoral groups. In 2015 there were 1 million Malians living abroad, with 90% living in Africa and 10 percent in Europe.[98] Malian migrants are more likely to travel to the Ivory Coast (70%). In Europe, a traditional destination has been France.[99] Climate change, economic and food insecurity and conflict have further increased migration. Mali is also a transit country for African migrants aiming for Northern African countries.

ECONOMY AND LIVELIHOODS

Mali is an agro-pastoral economy, in which agricultural production plays a central role in sustaining livelihoods and generating economic growth). With a Human Development Index (HDI) of 0.442, Mali is ranked 175 out of 188 countries, indicating that it is one of the least developed countries worldwide. Nevertheless, Mali is one of the richest countries in West Africa; in 2016, Mali had an estimated GDP per capita of 2,177 PPP $.[98] However, due to climate change, and the increased economic migration from rural areas to cities, the agricultural system is being weakened and poverty persists in rural areas. There is a need to generate employment or self-employment for Malians to participate in income-generating activities adapted to market demand. To reduce poverty and inequality in Mali, there is a need for growth, job creation and income-generating activities for the poor. What is needed is inclusive and sustainable growth adapted to climate change and other environmental challenges. [100]

According to the results of the Continuous Modular Survey (EMOP) in 2019, 43.8% of the Malian population was considered poor, and this poverty is much more accentuated in rural areas (i.e. 54.1%). The central and northern regions, in Mopti, Ségou and Gao, are considered the poorest. According to the same report, food insecurity and the armed conflict are the main causes Mali is still one of the poorest countries in the world. In 2019, it ranks 48th on the African continent and 184th globally in the HDI.

Mali's economy is based on the primary sector (agriculture, livestock, fishing and fish farming) which employs nearly 80% of the working population. Mali has a potential of 43.7 million ha of land suitable for agriculture and livestock, of which only 11.9% is used. In 2016, Mali had a herd of at least 10,622,750 cattle, 36 million sheep and goats, 1 million camels, 38,587,450 poultry, more than 90% of which are lowland poultry, yard and 1.5 million horses and donkeys, making the country the second largest animal population in the Economic Community of West African States (ECOWAS). [101]

POLITICS, GOVERNMENT AND ADMINISTRATION

History

The current territory of Mali has historically been part of several empires and kingdoms, dominating the trans-Saharan trade, from the Empire of Ghana (founded by the Soninke in the 8th century), the Empire of Mali (13th century), the Songhay empire (15th century) and the Bambara kingdom of Segou (17th century). The French colonised the area in the 19th and 20th century and named the region *Haut Senegal-Níger* (together with regions from Mauritania, Niger and Burkina Faso). Mali achieved its independence in 1960 after a failed attempt to create a Malian Federation including Senegal.

The initial post-independence years were dominated by the Soviet influence and a Socialist government led by President Modibo Keïta. In 1968 Moussa Traoré led a coup d'état and installed a centralised one-party military regime that was in power for two decades. Democratic movements like the Alliance for Democracy in Mali (ADEMA) and the National Congress for Democratic Initiative (CNID) advocated for democracy and multiparty politics. In March 1991, a popular uprising was severely repressed by the authorities and was followed days after by a military coup. The regime was replaced by Transition for the Safety of the People led by Amadou Toumani Touré, and multi-party democracy was installed in 1992, and a new constitution agreed.

This semi-presidential framework of multi-party politics has endured until today, yet is frequently shaken by droughts and food insecurity, armed insurrections and coup d'états in the last three decades. The most recent period of instability kick-started in 2012 with a

military coup by captain Sanago and important armed Tuareg insurrection in the north supported by the National Movement for the Liberation of Azawad (MNLA) aiming for the independence of the northern regions. Initially the MNLA made alliances with Al-Qaeda in the Islamic Maghreb, and Ansar Dine, yet these turned on the MNLA Tuareg forces and displaced them. An Islamic state was declared in the North, with Ansar Dine and Al-Qaeda, capturing the main northern cities of Timbuktu, Kidal and Gao and reaching Douentza in the centre. The government in the south-west, ECOWAS and the African Union agreed a military expedition to recapture the north. As the Islamic fighters were approaching the capital, the government asked the French to intervene, who, under the banner of the African-led International Support Mission in Mali (AFISMA), occupied major towns in the north in 2013, and then handed over security to the UN peacekeepers under the MINUSMA. Tuareg separatists also fought against their former Islamist allies. A peace agreement was achieved between the Malian government and the Tuareg in 2013, and whilst the ceasefire was broken, a new ceasefire was achieved in 2015. The recent years have involved terrorist attacks by Al-Qaeda linked groups like Nusrat al-Islam wal Muslimeen.

Ibrahim Boubacar Keïta had been president since 2013, and his support to the presence of French troops (together with the inability to solve the conflict in the north and intercommunal violence in the centre) sparked an opposition movement, coupled with the economic crisis and reports of political corruption. Mass protests were followed by a coup d'état by the National Committee for the Salvation of the People (CNSP) led by Colonel Assimi Goïta. Keïta resigned without resistance. On 12th September 2020, the CNSP agreed to an 18-month political transition to civilian rule. Bah Ndaw was appointed interim president, with Goïta assuming the vice presidency. The transitional government stated that legislative and presidential elections would be held on Feb. 27th, 2022.

Political parties

As indicated above, the interim government is dominated by military figures like Bah Ndaw and Goïta. Under the interim government, the elected parliament was replaced by an unelected transitional body. A 121-member National Transitional Council (CNT) was formed in December 2020, with CNSP member Colonel Malick Diaw named as its president. Security forces control 22 seats, while political parties and organizations hold 11. The June 5th Movement—Rally of Patriotic Forces (M5-RFP), an alliance of opposition parties and civil society groups, separately holds 8 seats.

Political parties are relatively weak in Mali, often mobilising around a particular person rather than along policy lines. Policy and ideology differences between parties are not always clear. The main parties in Mali are:

- Rally for Mali (RPM) party, led by Keita: won 66 seats in legislative elections held in 2013 (its allies took an additional 49 seats).
- Union for the Republic and Democracy (URD), led by Soumaïla Cissé, won 17 seats,
- Alliance for Democracy (ADEMA), which won 16 seats.

