Partnership for Health System Sustainability and Resilience

EGYPT

Sustainability and Resilience in the Egyptian Health System

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Contents

Glossary

AMR	Antimicrobial Resistance
CAPMAS	Central Agency for Public Mobilization and Statistics
CPD	Continuous professional development
EgyCDC	Egyptian Centre for Disease Control and Prevention
GAHAR	General Authority for Healthcare Accreditation and Regulation
GDP	Gross Domestic Product
HIO	Health Insurance Organization
MOHP	Ministry of Health and Population
MOSS	Ministry of Social Solidarity
OOP	Out-of-pocket
UHC	Universal Health Coverage
WHO	World Health Organization

Executive summary

Introduction

Egypt's healthcare system is characterized by a complex mix of public, quasi-governmental, private, and NGO providers and payers. The public sector, overseen by the Ministry of Health, faces challenges of underfunding and perceived low quality, while the growing private sector is seen as higher quality but unaffordable for many citizens. The system is hindered by limitations in health information systems, workforce distribution, inadequate funding, insufficient data for policy-making, lack of coordination, and limited community engagement. The health system governance structure is challenged by lacking clarity in roles, causing inefficiencies in planning, execution, financing, and regulation. The *Egypt 2030 Vision* (Ministry of Planning, Monitoring and Administrative Reform, website) emphasises expanding health insurance, decentralising governance, and improving regulatory capacity to achieve universal health coverage. However, the COVID-19 response showcased successes in containing mortality but revealed weaknesses in data transparency and policy effectiveness assessment. In conclusion, effective governance is crucial for Egypt to achieve its 2030 healthcare vision. Sustained political commitment and coordinated efforts are needed for successful implementation. Addressing challenges such as data transparency, stakeholder engagement, and resilience-building measures will determine the system's ability to adapt and thrive in the face of future health crises.

The health system in Egypt is currently financed through the old health insurance system – covering about 60% of the population, the newly implemented universal health insurance (UHI) system – covering about 0.8% of the population, private insurance system – covering about 1.2% of the population, and out-of-pocket financing. The full implementation of the new Universal Health Insurance system program will promote sustainability of health system financing in Egypt covering the whole population.

The Ministry of Health and Population launches several health promotion initiatives for prevention, early detection, and management of chronic conditions. The GAHAR (General Authority for Healthcare Accreditation and Regulation) is responsible for evaluating the quality of health services and accreditation of hospitals/healthcare facilities to be included within the new universal health insurance system.

The health workforce domain in Egypt is challenged by several factors including healthcare workers' brain drain, the uneven distribution of workers geographically and by specialty, and the lack of implementation of occupational safety criteria, as well as the significant levels of burnout among healthcare workers, exacerbated by the COVID-19 pandemic. There are national efforts to address these factors in the recent retention plan, but more actions must be taken to ensure sustainable workforce capacity.

The Egyptian pharmaceutical market has many strengths including low labour costs and a vast pool of highly qualified pharmacists, engineers, and skilled technicians and also a well-established manufacturing industry. There are also some weak points including economic instability and low per capita medicine spending, lack of research and development, and lack of implementing and coordinating digitalization of the health system. Egypt's Vision 2030 and current political will is moving with steady steps towards improving the pharmaceutical industry and technology in Egypt.

Population health in Egypt requires special attention and strategic planning to address structural challenges affecting health programs in light of the annual accelerating growth of the population. The Egyptian Ministry of Health and Population and the Ministry of Social Solidarity (MOSS) are working to address these structural challenges in population health programs, including financial constraints, high out-of-pocket expenditure, poor governance, and inadequate follow-up management. They are also raising public awareness about healthy lifestyles and reproductive health issues through initiatives like the 'Decent Life Initiative' and 'Solidarity and Dignity Programs'. Recommendations include evidence-informed policymaking, accurate population health databases, sustainable financing, decentralisation, and robust monitoring and evaluation systems.

Egypt started to take some serious measures to reduce the environmental impact of healthcare facilities through different channels, such as the climate resilience assessment, One Health strategy, and the new waste management control system. Those measures were helped post COP-27 that was hosted by Egypt in 2022. While some of these channels are still in their early stages of being assessed, there is a need to do these activities on a wider scale to include the whole country.

In conclusion, the healthcare system in Egypt is progressing on many fronts. The political leadership's support and focus on improving health for all Egyptians ensure that the system's ability to meet international standards for sustainability and resilience will be integrated in the different policies and plans for the future.

Findings: key themes for sustainability and resilience

As part of the Partnership for Health System Sustainability and Resilience (PHSSR), this report evaluates the sustainability and resilience of the health care system according to seven domains:

- Governance
- Financing
- Workforce
- Medicines and technology
- Service delivery
- Population health
- Environmental sustainability

By examining each of these domains, PHSSR seeks to identify strengths and weaknesses of health systems and generate evidence-informed solutions and policy recommendations to improve sustainability and resilience.The response to the COVID-19 pandemic has emphasised strengths and underlying issues for the health and care system in Egypt. Table 1 summarises the key findings for each domain.

Table 1: Sustainability and resilience – summary of findings by key domains

DOMAIN 1 GOVERNANCE		
Strengths	**Sustainability** ↑ Presence of legislation that organises the roles of each sector. ↑ Accountability and transparency improvement is one of the priorities on the political agenda for *Egypt Vision 2030.*	**Resilience** ↑ Presence of emergency response plan. ↑ Presence of health emergency technical committee.
Weaknesses	**Sustainability** ↓ High degree of centralization. ↓ Limited participation of civil society organisation and community representatives. ↓ Weak transparency and accountability practice. ↓ Limited access to reliable information and data.	**Resilience** ↓ Challenges in informed decision-making due to lack of transparency and concrete on-time data collection and analysis processes and tools.

Table 1 (continued): Sustainability and resilience – summary of findings by key domains

DOMAIN 2	FINANCING	
Strengths	**Sustainability** ↑ Health spending as a percentage of GDP increased between and 2020, reflecting improved sustainability of health financing. ↑ Out-of-pocket (OOP) spending as a percentage of current health expenditures decreased from 62.6% in 2010 to 59.3% in 2020. ↑ The new Universal Health Insurance program will ensure sustainability of health financing for the whole population. ↑ Payments to healthcare providers are based on level and type of care delivery. This currently sustains the health system in the short term.	**Resilience** ↑ During the COVID-19 pandemic, additional public funds were released to cover the additional pandemic-related expenditures, maintain resilience of health system financing during the pandemic. ↑ A new bill was approved in 2021 to establish a medical emergency fund to combat emergency medical expenses in Egypt aiming to promote the resilience of the health system financing.
Weaknesses	**Sustainability** ↓ The health system in Egypt is largely financed by OOP payments, so the health financing is mainly regressive. ↓ Burden of health financing falls more on the poor, urging a need to reform the health financing scheme to achieve more equitable financing. ↓ No financial efficiency indicators exist that study the relationship between healthcare spending and patients' health outcomes. ↓ The old health insurance system, funded by general taxation, suffers from financial deficits, compromising the quality and quantity of public health services. ↓ There are no mechanisms or risk equalisation measures to allocate funds based on population needs or disease burden based on real-world evidence from local context. ↓ Rural women, youth aged 20–24 years, and the self-employed informal sector 'the missing middle' are the most vulnerable populations for health insurance coverage.	**Resilience** ↓ There are no forecasts about risk of exposure to outbreaks or epidemic/pandemics limiting the resilience of the health system to cope with any future health crises.

Table 1 (continued): Sustainability and resilience – summary of findings by key domains

DOMAIN 3	WORKFORCE	
Strengths	**Sustainability** ↑ Egyptian healthcare workers planning to emigrate are willing to stay or return if retention policies and healthcare sector reforms are implemented.	**Resilience** ↑ The current political will and subsequent retention plan for the workforce in Egypt has adopted short-, medium-, and long–term interventions to solve the problem.
Weaknesses	**Sustainability** ↓ There is an unprecedented shortage of health workers, particularly in some specialties and rural areas. This shortage is exacerbated after the COVID-19 pandemic with little attention to solve this problem.	**Resilience** ↓ The existing challenges of health workers' burnout and shortage are worsening due to the national currency devaluation and economic instability.
DOMAIN 4	**MEDICINES AND TECHNOLOGIES**	
Strengths	**Sustainability** ↑ Low labour cost. ↑ Vast pool of highly qualified skilled workers. ↑ Political will to nourish the pharmaceutical market, encourage local manufacturing, and increase free trade agreement.	**Resilience** ↑ Well established pharmaceutical companies. ↑ Successful national immunisation system.
Weaknesses	**Sustainability** ↓ Economic instability. ↓ Low per Capita medical spending. ↓ Shortage of essential medicine. ↓ Lack of coordination towards achieving a digital health system and poor fragmented digital system.	**Resilience** ↓ Dependence on imported raw materials. ↓ Low capacity and little investment in research and development. ↓ Some regulatory bureaucracy in registration and pricing of new pharmaceutical products.