Note that there was a parliamentary vote in March and April 2020, but the contest was marred by violence (including the kidnapping of the opposition leader), low turnout, and disagreement over the results and quickly followed by the coup.

Unlike other TDDA countries, no single ethnic group dominates the government or security forces in Mali.[102] As shown below, Tuareg pastoralist groups in the north have historically been marginalised from Malian political life.

Conflict

As in other colonial States, French colonial rulers co-opted traditional authority structures and empowered some ethnicities and castes at the expense of others, creating lasting grievances. In Mali, the majority of State elites came from western and southern regions, and the decolonisation process transformed the northern (nomadic) zones into culturally, politically and economically isolated areas.[103] At the time of independence, the central government had assured the Tuareg that their autonomy in the new Malian state would be guaranteed, but this promise was not kept.[104] This political isolation of Northern nomadic communities has led to a series of Tuareg rebellions since independence, the most important ones being 1963, 1990, 2006, and 2012.

Foreign intervention has been a major player in Mali's conflict. Foreign-born Islamist movements from neighbouring countries such as Libya and Algeria have played a major role in armed insurgence in the north. For example, Ansar Dine received financial and military backing from al-Qaeda in the Islamic Maghreb (AQIM). As described above, these groups enabled the MNLA Tuareg insurgence in 2012. In turn, as a response of the 2012-13 advances of Islamist French armed forces, UN MINUSMA troops have been a constant presence in the north since 2012.

Intercommunal violence, in a country in which inter-ethnic relations were historically relative peaceful, has spread in the centre of the country, particularly to the south and south east of Mopti. The violence was initiated by jihadists and self-defence groups responding to them, resulting in civilians being killed and property destroyed. This violence has pitted the Fulani against the Dogon, creating a cycle of retaliation. Dogon people would accuse the Fulani of bringing cattle onto their farms and destroying their crops. These tensions had traditionally been solved by negotiation.[105] It is important to

note that this intercommunal violence is not the result of historical ethnic rivalries, but rather the intervention of Islamist fighters stoking violence and a lack of attention. The Dogon accuse the Fulani of aiding the jihadists and the Fulani claim the government is arming the Dogon self-defence forces. The Malian government has mistakenly focused on fighting terrorism, without paying attention to communal reconciliation or the fulfilment of other basic government services in the area.[106]

Administrative structure

The country is divided into eight *regions*: Gao, Kayes, Kidal, Koulikoro, Mopti, Ségou, Sikasso, and Timbuktu and the district of Bamako. Each of the *régions* is further divided into administrative units called *cercles*, which are in turn subdivided into communes. *Regions* are administered by a governor that oversees economic policy and the running of *cercles*. *Cercles* are the administrative level for government services, including the army, the policy, health etc. *Communes* are often composed of several villages, headed by customary chiefs, and elected village councils, normally around a school and a Community health centre.[75]

Mali went through an administrative decentralisation process in 1992. This process was done in parallel to the decentralisation of health care, ensuring care in the periphery and community participation to extend health coverage and improve access to medicines.[107] Within the framework of decentralisation, each municipality *commune* is administered by a municipal council headed by a mayor and municipal councilors elected by universal suffrage. Thus, the country has 703 local municipalities, including 684 rural municipalities and 19 urban municipalities. Six of the 19 urban communes are at the district level of Bamako.[97]

As in many other countries there is a tension between administrative and customary authorities in Mali, particularly so in rural areas. Traditional authorities were officially incorporated into the State apparatus after the Establishment and Administration of Villages, Fractions and Neighbourhoods Law in 2006. The legislation assigned them specific roles and how they related to the State administration. Chiefs (*chefs de village*, *chefs de fraction* (in nomadic communities), *chefs de quartier* (in urban areas) would have an assigned council (*conseil de village*, *de fraction* or *de quartier*) of 5-15 people depending on the population. These customary authorities would be responsible for basic service, mediation, tax collection, ceremonial roles and customary reconciliation and would be represented and receive monetary compensation for their services. In 2015, 70% of village chiefs had still not been formally recognised.[89]

Note that there are other kind of traditional authorities, respected by many members of communities. For example, in terms of their responsibility over natural resources, there are *chefs des terres* (land chiefs- e.g. the minianka chef de terre in Koutiala), chefs des eaux (water chiefs- e.g. chef bozos in Mopti region), chefs de paturages (pasture chiefs- eg. Djoro in Mopti and *chefs des forêts* (forest chiefs e.g. *alamodjou* in Bankass or *Ogokana* in the *cercle* of Koro). Other respected traditional authorities in terms of their wisdom and experience include traditional communicator like the *griots, Guérisseurs and chasseurs*, other leaders *Nyamakala* linked to traditional professions *(forgerons, tisserands, cordonniers)*, and the *Bouffon* (e.g. as part of the confrerie de bouffons de Sikasso).[89]

Religious authorities are also well respected. Imams, predicateurs, pasteurs and prêtres are all well recognised authorities to engage with in humanitarian response. Within them there are those also respected for their wisdom and are sought to give counsel, such as the *Chef spirituel*, e.g. the Hogon (amongst the Dogon in Mopti) or the *chef de tribu maraboutique*. Another figure is the *Juge religieux*, e.g. the *qadis* (in Timbuktu area), respected figures that would assist in reconciliation and justice, giving verdicts based on sharia law. [89]

As the Malian state receded in conflict areas since 2012, traditional authorities have had to step in to support communities. Government officials (and health workers as we have seen above) fled the areas, leaving village leaders as primary service providers in the area. The qadi other traditional figures replaced those elected officials who had abandoned their positions and helped to mediate with extremist groups. Since then, and as part of the peace agreement, there was a commitment to strengthen the role of qadis in public affairs.

SOCIAL ORGANISATION

Ethnicity

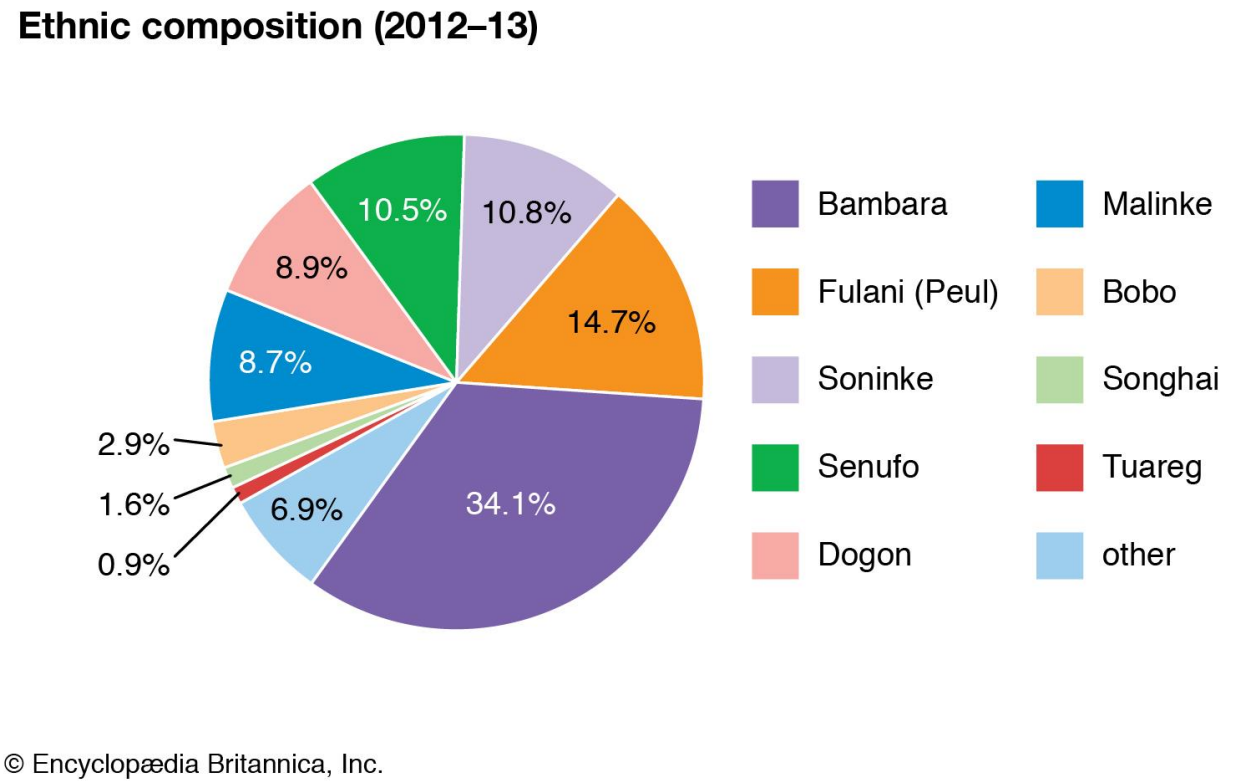

Figure 4. Mali ethnic composition (2012-12)[75]

Close to half of Mali's population consists of Manding (or Mandé) peoples, including the Bambara (also called Bamana) and the Malinké. The largest and dominant ethnic group, the Bambara (34.1% of the population), live in central and southern Mali along the middle Niger Valley. The Malinke (8.7 % of the population) live in the southwest and west. Bambara is the lingua franca of the country, especially in the centre, west and south, with around 80% of the population being able to speak it.[87] As mentioned above, the Bambara, as part of their colonial relationships and proximity to Bamako. had a stronger influence in the Malian state than the peoples in the north of the country. The Fulani (14.7% of the population), present across Western Africa, inhabits the inland delta of the Niger and the east of the country, speaking mostly Fulfude. The Fulani are sedentarised. The Soninke (10.8% of the population) live in the western Sahelian zone. The Songhai (8.9 % of the population) live in the Niger valley from Djenné to Ansongo. The Dogon (8.9 % of the population) live in the plateau region around Bandiagara. The Bwa, Bobo, Senufo, and Minianka occupy the east and southeast of the country.

In the Sahelian zone and north of the Niger bend live the Imazighen (Berbers, including the Tuareg (0.9 % of the population) and the Arab-Spanish-Amazigh (Berber) group known

as the Moors, who speak and write Arabic.[75] Note that there are reports of racist attitudes from the Tuareg towards peoples in the south of the country. Please note that ethnicity is a fluid identity in Mali, as people marry across ethnic groups, change their language or cultural affiliation.[75]

Religion

Islam is the dominant religion in Mali. Over 94% of the population is Muslim. The main tradition is Sunni Islam of the Malikite school, although there are also Ahmadis and a small percentage of Shiites. Sufi tariqas are very influential, as is the case of other Muslim African countries in general.[108] Christianity is minoritarian (protestant and catholic) followed by 2.8% of the population. 0.7% of the population practice traditional African religions (for example among the Dogon and some Malinke and Bambara), although many traditional practices and mysticism have been incorporated into both Christian and Muslim practice. Islamisation began in 11th century and incorporated believers from the Soninke, Songhai, Moors, Tuareg, and most Fulani.[75] Religious leaders in Mali are hugely popular, being able to bring together large crowds. They are also considered amongst the most trusted social actors in Mali together with traditional authorities, hence they should be fundamental partners in epidemic response.

Kinship, gender and youth

Most Malian ethnic groups are patrilineal, and residence tends to be patrilocal. In rural areas and to a large extent in the cities, domestic units are tightly integrated into extended patrilineal family e.g. father, his wife(ves), his sons, their wives and children, and unmarried daughters.[109] Most Tuareg today are bilateral in descent and inheritance systems. Descent-group allegiance is through the mother, social-stratum affiliation is through the father, and political office, in most groups, passes from father to son.[110]

Women and men are equal under the Constitution and other Malian legislation. That said, at a national level, social, traditional and religious norms continue to hinder the participation of women in public life, or allowing child marriage for girls, not always requiring consent for marriage, and discriminating against women in inheritance statutes in the Malian Family Code. Attempts to change family law to ensure more gender equality in 2009 was blocked by mass protests led by religious leaders. As mentioned above, decision-making about important economic choices or health-seeking relevant for women is dominated by their male peers. Mirroring this, women in public office are at a minority. Women are also likely to be the victims of conflict related sexual violence. The Malian government established a need to promote women's autonomy and representation in the country.[55]