Table 1 (continued): Sustainability and resilience – summary of findings by key domains

DOMAIN 5	SERVICE DELIVERY	
Strengths	**Sustainability** ↑ The GAHAR ensures the delivery of high-quality health service delivery and sustainability of services for the UHI through a rigorous accreditation process. ↑ The Ministry of Health and Population (MOHP) launched several initiatives to achieve efficiency in health service delivery, yet it is still necessary to achieve efficiency in the hospital sector which accounts for almost 30% of total health expenditure. ↑ Coordination between the public and private sectors (through public–private partnerships) along with the NGOs reduces the burden on the public sector and ensures the sustainability of service delivery. ↑ Several health promotion campaigns exist for prevention and treatment of chronic diseases, such as reducing the burden of Hepatitis C, early detection of some cancers, and maternity and childhood care programs, promoting sustainability of health services delivery.	**Resilience** ↑ The Egyptian healthcare system successfully absorbed the shock from the COVID-19 crisis with high levels of adaptability and resilience through collaborative efforts among national and international parties. ↑ The coordination of health service delivery was achieved between the public sector, the private sector, and the civil society (NGOs), which enabled resilience of the Egyptian healthcare system through the COVID-19 pandemic.
Weaknesses	**Sustainability** ↓ The role of primary health care is less institutionalised in most cities covered by the old health insurance system. ↓ The health service delivery system lacks explicit referral mechanisms in cities not covered by the new UHI program. ↓ Some disparities exist in the geographical distribution of healthcare services based on the geographic area (urban/rural), availability of primary care and specialised care, and variations in disease burden per region.	**Resilience** ↓ The COVID-19 pandemic caused initial disruption of health services, especially with the beginning of each new wave of the pandemic, where the main problem was the availability of adequate inpatient hospitalisation for the severe cases.

Table 1 (continued): Sustainability and resilience – summary of findings by key domains

DOMAIN 6	POPULATION HEALTH AND SOCIAL DETERMINANTS	
Strengths	**Sustainability**	**Resilience**
	↑ The National Food and Nutrition Strategy 2023–2030, launched in 2023, aims to reduce children's stunting, wasting, and obesity by expanding nutrition and health promotion and providing essential services to women, children, and other vulnerable groups. ↑ The fertility rate dropped from 3.5 births per woman in 2014 to 2.85 in 2021. ↑ Major government health promotion initiatives to address the behavioral determinants of health include the "Aware" program "Waai", the Mass media campaign "Their Dream Starts with You", and the Supporting healthy lifestyle initiative as a part of 100 million healthy lives campaign with an overarching goal to improve the levels of health literacy among the public.	↑ Two major policy initiatives, namely the "Haya Karima – Decent Life Initiative" and "Takaful & Karama – Solidarity & Dignity Initiative," are being applied on a national scale to address the social determinants of health for almost 58 million Egyptian people. ↑ The Health Conditionality of the Takaful (Solidarity) Conditional Cash Transfer Program is a example of applying the "Health in All Policies" approach and multisectoral collaboration to improve Egyptian population health. ↑ The government managed the COVID-19 pandemic in its early stages. ↑ Considering the larger population in Egypt, the number of cases and deaths was low compared to other countries in the same region.
Weaknesses	**Sustainability**	**Resilience**
	↓ Total life expectancy at birth in Egypt is slightly lower than the average for the Middle East and North Africa. ↓ The top five causes of mortality remained the same between 2009 and 2019 with cardiovascular diseases as the first cause of mortality. ↓ Areas of concern in the behavioural determinants of health include high smoking prevalence among men and a high obesity prevalence among females. ↓ Insufficient follow-up management for patients after chronic disease screenings in public health initiatives.	↓ Economic hardships and the tense global political atmosphere slowed down the national efforts for health system reform. ↓ Inadequate Electronic Medical Records utilisation in primary health facilities hinders the digitalization of patient records. ↓ Discrepancies were noticed in population health data such as life expectancy and mortality rates among other indicators between various sources such as the MOHP reports, Central Agency for Public Mobilization and Statistics (CAPMAS) reports, and WHO data repositories.

Table 1 (continued): Sustainability and resilience – summary of findings by key domains

DOMAIN 7	ENVIRONMENTAL SUSTAINABILITY	
Strengths	**Sustainability** ↑ Establishment of new waste management authority. ↑ Setting regulation and guidelines by GAHAR for green hospitals. ↑ The collaboration between different Egyptian authorities to set the One Health national strategy.	**Resilience** ↑ Assessment of the climate resilience and vulnerability adaptation of healthcare facilities in six Egyptian governorates. ↑ Setting a unified National Action Plan for Antimicrobial Resistance 2018–2022 for the use of antibiotics ↑ The presence of disease surveillance for human and animal diseases.
Weaknesses	**Sustainability** ↓ Despite regulation, a high percentage of wastes are still disposed of through illegal channels. ↓ Very few hospitals are shifting to green energy. ↓ Unclear policies of sharing data between departments and ministries can lead to duplication or missing important updates.	**Resilience** ↓ The measurement of the carbon footprint was limited to selected healthcare facilities, and the environmental costs of the facilities are not systematically measured. ↓ Antimicrobial resilience surveillance was applied in a restricted number of facilities and there is no applied legal restriction on the public use of antibiotics. ↓ Limited access of data by different departments.

To improve its health system sustainability and resilience status, Egypt needs to build on its key strengths in the different domains and address the challenging weaknesses that are inherent in it. Some of the key strengths that need to be leveraged are the new Universal Health Insurance system that will provide universal coverage, the strong pharmaceutical industry, the public health initiatives, the application of quality and accreditation standards, the political support and focus on healthcare as a pillar for sustainable development efforts to achieve the country's *Vision 2030*. Egypt has very good partnerships with international health organisations and can leverage this to continuously improve.

On the other hand, some systemic challenges need to be addressed, such as improvement of the governance system (balancing the needs for centralization and decentralisation), the lack of data collection and transparency across the system to improve decision making processes, the lack of measures for outcomes to adopt value-based healthcare models, and the brain-drain for doctors due to the challenging economic conditions.

Recommendations

We make 38 recommendations across the seven domains which are shown in Table 2 below.

Table 2: Recommendations across the seven domains

DOMAIN 1	**GOVERNANCE**
1A	Promote decentralization of healthcare management to empower local authorities and communities.
1B	Local entities should have more control over healthcare planning, budgeting, and service delivery to address region-specific healthcare needs.
1C	Ensure the timely and accurate collection of health data for evidence-based decision-making utilising up-to-date technological tools.
1D	Involve the public and civil society organisations in healthcare decision-making through consultation, feedback mechanisms, and public hearings.
1E	Establish mechanisms for transparency in healthcare funding, expenditures, decision-making processes and public data and information sharing.
1F	Implement strong accountability measures, including regular audits and reporting by independent entity reporting directly to the Prime Minister to avoid conflict of interest and to ensure that resources are used efficiently and ethically
DOMAIN 2	**HEALTH SYSTEM FINANCING**
	Sustainability
2A	Conduct micro-costing on the disease level based on the health provider perspective and the societal perspective (not only payer perspective).
2B	Make budgeting and spending projections based on disease burden, the consequential economic and societal costs of diseases, and the economic benefit of health to society.
2C	Make financial resource allocation based on population needs, disease burden, utilisation rates, and the need to improve health outcomes in priority areas, achieving allocative value.
2D	Adopt value-based payment (reimbursement) models for the novel expensive drugs to justify the value of money spent relative to improved health outcomes.
	Resilience
2E	Monitor the epidemiological relative risk of diseases and outbreaks to be prepared for upcoming health crises and make financial contingency plans for crisis management.

Table 2 (continued): Recommendations across the seven domains

DOMAIN 3	WORKFORCE
3A	Consider the monetary incentives to retain doctors in their jobs by increasing financial and non-financial incentives.
3B	Integrate nationally recognized, standardised processes for career advancement, and continuing medical education programs.
3C	Provide clearly expressed, rational, updated, accepted standard operating procedures, or methods to improve the normative work areas and ensure occupational safety.
3D	Ensure stakeholder involvement and consistent messaging about internal ownership and supporting organisational trust.
3E	Provide alternative plans to alleviate the shortage or uneven distribution of healthcare professionals. For example, community health workers can help serve and engage communities, especially in poor and rural areas. Teleconsultations can also help provide coverage of health services to the whole community. Additionally, a task-shifting strategy can help compensate for the physician shortage in emergencies.
DOMAIN 4	**MEDICINES AND TECHNOLOGY**
4A	Ensure availability of both adequate domestic government funding and international donor support for vital medicines and vaccines according to national priorities. Additionally, incentivize pharmaceutical companies to dedicate some of their budget to improve drug accessibility and avoid drug shortage.
4B	Promote and generalise the application of certificate of need system to optimise the medicines usage and to implement rational drug use based on monitoring consumption, defining targets, avoiding expiry of medicines that can be utilised in other districts and applying stewardship policies.
4C	Improve the research and development capacities within the Egyptian market through having a clear policy framework, a coordinated industrial and health strategy, strong intellectual property protection, and an atmosphere that stimulates stakeholder collaboration.
4D	Create a new area of investment in pharmaceutical production, for example cultivation of lands to produce new plants that contain active pharmaceutical ingredients and can be used in alternative medicine.
4E	Market control policies need to be implemented in order to control the expiry and counterfeit medicines and to Implement penalties against companies that don't comply with quality control and quality assurance policies and procedures.
4F	Coordinate different available technology platforms to be able to track need and invest to build more platforms. Data management and health information systems need to be available to help track and solve the gaps.

Table 2 (continued): Recommendations across the seven domains

DOMAIN 5	SERVICE PROVISION
5A	Implement a value-based healthcare program in Egypt and promote value in service delivery through measuring health outcomes achieved relative to the money spent.
5B	Standardise reporting of health outcome measures in a patient-centred approach through the establishment of the health outcomes measurement system.
5C	Encourage public-private partnerships, where private investments in healthcare should be based on real-world evidence from local contexts in Egypt about the disease burden, economic burden, and health outcomes that need improvement.
5D	Strengthen referral networks from primary care to secondary/tertiary care services, through electronic referral systems to make resource allocation based on the geographic distribution, availability of health services, and patients' needs.

DOMAIN 6	POPULATION HEALTH AND SOCIAL DETERMINANTS
	Planning and preparing for health crises
6A	Establish a unified clinical decision-making body to establish management and prevention protocols for health emergencies and epidemics.
6B	Reproductive health services are usually overlooked during any crisis, so a contingency plan needs to be in place to ensure the continuity and sustainability of the services.
	Resourcing the population health programs
6C	Data accuracy, availability and accessibility – accurate and consistent population health datasets should be made publicly available and accessible via the official websites of the Egyptian government.
6D	Health infrastructure-related resources – expand support to civil society organisations as health service providers by waiving or reducing water, gas, and electricity bills, and reducing taxes on health facilities associated with non-governmental organisations.
6E	Sustainable financial resources I – Diversify the financing sources for health programs by capitalising on building a sustainable public-private partnership model for financing health programs.
6F	Sustainable financial resources II – Consider innovative financing opportunities for health programs such as ear-marked taxation on high sugar-sweetened beverages and Tobacco products to fund health promotion initiatives "Health Promotion Levy" that are payable by the manufacturers.
	Implementing population health programs
6G	Decentralise the implementation of the population health programs and health services convoys based on health priorities at the level of the governorates, particularly in rural areas with limited access to health services.
6H	National population health programs and strategies should be discussed through civil society representatives as a part of the established national dialogue to build consensus on the implementation plans and ensure the social acceptance of such plans (e.g. gaining consensus on the rollout of family planning programs in villages).

Table 2 (continued): Recommendations across the seven domains

DOMAIN 7	ENVIRONMENTAL SUSTAINABILITY
7A	Systemizing the collection of data concerning the environmental impact of healthcare facilities, setting practical objectives and goals, and launching reward and punishment mechanisms for those who succeed or fail to meet the carbon footprint targets.
7B	Lobbying on all levels to raise the priority of the healthcare system's environmental resilience and sustainability in the national budget setting.
7C	Raising awareness of healthcare professionals on health and environmental sustainability, occupational hazards and proper waste disposal through training and education in all governorates.
7D	Setting clear policies and regulations for data sharing among departments and ministries. These policies should be added with the assistance of several ministries, so that each can add their perspectives and identify their constraints.

PROPOSED INITIATIVES/PROGRAMS
Value-based Healthcare National Program for health outcomes and costs measurement and including value-based payments within universal health insurance.
National Cost-of-illness Initiative for financial planning based on disease burden.
Population Health Data Support Initiative to be led by the Central Agency for Public Mobilization and Statistics (CAPMAS), and Egypt Cabinet Information and Decision Support Center (IDSC) in collaboration with MOHP and WHO.
Digital Health Initiative to implement the many strategies proposed for a national Electronic Medical Record (EMR) system, the use of virtual health solutions, and applying medical coding standards.

Introduction

The COVID-19 pandemic has brought to light the importance of not only improving the resilience of the health system to crises but also of ensuring their long-term sustainability. The Partnership for Health System Sustainability and Resilience (PHSSR) was established in 2020 with the goal of building more sustainable and resilient health systems around the world.

One of the key objectives of PHSSR is to build knowledge, understanding and consensus on the dimensions of health system sustainability and resilience, and how they can be improved. To achieve this goal, PHSSR focuses on seven key domains:

Governance: the wide range of steering and rule-making related functions carried out by governments and decision makers as they seek to achieve national health policy objectives

Financing: how health systems generate, pool and allocate financial resources and pay for health services

Workforce: how health systems plan for, train, recruit, reward, and deploy their workforce, and shape the conditions in which health professionals work

Medicines and technology: how health systems make use of medicines and (information) technologies in the delivery of health services

Service delivery: how health services are organised and delivered, including ambulatory and hospital care, and public health

Population health: how health systems address the social determinants of health and meet the needs and demand of the population

Environmental sustainability: how health systems prevent and minimise their carbon footprint and the impacts of pollution on the population's health

By examining each of these domains, PHSSR seeks to identify strengths, weaknesses, opportunities and threats to health systems and to generate evidence-informed solutions and policy recommendations to improve sustainability and resilience.

A sustainable health system improves population health by continually delivering the key functions of providing services, generating resources, financing and stewardship, incorporating principles of financial fairness, equity in access, responsiveness and efficiency of care, and does so in an environmentally sustainable manner.

A resilient health system is able to prevent, respond to, manage the health system impact of, and recover and learn from, acute and chronic crises (including, but not limited to, pandemic threats, climate change and economic and technological shocks), minimising their short- and long-term impacts on health, social and economic wellbeing.

1. DOMAIN 1
Governance

Good governance encompasses participation, the rule of law, transparency, responsiveness, consensus-building, equity, accountability, and strategic vision. In healthcare, effective governance can enhance sector performance, balance stakeholder interests, and promote health equity.

Governance structure and leadership

Egypt's health system is complex and fragmented, comprising both public and private providers and payers. The governmental sector includes health services affiliated with ministries, which receive funding from the Ministry of Finance. The parastatal health service provider sector includes quasi-governmental organizations where government ministries hold decision-making control, such as the Health Insurance Organization (HIO), the Curative Care Organization (CCO), the Specialized Medical Centres Secretariat, and the Teaching Hospitals and Institutes Organization (THO), and the General Secretariat of Mental Health and Addiction Treatment. The private sector, comprising non-profit and for-profit organizations, includes private clinics, laboratories, hospitals, and pharmacies.

In 2019, Law 151 established the Egyptian Authority for Unified Procurement (UPA), responsible for purchasing pharmaceutical products and medical devices for all public agencies. Reporting to the Prime Minister, this entity was created to allow the Ministry of Health to focus on public health programs, population immunization, policy setting, and strategy development while reducing the risk of fraud. Additionally, the Egyptian Health Council, established in 2022 according to Law 12, reports directly to the Egyptian President and focuses on capacity building and health worker development.

Figure 1 presents the landscape of the Egyptian healthcare system and its affiliated institutions.

Figure 1: Health sector organisation in Egypt

President	Egyptian Health Council		
Prime Minister	Authority for Unified Procurement (UPA)		
Ministry of Health and Population (MOHP)	Health Insurance Authority Ambulance Authority	Health Insurance Organisation (HIO) Curative Care Organisation (CCO) Specialised Medical Centres Secretariat Teaching Hospitals and Institutes Organisation (THO) General Secretariat of Mental Health and Addiction Treatment Universal Health, Insurance Authority (UHIA)	
Other ministries	Ministry of Higher Education and Scientific Research Ministry of Interior, Medical Services Department Ministry of Defence, Medical Services Department		
Private sector			Non-profit clinics, laboratories, hospitals, and pharmacies For-profit clinics, laboratories, hospitals, and pharmacies

The Ministry of Health oversees the public system, while the HIO provides financial coverage for 60% of the population. Although the public system offers universal basic coverage, it is underfunded and perceived as low quality. Conversely, the private sector, which has expanded through privatization, is considered higher quality but unaffordable for many citizens. Total health expenditure is only 4.75% of GDP, lower than regional comparators, with over 60% of healthcare expenditure being out-of-pocket. The Arab Spring revolution led to increased demands for health reforms, yet political instability has impeded progress. Proposed reforms include expanded health insurance, improved primary care, better resource distribution, increased public health spending, and the introduction of a new system of universal health coverage (UHC), approved by Parliament in 2017 and still in the piloting phase.