Young people in Mali are in a majority, around 60% of the country's population is under 25 years old. Each year around 300,000 young people are entering the labour market. The formal sector employs only 5% of the labour force, hence a majority of young people depend on precarious, low paid jobs. This has been exacerbated in the economic crisis product of the protracted conflict. Despite fears of young people being recruited by armed groups, young people are also potentially leaders of social movements for social change[111] and mediators for cross-generational dialogue and relationship with State services.[112]

REFERENCES

1. World Bank. (2018). *Urban population (% of total population)—Mali*. World Bank Data. https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=ML
2. Institut National de la Statistique (INSTAT), Cellule de Planification et de Statistique Secteur Santé-, Développement Social et Promotion de la Famille (CPS/SS-DS-PF) et ICF. 2019. . 2019. Enquête Démographique, et de Santé au Mali 2018 : Rapport de synthèse. Bamako, Mali et Rockville, Maryland, USA : INSTAT, CPS/SSDS-, & PF et ICF. (2018). *Enquête Démographique et de Santé 2018, Rapport de synthèse* (V; Issue V).
3. Institute for Health Metrics. (2021, January 6). *Mali Health Data*. Www.Healthdata.Org. www.healthdata.org/Mali
4. Institut National de la Statistique du Mali. (2019). *Enquête modulaire et permanente auprès des ménages (EMOP)*. Institut National de la Statistique du Mali. https://www.instat-mali.org/laravel-filemanager/files/shares/eq/rana19pas1_eq.pdf
5. Secrétariat permanent du PRODESS Cellule de Planification et de Statistique Secteur Santé, Développement Social et Promotion de la Famille. (n.d.). *Plan Décennal de Développement Sanitaire et Social (PDDSS) 2014-2023*. http://www.sante.gov.ml/docs/PDDSS_2014-2023.pdf
6. Ministère de la Santé et de, & l'Hygiène Publique. (2018). *Annuaire Statistique du Système National d'Information Sanitaire 2018*. http://www.sante.gov.ml/docs/Annuaire%20SNIS%202018%20VF_%20version%2027%20Avril.pdf
7. WHO. (2021). *Mali*. Global Health Workforce Alliance. https://www.who.int/workforcealliance/countries/mli/en/
8. CIA factbook. (2021). *CIA factbook report for Mali*. CIA. https://www.cia.gov/the-world-factbook/countries/mali/
9. Ministère de la Santé et del'Hygiène Publique. (2019). *Annuaire Statistique 2018 des Ressources Humaines du secteur Santé, Developpement Social et Promotion de la Famille*. Ministère de la Santé et del'Hygiène Publique. http://www.drh.sante.gov.ml/docs/ASRH-2018.pdf
10. World Bank. (2019). *Mali -Accelerating Progress Towards Universal Health Coverage. Combined Project Information Documents / Integrated Safeguards Datasheet (PID/ISDS)*. World Bank. http://documents1.worldbank.org/curated/en/929821547659438840/pdf/Project-Information-Document-Integrated-Safeguards-Data-Sheet-Mali-Accelerating-Progress-Towards-Universal-Health-Coverage-P165534.pdf
11. Audibert,de Roodenbeke, M., Eric. (2005). *Utilisation des services de santé de premier niveau au Mali: Analyse de la situation et perspectives*. http://documents1.worldbank.org/curated/en/395701468281960706/pdf/33643a10MLI0sante0AFR0Human0dev0no087.pdf
12. *Initiative: Faire reculer le paludisme Roll Back Malaria,Evaluation des besoins par pays*, P26 (2008) (testimony of Ministère de la santé du Mali).
13. Ministère de la santé de la république du Mali ; secrétariat général. (2008). *Plan Stratégique National pour le Renforcement du Système de Santé (PSN/RSS) 2009-2015* (p. 8). https://www.who.int/pmnch/media/events/2014/mai_psn.pdf
14. P4H. (2021). *Mali*. P4H Social Health Protection Network. https://p4h.world/en/universal-object-country/mali
15. Yates, R. (2019, March 15). As Mali Scraps Healthcare Fees, It Is Time to Bury The Bamako Initiative. *Chatham House Blog*. https://www.chathamhouse.org/2019/03/mali-scraps-healthcare-fees-it-time-bury-bamako-initiative
16. Millard, C. (2021, September 1). The beginning of Universal Health Care in Mali. *The Borgen Project Blog*. https://borgenproject.org/universal-health-care-in-mali/
17. Adepoju, P. (2019). Mali announces far-reaching health reform. *The Lancet*, *393*(10177), 1192. https://doi.org/10.1016/S0140-6736(19)30684-1
18. Ministère de la Santé et de l'Hygiène Publique. (2018). *Annuaire statistique 2018 du système local d'information sanitaire du Mali*. http://www.sante.gov.ml/index.php/nep-mali/item/3304-annuaire-statistique-2018-du-systeme-local-d-information-sanitaire-du-mali
19. Boubou, Nouhoum, B. C. (2017). *Pharmaciens d'officine et paludisme au Mali rapport final*. http://remed.org/wp-content/uploads/2017/08/Rapport_Final_MALI.pdf
20. Organisation Mondiale de la Santé. (2018). *Stratégie de coopération,Aperçu*. 05.
21. HFG. (2017). *Mali Private Health Sector Assessment*. Health Finance and Governance. https://www.hfgproject.org/mali-private-health-sector-assessment/
22. Advancing Partners & Communities. 2014. Profil de Pays : Programmes de santé communautaire du Mali., & Arlington, VA: Advancing Partners & Communities. (Janvier). *Profil du pays: Programmes de santé communautaire du Mali*. https://www.advancingpartners.org/sites/default/files/landscape/countries/profiles/mali_fre_apc_landscape_analysis_final.pdf
23. Sarah Castle, Bokar Touré, Françoise Armand, Yann Derriennic et Romana Haider. Décembre 2017 Évaluation du secteur privé de la santé au Mali Bethesda, Maryland : Health Finance and Governance Project, Abt Associates Inc. (2017). *Etat des lieux du secteur privé de la santé au Mali* (pp. 5, 7, 8, 17). https://pt.slideshare.net/HFGProject/valuation-du-secteur-priv-de-la-sant-au-mali