However, a major gap facing the Egyptian health system is the capacity of health information systems. While disease surveillance has increased, it primarily focuses on communicable diseases. Health facilities have expanded rapidly, yet public facilities are underutilized compared to the private sector. The healthcare workforce is inadequately distributed, with concentrations in urban areas. Additionally, limited funding, fragmentation, uneven access and quality, lack of coordination, and insufficient data for policymaking are significant obstacles (Gericke et al., 2018).

Given these perspectives, the current state of the healthcare system requires increased attention and efforts on different levels, primarily due to the absence of clear demarcation between roles, such as planning, executive functions, financing, and regulatory and supervisory responsibilities. Presently, the Ministry of Health and Population bears sole responsibility for all these roles, and this situation contributes to the current challenges faced by the system (Ministry of Planning, Monitoring and Administrative Reform, 2016).

In this context, *Egypt Vision 2030*, announced by the Egyptian President in 2016, identified key factors affecting the health of Egyptian citizens and proposed mechanisms to achieve universal healthcare coverage for all. One of the main objectives of this strategy is to improve health sector governance. This entails "ensuring the availability of accurate data for informed decision-making in a timely manner, while enhancing the efficiency, accountability, transparency, and resource management of the health sector." Achieving this objective requires diversification and alignment of the health sector's relationship with other sectors, as well as strengthening the role of the Ministry of Health and Population as regulator and steward to ensure population health needs are met, and ensure quality of the health system. The availability of accurate data for informed and timely decision-making is crucial to enhancing sector resource management in a transparent and accountable manner (Ministry of Planning, Monitoring and Administrative Reform, 2016). However, no documented data is available to measure progress regarding this specific objective.

Furthermore, there is a lack of data on patient satisfaction, despite the presence of complaint boxes and contact numbers at the entrance of some public healthcare facilities. Assessment tools primarily focus on service utilization through in-patient and out-patient records. However, the evaluation of services in the new universal health coverage system is based on patient satisfaction, with service provider continuation contingent upon this evaluation and technical audits by GAHAR[1] (the national institute for registration and accreditation).

Participation and community engagement

Although discussions and proposals have been made to establish a Supreme Health Council that allows various civil society representatives to participate in formulating health policies and regulations, there is no documented mechanism for community engagement or participation. Consequently, measuring outcomes from round table discussions with civil society organizations or assessing the extent to which these discussions influenced policymakers' decisions is challenging.

[1] www.gahar.gov.eg

1.1 Sustainability

1.1.1 The current situation

Effective governance in healthcare relies on participation, the rule of law, transparency, responsiveness, consensus-building, equity, accountability, and strategic vision. These elements are fundamental to ensuring the sustainability of the system, enhancing sector performance, balancing stakeholder interests, and promoting health equity.

In Egypt, the importance of accountability, the legal framework, and the role of civil society were exemplified in a case brought by the Egyptian Initiative for Personal Rights (EIPR), an independent human rights organization with a focus on the right to health. The EIPR contested the Prime Ministerial Decree 637 of 2007, which aimed to establish the Health Care Holding Company and grant it control over the assets and facilities of the public HIO, which covered 52% of Egyptians at the time. This company could have potentially sold these assets to private investors while operating health services for profit. In 2008, the Court of Administrative Justice found in favour of the EIPR and suspended the establishment of the Health Care Holding Company. The court's ruling was based on the government's constitutional obligation to ensure affordable health services to all citizens, regardless of justification. Ultimately, the court preserved the HIO under public ownership and control, setting a significant legal precedent affirming the government's duty to provide accessible and affordable quality healthcare as a right for all citizens (Elsayed & Anwar, 2015). The court recognized civil society groups' legal standing as citizens entitled to health rights from the state. However, the role of independent civil society organizations such as the EIPR remains weak and insufficiently empowered to hold the government accountable.

Structurally, the Ministry of Health and Population is headed by the Minister of Health and Population, a Cabinet-level position appointed by the Prime Minister. Under the Minister, several deputy ministers and directors general oversee various departments and agencies within the Ministry, including those focused on primary healthcare, preventive medicine, public health programs, pharmaceutical affairs, and medical supply.

The Ministry operates with a relatively high degree of centralization. Policies, plans, budgets, and standards for healthcare provision are predominantly determined at the national level and implemented through the network of health directorates in different regions as well as directly managed hospitals and clinics. Provincial and local health offices have limited autonomy or decision-making power.

While centralization facilitates coordination of policies and resource allocation nationally, it presents several drawbacks:

- **Responsiveness and flexibility to local needs**: Centralization can lead to national policies and programs that lack local input, failing to address the specific needs, priorities, and health challenges of different regions.
- **Access and health equity**: Centralized systems may struggle to ensure equitable access to quality healthcare across all regions, with remote areas often overlooked.
- **Innovation**: Limited decision-making at the local level may hinder innovation in healthcare delivery, as frontline health workers and regional managers have limited autonomy to experiment with new approaches.
- **Accountability**: Reduced opportunities for citizens and local communities to voice concerns about local health services to policymakers can diminish accountability and incentives for performance improvement.
- **Bureaucracy**: Dependence on national ministry leadership for decisions on minor matters can slow response times and create bureaucratic hurdles for regional health offices.

- **Political instability**: Highly centralized hierarchies concentrate power, making health systems vulnerable to interference or disruptions due to sudden leadership changes.

Despite efforts to decentralize governance and shift authority for health service delivery planning and decision-making to provincial and local levels, governance and health systems management in Egypt largely remain centralized.

1.1.2 Challenges in sustainability

Egypt's healthcare system faces significant sustainability challenges due to poor governance, which are manifested in several key areas:

- **Inadequate healthcare spending**: Egypt allocated only 4.36% of its GDP to healthcare in 2020 (World Bank, Data), a figure that contrasts starkly with the high out-of-pocket expenditure, which accounts for over 60% of total health spending.
- **Shortages and uneven distribution of healthcare workers**: this is particularly noticeable in rural areas where the shortage and uneven distribution of healthcare workers exacerbate accessibility issues.
- **Fragmented health insurance schemes**: with limited population coverage, estimated at around 60%.

In response to these challenges, Egypt has articulated a vision for 2030 (Ministry of Planning, Monitoring and Administrative Reform, 2016), which aims to achieve universal health coverage and sustainable healthcare for all citizens. Key governance priorities outlined in this vision include:

- **Expansion of health insurance**: the goal is to ensure coverage for all Egyptians.
- **Integration of care**: the establishment of a national health insurance system is proposed to streamline care delivery.
- **Decentralization of governance**: engaging local communities and decentralizing decision-making processes are emphasized.
- **Strengthening regulatory capacity**: central healthcare bodies will focus on enhancing regulatory oversight.
- **E-health systems**: integration of systems to improve data management and transparency.
- **Primary and preventative care**: prioritizing primary healthcare services and preventive measures.
- **Investment in healthcare human resources and infrastructure**: ensuring an adequate workforce and infrastructure to support healthcare delivery.

While effective governance and leadership will be critical for Egypt to overhaul its healthcare system by 2030, and the outlined vision presents sound strategies, sustained political commitment, and coordinated efforts among diverse stakeholders will be necessary to fully implement reforms. Strong governance holds the potential to enhance efficiency, transparency, and sustainability in Egypt's healthcare sector.

1.2 Resilience

Health system resilience is crucial for mitigating the impacts of significant shocks such as economic crises, disease outbreaks, and pandemics. However, there is considerable confusion surrounding the definition of resilience, strategies to enhance it within the system, and methods for measurement. One commonly accepted definition of health system resilience is "the ability to prepare for, manage (absorb, adapt, and transform), and learn from shocks" (Thomas et al., 2020).

Egypt's government managed to effectively mitigate overall mortality rates and prevent overwhelming the healthcare system during the COVID-19 pandemic, although like many other countries, it encountered challenges in certain aspects of its response. Though policies such as lockdowns were swiftly implemented, there were concerns regarding limited and questionable data transparency, hindering a thorough assessment of policy effectiveness. Stakeholder consultation took place through bodies such as the National Scientific Committee for Coronavirus, which engaged academics in the National COVID-19 Scientific Committee and sought research inputs. However, there was a lack of clarity regarding the extent of stakeholder input during policy formulation and decision-making processes (Abu El Sood et al., 2021).

In terms of public health response, Egypt employed testing, surveillance, contact tracing, and isolation measures. However, low testing levels in the early stages potentially resulted in missed cases. Other challenges included enforcing quarantines in slum areas, inadequate training on preparedness plans, nursing staff shortages due to absenteeism and infection, and psychological issues such as fear and anxiety (Hossny et al., 2022). While policies and restrictions were aligned with WHO recommendations, their implementation and effectiveness were not thoroughly measured.

During the crises, the level of transparency was called into question, primarily stemming from the inconsistency between the official information disseminated through official channels and the reality experienced by citizens. This dissonance was particularly evident in the shortages of essential supplies such as Personal Protective Equipment (PPE) and disinfectants in public health facilities. Furthermore, several physicians working in public hospitals reported receiving undocumented, non-official instructions to limit the number of COVID-19 tests conducted, when there were indications of a higher number of suspected cases. There is uncertainty among medical professionals regarding whether these instructions stemmed from a scarcity of testing kits or were politically motivated[2]. Unfortunately, these occurrences widened the trust deficit between the populace and the Government.

Despite these challenges, successful measures included establishing isolation areas, enhancing communication between district-level teams, and the dedication of frontline health workers. Material support, such as PPE received from international non-governmental organizations (INGOs), was instrumental in supporting response efforts.

Although media campaigns and community outreach were used to promote COVID-appropriate behaviour, confusion regarding some health advisories hindered adherence. Initially, inter-sectoral coordination for communicating guidance to workplaces and religious institutions was also weak. While centralized governance facilitated swift decisions, deficiencies were observed in transparency, expert engagement, and tailored messaging. Investing in pandemic preparedness, through evidence-based policymaking and risk communication, would enhance Egypt's capacity to manage future outbreaks.

Learning from the pandemic, Egypt has initiated governance reforms to enhance healthcare resilience[3]:

- Expanding health insurance coverage
- Upgrading healthcare IT infrastructure
- Building strategic reserves of essential medicines and supplies
- Training rapid response teams
- Strengthening primary healthcare and community-based care.

[2] Key informant interviews.

[3] Key informant interviews.

In conclusion, robust and adaptable governance is essential for enhancing Egypt's healthcare resilience against future health threats. The COVID-19 crisis offers vital lessons for advancing the strategic vision for healthcare governance transformation by 2030. Sustained efforts and political commitment to reform will determine the success of building governance capacity for resilience.

1.3 Recommendations

RECOMMENDATION 1A
Promote decentralization of healthcare management to empower local authorities and communities.

RECOMMENDATION 1B
Local entities should have more control over healthcare planning, budgeting, and service delivery to address region-specific healthcare needs.

RECOMMENDATION 1C
Ensure the timely and accurate collection of health data for evidence-based decision-making utilising up-to-date technological tools.

RECOMMENDATION 1D
Involve the public and civil society organisations in healthcare decision-making through consultation, feedback mechanisms, and public hearings.

RECOMMENDATION 1E
Establish mechanisms for transparency in healthcare funding, expenditures, decision-making processes and public data and information sharing.

RECOMMENDATION 1F
Implement strong accountability measures, including regular audits and reporting by independent entity reporting directly to the Prime Minister to avoid conflict of interest and to ensure that resources are used efficiently and ethically.

2. DOMAIN 2
FINANCING

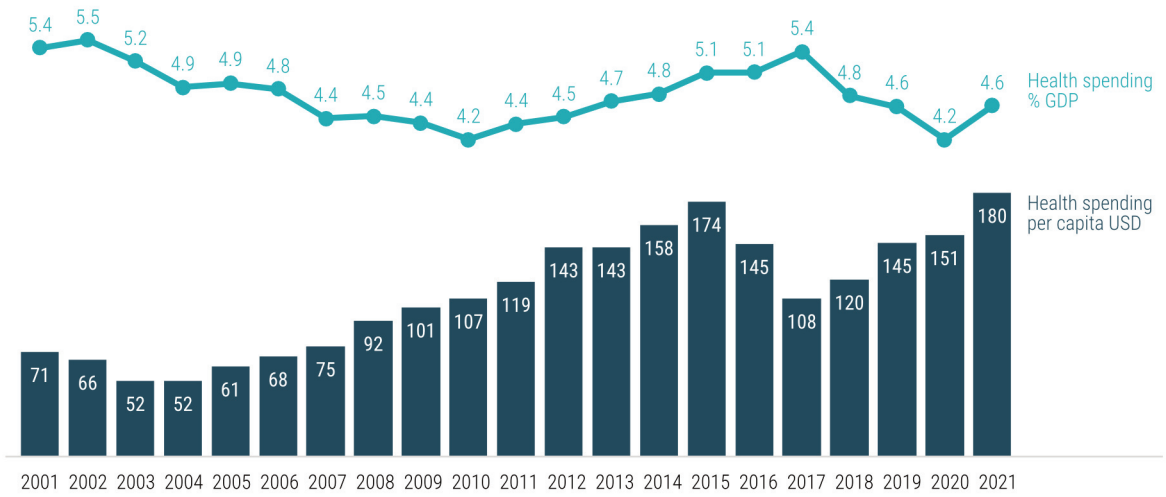
2.1 Sustainability

2.1.1 Revenue generation and expenditures

Historically, the Egyptian healthcare system has faced challenges due to limited public investment in the health sector and high out-of-pocket expenditures. However, the approval of the new Constitution in January 2014, which nearly doubled government expenditure on healthcare from 1.5% to 3% of GDP, presents a significant opportunity to improve health system financing toward universal health coverage (UHC) in Egypt.

In 2023, the Ministry of Health and the WHO Egypt Country Office released the National Health Accounts 2019/2020 report, providing an expenditure baseline to support Egypt's health system financing reform (WHO Eastern Mediterranean Region, 2023a). The trend in health spending per capita increased over time from USD 71.04 in 2000 to USD 173.52 in 2015, and then slightly decreased to USD 150.91 in 2020, as shown in Figure 2. Health spending as a percentage of GDP increased from 4.15% in 2010 to 4.36% in 2020, reflecting improved sustainability of health financing, with government health spending currently in the process of meeting the 2014 Constitution's ambition to reach or exceed 3% of GDP.

Figure 2: Current health expenditure as a percentage GDP and per capita, 2001–2021



Note: GDP = Gross domestic Product; Sources: WHO (database); WHO Eastern Mediterranean Region (2023a).

The key statistics of Egypt's health expenditure profile between 2005 and 2020 reflect improved sustainability in most health system financing indicators, as shown in Table 3. Health spending per capita increased from USD 107 to USD 174 between 2010 and 2015, and then decreased to USD 151 in 2020. The decrease is attributed to the 2016 devaluation of the Egyptian Pound (EGP) relative to the US dollar. Therefore, even if spending per capita increased in terms of EGP, it would show a decrease when expressed in USD due to the change in exchange rate. The devaluation of the EGP, caused by economic instability, negatively affects the sustainability of health system financing due to high inflation rates in Egypt and the floating of the local currency.

On the other hand, the out-of-pocket (OOP) spending as a percentage of current health expenditure (CHE) decreased from 62.6% in 2010 to 59.3% in 2020. Nevertheless, the percentage of government health spending (from CHE) increased slightly around 2015 and then slightly decreased between 2016 and 2019 (as shown in Figure 3). However, there are no efficiency indicators linking healthcare spending to health outcomes. Therefore, it is important for healthcare providers to measure their efficiency in spending indicators, for which they should be accountable through an incentive system.

Table 3: Key statistics of Egypt's health expenditure profile, 2010–2021

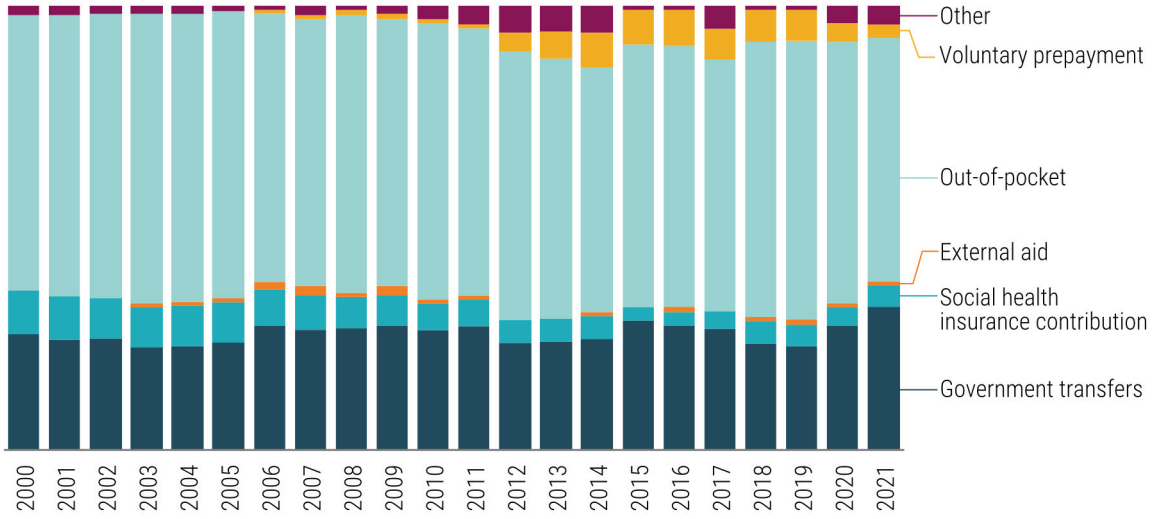
	2010	2015	2020	2021
Health spending, $US per capita (CHE)*	$107	$174	$151	$180
Government health spending as a percentage of CHE	32.9%	31.2%	31.9%	37.7%
Out-of-pocket (OOP) spending as a percentage of CHE	62.6%	59.5%	59.3%	54.9%
Priority to health (GGHE % GGE)	4.4%	5.1%	5.2%	6.8%
Gross Domestic Product (GDP) per capita ($US)	$2,586	$3,428	$3,457	$3,898

Notes: CHE = Current Health Expenditure; GGHE = General Government Health Expenditure; GGE = General Government Expenditure.
* Health spending per capita adjusted for inflation using consumer price index from the Central Bank of Egypt.
Sources: WHO Eastern Mediterranean Region (2023a); WHO (database).