24. Nations Unies Mali. (2020). *Analyse rapide des impacts socio-économiques du COVID-19 au Mali* (pp. 15, 17). https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/rapport_danalyse_rapide_impact_covid_-_10_mai_2020.pdf
25. Debarre, A. (2018). *Hard to Reach: Providing Healthcare in Armed Conflict*. https://www.ipinst.org/wp-content/uploads/2018/12/1812_Hard-to-Reach.pdf
26. Hill, J., Kayentao, K., Achieng, F., Diarra, S., Dellicour, S., Diawara, S. I., Hamel, M. J., Ouma, P., Desai, M., Doumbo, O. K., ter Kuile, F. O., & Webster, J. (2015). Access and use of interventions to prevent and treat malaria among pregnant women in Kenya and Mali: A qualitative study. *PloS One*, *10*(3), e0119848–e0119848. PubMed. https://doi.org/10.1371/journal.pone.0119848
27. Sangare, M., Coulibaly, Y. I., Coulibaly, S. Y., Dolo, H., Diabate, A. F., Atsou, K. M., Souleymane, A. A., Rissa, Y. A., Moussa, D. W., Abdallah, F. W., Dembele, M., Traore, M., Diarra, T., Brieger, W. R., Traore, S. F., Doumbia, S., & Diop, S. (2021). Factors hindering health care delivery in nomadic communities: A cross-sectional study in Timbuktu, Mali. *BMC Public Health*, *21*(1), 421. https://doi.org/10.1186/s12889-021-10481-w
28. UNICEF. (2021). *Mali Humanitarian Situation Report No. 2 1 to 28th February 2021*. UNICEF. https://reliefweb.int/sites/reliefweb.int/files/resources/UNICEF%20Mali%20Humanitarian%20Situation%20Report%20No.%202%20-%20February%202021.pdf
29. Ministère de la santé et des affaires sociales, République du Mali. (2019). *L'expérience du Mali dans le déploiement du DHIS2 (District Health Information Software, version 2)* (pp. 12, 13). https://www.measureevaluation.org/resources/publications/tr-20-407-fr/at_download/document
30. Sissoko, M. (2006). Chapitre 4. Comment guider les tradipraticiens pour qu'ils jouent un rôle dans les changements de comportement, notamment du couple « mère-enfant »? In Moulin, A., Orfila, J., Sacko, D., & Schemann, J. (Eds.),. IRD Éditions. Doi:10.4000/books.irdeditions.5096. In A. Moulin, J. Orfila, D. Sacko, & J. Schemann (Eds.), *Lutte contre le trachome en Afrique subsaharienne*. IRD Editions; /z-wcorg/. http://www.documentation.ird.fr/hor/fdi:010039906
31. Diarra, N., Klooster, C. van't, Togola, A., Diallo, D., Willcox, M., & Jong, J. de. (2015). Ethnobotanical study of plants used against malaria in Sélingué subdistrict, Mali. *Journal of Ethnopharmacology*, *166*, 352–360. https://doi.org/10.1016/j.jep.2015.02.054
32. Wangensteen, H., Diallo, D., & Paulsen, B. S. (2015). Medicinal plants from Mali: Chemistry and biology. *Journal of Ethnopharmacology*, *176*, 429–437. https://doi.org/10.1016/j.jep.2015.11.030
33. Inngjerdingen, K., Nergård, C. S., Diallo, D., Mounkoro, P. P., & Paulsen, B. S. (2004). An ethnopharmacological survey of plants used for wound healing in Dogonland, Mali, West Africa. *Journal of Ethnopharmacology*, *92*(2–3), 233–244.
34. Togola, A., Diallo, D., Dembélé, S., Barsett, H., & Paulsen, B. S. (2005). Ethnopharmacological survey of different uses of seven medicinal plants from Mali,(West Africa) in the regions Doila, Kolokani and Siby. *Journal of Ethnobiology and Ethnomedicine*, *1*(1), 1–9.
35. Bah, S., Diallo, D., Dembélé, S., & Paulsen, B. S. (2006). Ethnopharmacological survey of plants used for the treatment of schistosomiasis in Niono District, Mali. *Journal of Ethnopharmacology*, *105*(3), 387–399.
36. Mounkoro, P. P., Togola, A., de Jong, J., Diallo, D., Paulsen, B. S., & van' t Klooster, C. (2020). Ethnobotanical survey of plants used by traditional health practitioners for treatment of schizophrenia spectrum disorders in Bandiagara, Mali, West Africa. *Journal of Herbal Medicine*, *24*, 100402. https://doi.org/10.1016/j.hermed.2020.100402
37. UNODC. (2018). *Malian authorities achieve positive results in the fight against fraudulent medicine and drugs*. UNODC. https://www.unodc.org/westandcentralafrica/en/2018-03-12-mali-fight-against-fraudulent-medicine-and-drugs.html
38. Nergard, C. S., Ho, T. P. T., Diallo, D., Ballo, N., Paulsen, B. S., & Nordeng, H. (2015). Attitudes and use of medicinal plants during pregnancy among women at health care centers in three regions of Mali, West-Africa. *Journal of Ethnobiology and Ethnomedicine*, *11*(1), 73. https://doi.org/10.1186/s13002-015-0057-8
39. Ag Ahmed, M. A., Hamelin-Brabant, L., & Gagnon, M. P. (2018). Sociocultural determinants of nomadic women's utilization of assisted childbirth in Gossi, Mali: A qualitative study. *BMC Pregnancy and Childbirth*, *18*(1), 388. https://doi.org/10.1186/s12884-018-2027-3
40. Johnson, A., Goss, A., Beckerman, J., & Castro, A. (2012). Hidden costs: The direct and indirect impact of user fees on access to malaria treatment and primary care in Mali. *Social Science & Medicine*, *75*(10), 1786–1792. https://doi.org/10.1016/j.socscimed.2012.07.015
41. Gage, A. J. (2007). Barriers to the utilization of maternal health care in rural Mali. *Social Science & Medicine*, *65*(8), 1666–1682. https://doi.org/10.1016/j.socscimed.2007.06.001
42. James, P. B., Wardle, J., Steel, A., & Adams, J. (2018). Traditional, complementary and alternative medicine use in Sub-Saharan Africa: A systematic review. *BMJ Global Health*, *3*(5), e000895. https://doi.org/10.1136/bmjgh-2018-000895
43. Brunet-Jailly, Joseph., & Pairault, Claude. (1993). *Se soigner au Mali: Une contribution des sciences sociales: Douze experiences de terrain: Hommage a Claude Pairault*. /z-wcorg/.
44. Tinta, S. (1999). *Projets de santé et prévention en milieu dogon du Mali*. 2, 4. http://journals.openedition.org/apad/480
45. Diakite, D. (n.d.). *Quelques maladies chez les Bamanan*. https://horizon.documentation.ird.fr/exl-doc/pleins_textes/pleins_textes_7/b_fdi_03_03/37862.pdf
46. Seidu, A.-A., Dzantor, S., Sambah, F., Ahinkorah, B. O., & Ameyaw, E. K. (2021). Participation in household decision making and justification of wife beating: Evidence from the 2018 Mali Demographic and Health Survey. *International Health*, *ihab008*. https://doi.org/10.1093/inthealth/ihab008