Overall, health financing in Egypt is mainly regressive, as it is largely financed by OOP payments. A study by Ahmed et al. (2021) showed an overall Kakwani index of −0.079, where the regressive effect resulted from three regressive sources (OOP payments, an earmarked cigarette tax, and direct taxes), one proportional finance source (social health insurance), and two (mildly) progressive sources (private health insurance and indirect taxes). Accordingly, these findings show that the burden of financing healthcare falls more on vulnerable populations (the poor), highlighting the need for reforming healthcare financing schemes in Egypt to reduce OOP payments and achieve more equitable financing.

Therefore, the implementation of the new universal health insurance (UHI) system will ensure financial protection and health equity for all the population regardless of their ability to pay or other socioeconomic variations. Figure 3 shows the proportion and trend in OOP spending compared to other sources of expenditure between 2000 and 2021.

Figure 3: Sources of health expenditure (percentages), 2000–2021



Source: WHO (database).

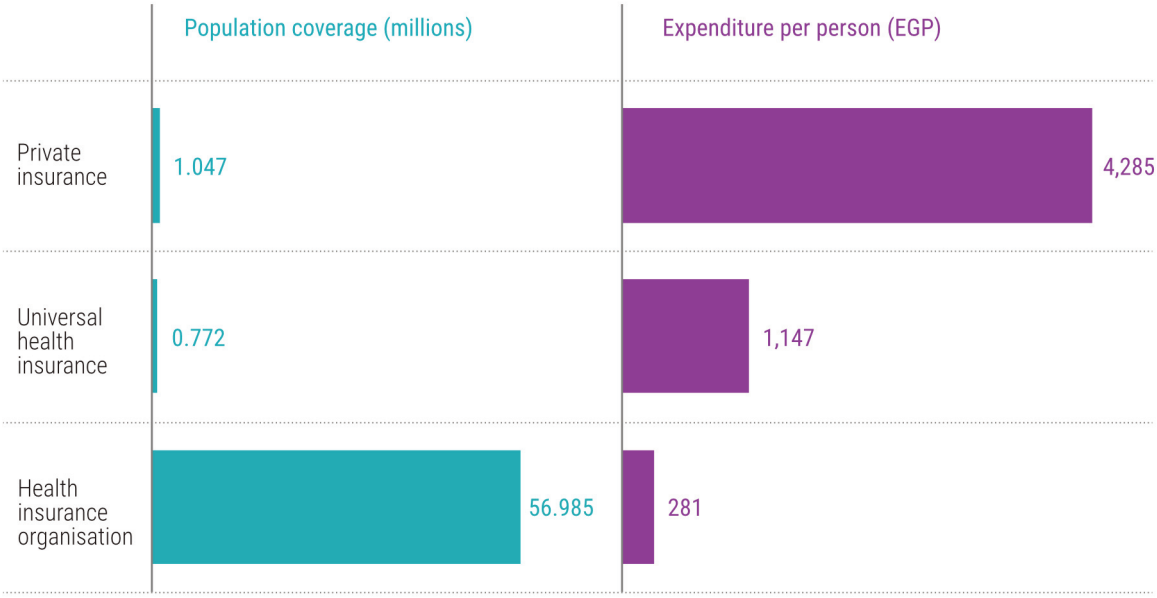
The main source of revenue for the new UHI financing scheme is predominantly contribution-based, whereas the old health insurance system is mostly taxation-based. The new financing scheme is a hybrid of contribution payments, social health insurance (tax-based), and earmarked revenues (including cigarette taxes, car tolls, car licensing), showing initially a large surplus in revenues. In contrast, the old health insurance system suffers from financial deficits, compromising the quality and quantity of public services. Although there is an increasing aging population (>60 years) (CAPMAS, 2022a) (Sweed, 2014) (Gadalla, 2016), the country is not suffering from a narrowing tax base due to the aging population, as around 40% of the population is under 18 years old. For now, the young population (<18 years old) adds to the tax burden along with the elderly population. However, in the long run, this large young population will enter the workforce and improve the dependency ratio. Over the last ten years, there have been no bailouts of public providers or social insurance funds that ran into deficits. Public hospitals could either manage these deficits based on the generated revenues from service surplus or through government transfers.

2.1.2 Coverage and resource allocation

The Universal Health Insurance law was approved by the Egyptian parliament in 2017 to ensure universal health insurance coverage for the entire population with quality health services without facing financial hardship (Elsayed, 2023). Beneficiaries receive health insurance plans through different schemes: public health insurance (either through the old health insurance system or the new UHI system) or private health insurance.

In 2020, the old HIO covered 56.985 million people (beneficiaries) with an expenditure per person of around EGP 280 (WHO Eastern Mediterranean Region, 2023a). The new UHI system launched in July 2019 and is still in a pilot phase, currently covering six out of the 27 governorates (0.772 million beneficiaries in 2020) with EGP 1,147 expenditure per person. The plans for the new UHI system are for it to be applied in six phases and it will be fully implemented across the country by 2030. In 2020, private insurance covered 1.047 million people, with EGP 4,285 spent per person as shown in Figure 4.

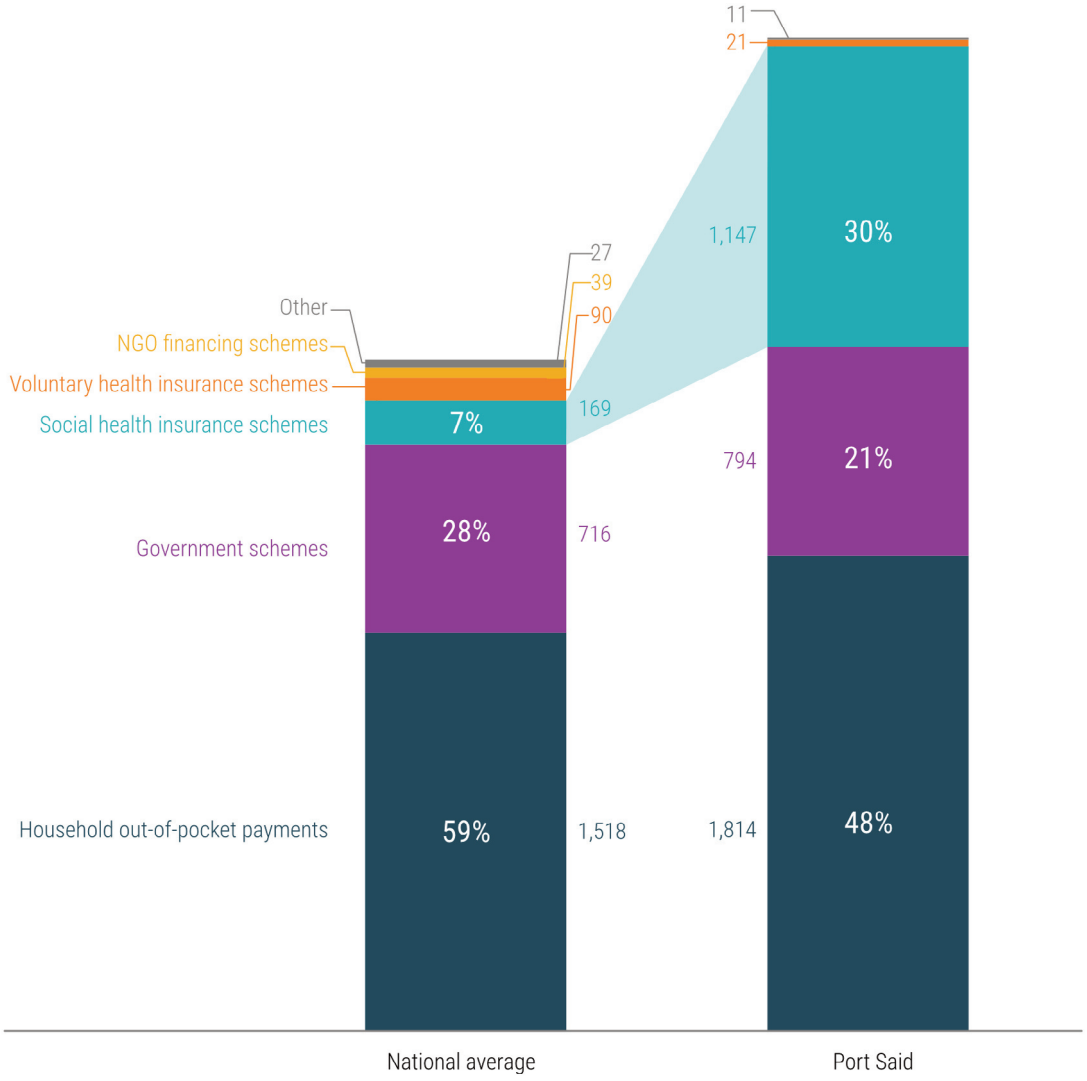
Figure 4: Population coverage and expenditure per person by health financing scheme, 2020



Source: WHO Eastern Mediterranean Region (2023a).

After the implementation of the new UHI financing scheme in Port Said governorate, the percentage of social health insurance (from current healthcare expenditure) increased from around 5% as a national average to more than 20% in Port Said, as shown in Figure 5. Most of the financial allocations in the six governorates (covered by the new UHI) are based on contributions from these regions/governorates. However, there are no existing mechanisms in Egypt to allocate funds based on population needs or disease burden. That is why it is recommended to make allocation of funds based on real-world evidence from the local context in Egypt regarding disease burden, population needs, and the need to improve health outcomes.

Figure 5: Share of current health expenditure per capita by financing scheme, comparison of national average and Port Said



Source: WHO Eastern Mediterranean Region (2023a).

The old health insurance system (tax-based) follows a proportional scheme for all citizens with exemption for the poor/vulnerable populations. The new UHI covers all vulnerable populations (the poor) in the six governorates, with the Ministry of Finance paying the UHI contribution for those who cannot afford to pay. However, while the very poorest are better covered by the new UHI scheme, there remain coverage vulnerabilities for those in the informal economic sector (self-employed), women (particularly rural women), and young people between 20–24 (Selwaness & Ehab, 2019).

In Egypt, there are no risk equalization measures in place to ensure that financial resources are optimally allocated based on population needs rather than ability to pay. There should be better processes for budgeting on the long term, optimal resource distribution, and insurance coverage based on population needs, disease burden, and the consequential economic and social costs of diseases. Cost projections and burden of disease estimates are conducted by the Universal Health Insurance Authority (UHIA) on a macro level based on the payer perspective only (not based on the provider or societal perspectives), whereas on a micro level, it is a priority to conduct health technology assessment (HTA) of interventions (see Domain 4: Medicines and Technology).

The rate of OOP health expenditure as a percentage of household expenditure is 9.4%, approaching catastrophic healthcare expenditure (OOP spending exceeding 10% of household expenditure. This was calculated by dividing OOP spending per capita $89.51 (USD 2020) based on World Bank data, by annual household expenditure per capita $950.771 (USD 2020) (CEIC, database). In Egypt, OOP represents around 60% of overall healthcare expenditure, influenced by limited national resources and funds. The implementation of the new universal health insurance project aims to provide further financial protection for families who cannot afford to pay for the health services through covering the costs of healthcare services from the public budget (The Arab Republic of Egypt Presidency, 2019). This is in line with ultimate goals of the UHC project to reduce the rate of OOP health expenditure as a percentage of household expenditure to much lower levels than the World Bank catastrophic levels.

2.1.3 Paying providers

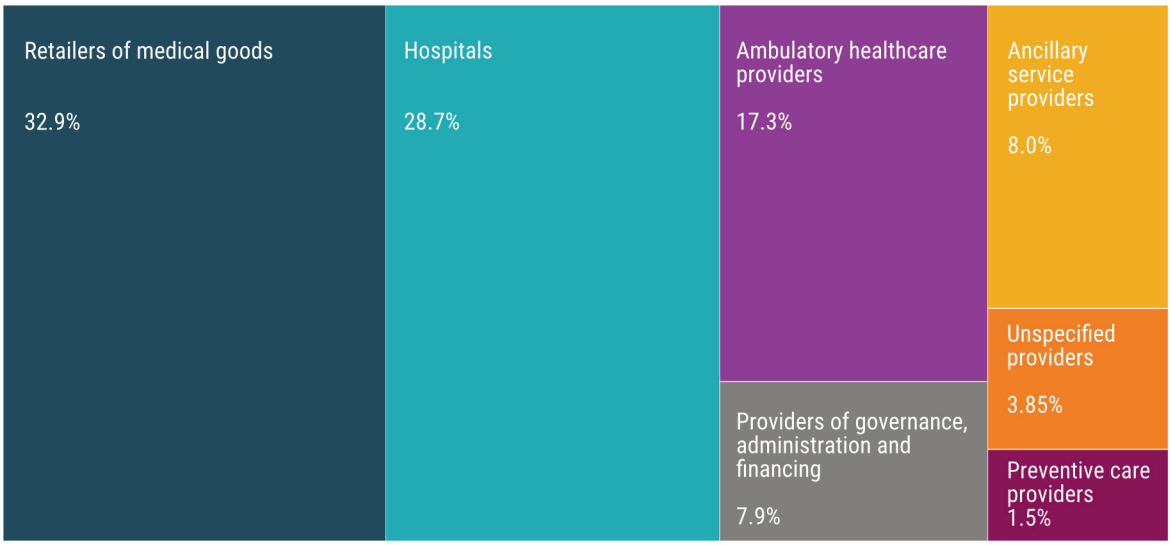
The financing scheme for paying healthcare providers differs based on the level (primary, secondary, and tertiary care) and the type of care delivery (inpatient, outpatient, intensive care, surgical care). There are capitated payments for primary care services; fee-for-service payment for outpatient secondary/tertiary care and medical treatment (conservative/non-surgical); case-based payments for surgical interventions; and per-diem only payments for intensive care and long-term conditions. These payments are made by the new universal health insurance system (the payer) to the service providers through subscriptions, while no financial incentive mechanisms for quality of care exist. As currently constituted, health services payment models therefore incentivise care on the volume of services, rather than the value generated by those health services.

In contrast to fee-for-service models that focus on the quantity (volume) of delivered services, value-based payment (VBP) models focus on the quality, efficiency, and patient health outcomes. Nevertheless, VBP has not been introduced yet in the Egyptian health system financing scheme due to the absence of real-world data on efficiency measures and health outcome measures on a national level. Yet, transitioning to value-based reimbursement should be planned in the medium- or longer-term after maintaining the collection and availability of efficiency indicators and health outcomes measures after health information system implementation nationwide. Shifting from fee-for-service to VBP would promote sustainability of health system financing as it can address excess health spending and growth, including prices, administrative waste, and clinical waste (Health Affairs, 2022) (Werner et al., 2021) (Wise et al., 2021). It is therefore recommended to start adopting VBP for novel expensive drugs (i.e., targeted therapies) to justify the value of money spent relative to health outcomes, thus reducing non-value-adding costs and promoting sustainability of health system financing.

Payments to health service providers is mainly to retailers of medical goods for medicines, medical supplies, and equipment (32.9%), followed by hospitals (28.7%), and ambulatory healthcare providers (17.3%), as shown in Figure 6[4]. Together, these three constitute around 80% of the total spent on healthcare providers (WHO Eastern Mediterranean Region, 2023a).

[4] Factors behind the relatively high proportion of medicines and supplies expenditure are explored in Domain 4: Medicines and Technology.

Figure 6: Paying health service providers – share of current health expenditure by type of provider



Source: WHO Eastern Mediterranean Region (2023a).

2.2 Resilience

Although actuarial studies are conducted to estimate health spending in the short- and medium-term, there are no projections undertaken related to the risk of exposure to epidemics/pandemics. In addition, relative risk estimates are not measured to make budget planning accordingly. Therefore, the health system needs to put financial risk management and preparedness plans in place to promote resilience of the health system to crises, outbreaks, or epidemics/pandemics. During the COVID-19 pandemic, additional public funds were released from the Ministry of Finance to cover additional pandemic-related expenditures. Although there were no crisis preparedness contingency plans to deal with the COVID-19 pandemic, it was well-controlled and well-covered as the situation was not very severe in Egypt. In May 2021, Egypt's parliament approved a new bill establishing a medical emergency fund to combat emergency medical expenses with the aim of promoting resilience in health system financing (Essam El-Din, 2021). The fund will be allocated to spending on patients receiving treatment at emergency and intensive care units; purchasing medicines and providing accelerated healthcare services to reduce waiting lists (Essam El-Din, 2021).