47. Bulletin du cluster santé. (2021). *MALI, Crise Humanitaire Prolongée* (No. 21). *21*, Article 21. https://reliefweb.int/sites/reliefweb.int/files/resources/Mali%20-%20Bulletin%20du%20cluster%20sant%C3%A9%20n%C2%B01%2C%20janvier%20-%20mars%202021.pdf
48. Severe Malaria Observatory. (2021, January 6). *Mali Fardeau de Paludisme*. Partage de Connaisances a Propos Du Paludisme Grave. https://www.severemalaria.org/fr/pays/mali
49. *Préparation et riposte aux situations d'urgenceFièvre jaune – Mali*. (2019, December 26). https://www.who.int/csr/don/26-december-2019-yellow-fever-mali/fr/
50. Ministere de la Sante Publique. (2016). *Plan Directeur de Lutte contre les Maladies Tropicales Negliges (MTN) 2016-2020*. Ministere de la Sante Publique. https://espen.afro.who.int/system/files/content/resources/CHAD_NTD_Master_Plan_2016_2020.pdf
51. Mounier-Jack, S., Burchett, H. E. D., Griffiths, U. K., Konate, M., & Diarra, K. S. (2014). Meningococcal vaccine introduction in Mali through mass campaigns and its impact on the health system. *Global Health: Science and Practice*, *2*(1), 117–129.
52. OCHA. (2021). *Apercu des besoins humanitaires Mali*. OCHA Mali. https://reliefweb.int/sites/reliefweb.int/files/resources/apercu_des_besoins_humanitaires_mali_2021.pdf
53. CDC. (n.d.). *One Health Zoonotic Disease Prioritization for Multisectoral Engagement in Mali. Workshop Summary*. Retrieved 5 July 2021, from https://www.cdc.gov/onehealth/pdfs/mali-508.pdf
54. Rebaudet, S., Sudre, B., Faucher, B., & Piarroux, R. (2013). Environmental Determinants of Cholera Outbreaks in Inland Africa: A Systematic Review of Main Transmission Foci and Propagation Routes. *The Journal of Infectious Diseases*, *208*(suppl_1), S46–S54. https://doi.org/10.1093/infdis/jit195
55. Gorman, Z. (2019). *'Hand in hand': A study of insecurity and gender in Mali*. Stockholm International Peace Research Institute. https://www.sipri.org/sites/default/files/2019-12/sipriinsight1912_6.pdf
56. Affaires Humanitaires des Nations Unies (OCHA). (2020). *Mali: COVID 19,Rapport de situation 3* (No. 3; p. 2,4,5,6). https://reliefweb.int/sites/reliefweb.int/files/resources/Sitrep-Covid19-%233_final.pdf
57. Présidence de la République du Mali. (2012). *Rapport national UNGASS 2012 Périiode: Janviier 2010—Décembre 2011* (pp. 9, 10, 12, 13, 33, 34). https://www.unaids.org/sites/default/files/country/documents/RAPPORT_UNGASS%202012%20_Mali.pdf
58. *CENTRE NATIONAL D'APPUI À LA LUTTE CONTRE LA MALADIE*. (n.d.). [Interview]. http://www.sante.gov.ml/index.php/nep-mali/item/107-centre-national-d-appui-a-la-lutte-contre-la-maladie
59. Doumbia, S., Sow, Y., Diakite, M., & Lau, C.-Y. (2020). Coordinating the research response to COVID-19: Mali's approach. *Health Research Policy and Systems*, *18*(1), 1–7.
60. Ministère de la Santé et des Affaires, & Sociale du Mali. (2020). *Plan d'Actions pour la Prévention et la Réponse à la Maladie à COVID-19 (COVID-19)* (pp. 06, 08, 12, 13, 14, 28). https://www.rvo.nl/sites/default/files/2020/05/Nationaal-Actieplan-Mali-COVID-19-FR.pdf
61. Ministère de la Santé et des Affaires, & Sociale du Mali. (2020). *Plan d'Actions pour la Prévention et la Réponse à la Maladie à COVID-19 (COVID-19)* (pp. 06, 08, 12, 13, 14, 28). https://www.rvo.nl/sites/default/files/2020/05/Nationaal-Actieplan-Mali-COVID-19-FR.pdf
62. Ministère de la Santé et des, & Affaires Sociales du Mali. (2020). *Plan de formation du personnel employé dans des unités de prise en charge des malades du « projet d'intervention d'urgence COVID 19 mali »* (p. 15,18,19,20). http://documents1.worldbank.org/curated/en/967341604953459935/pdf/Revised-Training-Plan-for-Staff-Employed-MALI-COVID-19-EMERGENCY-RESPONSE-PROJECT-P173816.pdf
63. Ministère de la santé et du développement Social. (2017). *Atelier de formation des formateurs sur le guide de la surveillance intégrée de la maladie et la riposte (SIMR) au Centre Diamcis de Banankoro/ région de Koulikoro.* http://www.sante.gov.ml/index.php/actualites/item/3044-atelier-de-formation-des-formateurs-sur-le-guide-de-la-surveillance-integree-de-la-maladie-et-la-riposte-simr-au-centre-diamcis-de-banankoro-region-de-koulikoro
64. Organisation Mondiale de la Santé. (2012, July 11). *Atelier sur la Surveillance Intégrée et la riposte aux épidémies*. https://www.afro.who.int/fr/news/atelier-sur-la-surveillance-integree-et-la-riposte-aux-epidemies
65. Secrétariat exécutif de l'APESS. (2020). *Note d'analyse des premiers impacts de la pandémie du COVID 19 sur les Exploitations Familiales Agropastorales membres de l'APESS*. 3, 4, 19.
66. Jurrien Toonen, Dramane Dao et Thea Hilhorst. (2006). *Développement d'un Système d'information essentielle sur le secteur de la Santé pour les acteurs communaux au Mali* (pp. 03, 04, 06). https://www.kit.nl/wp-content/uploads/2018/08/54c75cfd85a09_D%C3%A9veloppement-d%E2%80%99un-syst%C3%A8me-d%E2%80%99information-essentielle-sur-le-secteur-de-la-sant%C3%A9-pour-les-acteurs-communaux-au-Mali.pdf
67. WHO. (2015). *Successful Ebola responses in Nigeria, Senegal and Mali*. https://www.who.int/csr/disease/ebola/one-year-report/nigeria/en/
68. Sagaon-Teyssier, L., Yattassaye, A., Bourrelly, M., Dembélé Keïta, B., & Spire, B. (2020). The COVID-19 response must integrate people living with HIV needs in Sub-Saharan Africa: The case of Mali. *Tropical Medicine and Health*, *48*, 1–4.
69. World Bank. (2017). *Mobile cellular subscriptions (per 100 people)—Niger | Data*. https://data.worldbank.org/indicator/IT.CEL.SETS.P2?locations=NE
70. Kemp, S. (2020). *Digital 2020: Mali*. Datareportal. https://datareportal.com/reports/digital-2020-mali

71. Morgan, C., & Boudre, S. (n.d.). *Continuing Community Outreach in the face of Covid-19*. Institute of Development Studies. Retrieved 5 July 2021, from https://www.ids.ac.uk/opinions/continuing-community-outreach-in-the-face-of-covid-19/
72. TWB. (n.d.). *Language map of Mali- Interactive*. Translators Without Borders. Retrieved 5 July 2021, from https://translatorswithoutborders.org/languages-of-mali-interactive-en/
73. UNESCO. (2018). *Mali Country Profile*. UNESCO. http://uis.unesco.org/en/country/ml
74. International Media Support. (2013). *Media in Mali: Divided by conflict*. International Media Support. https://www.mediasupport.org/wp-content/uploads/2013/02/media-in-mali-divided-by-conflict-2013-ims2.pdf
75. Imperato, P. J., Clark, A., & Baker, K. (2021). *Mali*. Encyclopedia Britannica. https://www.britannica.com/place/Mali
76. Peyton, N. (2019, April 17). Donkeys deliver vaccines in Mali as diseases spike with violence. *Reuters*. https://www.reuters.com/article/us-mali-health-vaccines-idUSKCN1RT25C
77. Keenan, J. (2008). Uranium Goes Critical in Niger: Tuareg RebellionsThreaten Sahelian Conflagration. *Review of African Political Economy*, *35*(117), 449–466. https://doi.org/10.1080/03056240802411107
78. Boubou, Nouhoum, B. C. (2017). *Pharmaciens d'officine et paludisme au Mali rapport final* (pp. 08, 09, 10, 12, 13, 14, 59).
79. West African Health Organization. (2015). *Rencontre annuel conjointe des responsables des systèmes nationaux d'information sanitaire (SNIS) et de la surveillance intégrée de la maladie et riposte (SIMR) avec les partenaires techniques et financiers de l'espace CEDEAO* (pp. 05, 12, 42). https://www.measureevaluation.org/resources/publications/ws-15-25-fr
80. GBESSEMEHLAN, J. (2017). *Plan de gestion intégrée des vecteurs et des pesticides* (pp. 02, 06, 32).
81. IFRC. (n.d.). *Mali Epidemic Preparedness and Response. Communities at the heart of our work*. IFRC. https://media.ifrc.org/ifrc/wp-content/uploads/2019/01/202002-CP3Mali-MarketingDocument-dgtl-EN.pdf
82. De Groot, A. S., Tounkara, K., Rochas, M., Beseme, S., Yekta, S., Diallo, F. S., Tracy, J. K., Teguete, I., & Koita, O. A. (2017). Knowledge, attitudes, practices and willingness to vaccinate in preparation for the introduction of HPV vaccines in Bamako, Mali. *PLOS ONE*, *12*(2), e0171631. https://doi.org/10.1371/journal.pone.0171631
83. Poole, D. N., Tracy, J. K., Levitz, L., Rochas, M., Sangare, K., Yekta, S., Tounkara, K., Aboubacar, B., Koita, O., Lurie, M., & De Groot, A. S. (2013). A Cross-Sectional Study to Assess HPV Knowledge and HPV Vaccine Acceptability in Mali. *PLOS ONE*, *8*(2), e56402. https://doi.org/10.1371/journal.pone.0056402
84. Lhomme, E., Modet, C., Augier, A., Faye, S., Dabakuyo-Yonli, T. S., Levy-Marchal, C., D'Ortenzio, E., Yazdanpanah, Y., Chêne, G., Beavogui, A. H., Richert, L., & the PREVAC study team. (2019). Enrolling study personnel in Ebola vaccine trials: From guidelines to practice in a non-epidemic context. *Trials*, *20*(1), 422. https://doi.org/10.1186/s13063-019-3487-0
85. Wellcome Trust. (2018). *Wellcome Global Monitor*. Wellcome Trust. https://wellcome.org/reports/wellcome-global-monitor/2018
86. Hilhorst, T. (2005). *Building Effective Local Partnerships for Improved Basic Social Services Delivery in Mali*. Royal Tropical Institute of the Netherlands (KIT). https://www.kit.nl/wp-content/uploads/2018/08/871_Building-effective-local-partnerships-Mali.pdf
87. Minority Rights Group International. (2019). *Mali*. Minority Rights Group International. https://minorityrights.org/country/mali/
88. Coulibaly, M., & Logan, C. (2020). *Is democracy in Mali dying? Not if citizens' voices are heard*. Afrobarometer. https://afrobarometer.org/blogs/democracy-mali-dying-not-if-citizens-voices-are-heard
89. SDC network. (2015). *Étude de cas 4: Autorités traditionnelles et religieuses dans la gouvernance locale au Mali*. Swiss Development Cooperation. https://sahelresearch.africa.ufl.edu/files/Autorite%CC%81s_traditionnelles_et_religieuses_Malicasestudy_2015.pdf
90. Baratti-Mayer, D., Baba Daou, M., Gayet-Ageron, A., Jeannot, E., & Pittet-Cuénod, B. (2019). Sociodemographic Characteristics of Traditional Healers and Their Knowledge of Noma: A Descriptive Survey in Three Regions of Mali. *International Journal of Environmental Research and Public Health*, *16*(22), 4587. PubMed. https://doi.org/10.3390/ijerph16224587
91. Verbeek, N. (2021). *Ripening Conflict in Civil Society Backchannels: The Malian Peace Process (1990–1997)*. https://www.e-ir.info/2021/01/15/ripening-conflict-in-civil-society-backchannels-the-malian-peace-process-1990-1997/
92. Mali Jet. (2017, July 21). Prévention contre les épidémies des maladies infectieuses: Le projet EAH de l'Unicef enchante. *Mali Jet*. http://malijet.com/la_societe_malienne_aujourdhui/la_sante_au_mali/190952-pr%C3%A9vention-contre-les-%C3%A9pid%C3%A9mies-des-maladies-infectieuses-le-pro.html
93. Prevent Epidemics. (2021). *Prevent Epidemics: Mali*. Prevent Epidemics. https://preventepidemics.org/countries/mli/?section=data
94. Diarra, B., Safronetz, D., Sarro, Y. D. S., Kone, A., Sanogo, M., Tounkara, S., Togo, A. C. G., Daou, F., Maiga, A. I., Dao, S., Rosenke, K., Falzarano, D., Doumbia, S., Zoon, K. C., Polis, M., Siddiqui, S., Sow, S., Schwan, T. G., Feldmann, H., … Koita, O. A. (2016). Laboratory Response to 2014 Ebola Virus Outbreak in Mali. *The Journal of Infectious Diseases*, *214*(suppl 3), S164–S168. PubMed. https://doi.org/10.1093/infdis/jiw200
95. Global Health Security Index. (2019). *Mali Country Profile*. GHSI. https://www.ghsindex.org/country/mali/
96. Nations Unies Mali. (2020). *Analyse rapide des impacts socio-économiques du COVID-19 au Mali* (pp. 15, 17). https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/rapport_danalyse_rapide_impact_covid_-_10_mai_2020.pdf

97. Ministere de la Sante Publique. (2020). *Plan national de contingence pour la preparation et la riposte a l'epidemie de la maladie a coronavirus COVID-19. 1 Mars 2020 au 28 Février 2021*. Ministere de la Sante Publique. https://www.tralac.org/documents/resources/covid-19/countries/3798-republic-of-chad-national-contingency-plan-preparation-and-response-to-covid-19-epidemic-1-march-2020-28-february-2021-french/file.html
98. MGSoG. (2017). *Mali. Migration Profile. Study on Migration Routes in West and Central Africa.* Maastricth Graduate School of Governance.
99. Baratta, A. F., Calcagnini, L., Deyoko, A., Finucci, F., Magarò, A., & Mariani, M. (2021). Mitigation of the Water Crisis in Sub-Saharan Africa: Construction of Delocalized Water Collection and Retention Systems. *Sustainability*, *13*(4), 1673.
100. Institut National de la Statistique du Mali. (2016). *Enquête modulaire et permanente auprès des ménages (EMOP)* (p. 37 et 38, 38). file:///C:/Users/hgf/Downloads/rana16pas1_eq.pdf
101. Centres pour le contrôle et la prévention des maladies. (n.d.). *Résumé de l'atelier Priorisation des maladies zoonotiques pour l'engagement multisectoriel au Mali*. https://www.cdc.gov/onehealth/pdfs/mali-report-fr-508.pdf
102. Freedom House. (2021). *Mali Country Profile* (Freedom in the World 2021). https://freedomhouse.org/country/mali/freedom-world/2021
103. Rass, N. (n.d.). *Policies and Strategies to Address the Vulnerability of Pastoralists in Sub-Saharan Africa*. Pro-poor livestock policy initiative (FAO). Retrieved 5 July 2021, from http://www.fao.org/3/bp197e/bp197e.pdf
104. Molenaar, F., Tossell, J., Schmauder, A., Idrissa, R., Lyammouri, R., & Nederlands Instituut voor Internationale Betrekkingen 'Clingendael'. (2019). *The status quo defied: The legitimacy of traditional authorities in areas of limited statehood in Mali, Niger and Libya*. /z-wcorg/. https://www.clingendael.org/sites/default/files/2019-09/legitimacy_traditional_authorities_mali_niger_libya.pdf
105. BBC News. (2019, March 26). Mali attack: Behind the Dogon-Fulani violence in Mopti. *BBC*. https://www.bbc.co.uk/news/world-africa-47694445
106. International Crisis Group. (2020). *Reversing Central Mali's Descent into Communal Violence*. International Crisis Group. https://www.crisisgroup.org/africa/sahel/mali/293-enrayer-la-communautarisation-de-la-violence-au-centre-du-mali
107. GBESSEMEHLAN, J. (2017). *Plan de gestion intégrée des vecteurs et des pesticides* (pp. 02, 06, 32).
108. Salam Web. (2020). *Islam throughout the world: Mali*. Salam Web Today. https://today.salamweb.com/islam-throughout-the-world-mali/
109. Countries and their cultures. (2021). *Mali*. Countries and their Cultures. https://www.everyculture.com/Ja-Ma/Mali.html
110. Countries and their cultures. (2021). *Tuareg- Kinship*. Countries and their Cultures. https://www.everyculture.com/Africa-Middle-East/Tuareg-Kinship.html#ixzz6u7TMHfAJ
111. de Bruijn, M., & Both, J. (2017). Youth Between State and Rebel (Dis)Orders: Contesting Legitimacy from Below in Sub-Sahara Africa. *Small Wars & Insurgencies*, *28*(4–5), 779–798. https://doi.org/10.1080/09592318.2017.1322329
112. Rasmussen, S. (2020). Youth as actors and mediators in Tuareg theater and social life (Urban Niger and Mali). *Ateliers d'anthropologie. Revue Éditée Par Le Laboratoire d'ethnologie et de Sociologie Comparative*, *47*.