2.3 Recommendations

RECOMMENDATION 2A

Conduct micro-costing on the disease level based on the health provider perspective and the societal perspective (not only payer perspective).

RECOMMENDATION 2B

Make budgeting and spending projections based on disease burden, the consequential economic and societal costs of diseases, and the economic benefit of health to society.

RECOMMENDATION 2C

Make financial resource allocation based on population needs, disease burden, utilization rates, and the need to improve health outcomes in priority areas, achieving allocative value.

RECOMMENDATION 2D

Adopt value-based payment (reimbursement) models for the novel expensive drugs to justify the value of money spent relative to improved health outcomes.

RECOMMENDATION 2E

Monitor the epidemiological relative risk of diseases and outbreaks to be prepared for upcoming health crisis and make financial contingency plans for crisis management.

3. DOMAIN 3
Workforce

3.1 Sustainability

3.1.1 Health workforce shortages in Egypt

Countries at all stages of development faced shortages of healthcare workers even before the COVID-19 epidemic. The WHO Global Strategy on Human Resources for Health: Workforce 2030 (WHO, 2020a) was developed in response to the physician recruitment and retention crisis. The situation before and after 2020 differs. Before 2020, there was an increase in the number of healthcare workers in Egypt, potentially linked to the rise in medical schools (WHO Eastern Mediterranean Region, 2016). Following the COVID-19 pandemic there has been a reduction in the number of healthcare workers due in part to worker exhaustion (WHO, 2020a).

A significant factor in shortages is the number of Egyptian healthcare professionals (HCPs) choosing to work abroad (The Africa Report, 2023). According to internal reports from the Egyptian Medical Association, in 2018–2019, the number of doctors working in the Ministry of Health and Population (MOHP) decreased by 1,500 compared to 2015. Additionally, about 3,000 doctors under the age of 35 resigned during 2018 and 2019, and 4,700 found opportunities to work abroad in 2021. Similarly, between 2019 and 2022, 11,500 doctors left Egypt to work in the UK (United Kingdom, 2023). The outflow of doctors from the system presents a challenge, as more doctors retired or registered as "free doctors" in the last decade than new trainees entering the service. Doctor retention is a key policy challenge for strengthening the sustainability of the health system (Nature Middle East, 2020). Egyptian policymakers have traditionally deliberated on the benefits and costs of international migration – with some having advocated for physicians' immigration to wealthy Arab Gulf countries to bring foreign currency back into Egypt and to extend their influence on newly structured health systems (Loza & Sorour, 2016).

Furthermore, there is uneven distribution of healthcare workers, with concentrations in urban areas leading to lower quality of care in rural and remote areas, and these shortages further exacerbates health inequities (Serour, 2009; Fouad et al., 2014). Even within cities, certain locations, such as slums, suffer from a lack of basic services including water and consequently make it unfavourable for health workers to work there (Fathalla Y, 2020). Moreover, the inequitable distribution is not only geographical but also varies across different categories and specialties in Egypt, as shown in the following table.

Table 3: Comparison of densities of types of healthcare worker against global indicators, 2017–2018

	Egypt current situation	Global indicator	Current gap
Physicians	12.1/10,000	23/10,000	10.9/10,000
Dentists	3/10,000	6/10,000	3/10,000
Pharmacists	9.3/10,000	5.4/10,000	-3.9/10,000
Nursing	22/10,000	45/10,000	23/10,000
Mental Health Physician	1.7/100,000	0.84/100,000	0.86/100,000
Mental health specialists	1.4/100,000	0.86/100,000	0.54/100,000
Social practitioners	0.7/100,000	0.23/100,000	0.47/100,000

Source: Ministry of Health and Population, 2018a; WHO, 2022a.

3.1.2 Trends and patterns

The high rate of physicians' leaving the country compounds the existing shortage of doctors in Egypt, widening the gap between global density indicators of 23 doctors/ 10,000 population, and national ones at 12.1/10,000 (MOHP, 2023a). This deficit cannot be made up simply recruiting new medical graduates (Serour, 2009). Egypt is considered one of the top source countries for international medical doctors. In the recent WHO report on global health worker mobility, preferred destination countries for medical graduates and doctors who emigrate for better clinical practice or training opportunities are KSA, the USA, Germany, Canada, Australia, the UK, and the Maldives (WHO Health Workforce Team, 2023). Two local studies surveying 1,795 Egyptian medical students and residents in 2014 and 2019 revealed that an average of 87% intended to emigrate to seek better research and training opportunities (Fouad et al., 2014; Kabbash et al., 2021). There is specific evidence related to the emigration of Egyptian psychiatrists in the last decade. International migration of Egyptian psychiatrists was at one stage attributed to a halving of the expected number of psychiatrists per 100,000 people, compared with the counterfactual situation without these migration patterns (Loza & Sorour, 2016).

Similarly, nurse migration widens the gap between the global density of 45 nurses/10,000 population, and the Egyptian density of only 22/10,000 (MOHP, 2023a). For example, in a recent study in 2023, almost 70% of the 323 nurses surveyed in eleven hospitals in the Beni-Suef governorate intend to emigrate at some point in their careers (Basiony & Ahmed, 2023). Egyptian nurses tend to emigrate to the following destination countries: KSA, UAE, Kuwait, USA, Canada, Germany, and the UK (WHO Health Workforce Team, 2023).

3.1.3 Determinants

Table 4 summarizes the push and pull factors that determine migration intention among Egyptian medical students, residents, young physicians, and nurses.

Table 4: Factors affecting migration intention in Egyptian healthcare workers

Categories	Examples
Push factors: factors within the source country (Egypt)	
1. Economic/ financial	• Inadequate remuneration and health insurance plans • Insufficient recompense for occupational infection risks
2. Structural	• The predominance of favouritism and bureaucratic organizational processes in workplace • Shortages of staff and medical supplies result in a heavy workload for nurses, especially those working in ICUs.
3. Professional	• Low satisfaction with physicians' accommodation due to the poor quality of housing provided in public hospitals. • Lack of medical liability protection insurance to support doctors in case of medical errors. • Lack of nurses' ability to make decisions in their units due to a lack of autonomy and poor governance structure of the health facility.
4. Sociocultural	• Harassment and exposure to violence in hospitals from patients' relatives, especially in emergency departments • Negative portrayal of the nursing profession in the media and the lack of societal recognition for nurses among the public.

Continued on next page.

Table 4 (continued): Factors affecting migration intention in Egyptian healthcare workers

Categories	Examples
Pull factors: include intended or unintended policies and strategies within the destination country that attract foreign physicians	
1. Economic/ financial	• European countries have a high demand for physicians due to aging populations and health workforce shortages • Relatively easy licensing requirements in countries like Germany, a significant destination for Egyptian doctors.
2. Structural	• Attractive salaries, pensions, and benefits • Migrants' remittances – ability to send money back to support family members.
3. Professional	• Better research facilities and more funding. • Better working atmosphere that supports career advancement and self-actualization for foreign doctors and nurses.
4. Sociocultural	• Seeking to perform religious rituals such as Hajj and Umrah in KSA • Shared language and geographical proximity of the destination country, e.g., more than 45% of the Egyptian doctors migrate to Saudi Arabia.

Sources: Adapted from: WHO Health Workforce Team, 2023, Basiony & Ahmed, 2023; Kabbash et al. 2021; Hashish & Ashour, 2020; Saadawi et al., 2020; Schumann M et al., 2019; Fouad et al., 2014; Serour, 2009; Dovlo, 2003.

3.1.3.3 Implications

Workforce shortages have adverse implications for patient care, economic growth, and the sustainability of the health system. They create a "reinforcing feedback causal loop": increasing workload for remaining staff, low job satisfaction, high burnout rates, and thus further emigration of HCPs, weakening the health system's resilience and ability to adapt to health emergencies (Hashish and Ashour, 2020). The exodus of skilled physicians could hinder the proper implementation of Egypt's universal health coverage program.

3.1.4 Occupational health and safety

A culture of occupational safety needs to be introduced into healthcare settings to gain organizational trust and improve worker satisfaction. One of the most critical factors that led to HCP burnout during the pandemic in Egypt was the lack of clear policies to protect frontline workers against infections (El-Sokkary et al., 2021). Defective workplace policy implementation, a lack of critical managerial support, and inadequate communication between administration and HCPs during the pandemic were all evident. The absence of psychological support for stress caused by COVID-19 dramatically exacerbates the problem (Saleh, 2023).

There is variability in adherence to safety practices by HCPs: not all personnel receive regular safety training, and safety precaution implementation is not updated regularly. Additionally, there is poor evaluation of hazard exposure thresholds in the workplace and of potential related health hazards (Abo Ghamema et al., 2023). Egypt's safety culture is lower than other nations and contexts. There are economic costs of failure to comply with the safety standards too: damages to materials and equipment (for example, from fires) impact production and efficiency (Said et al., 2019).

Institutional and technical issues include the lack of: defined plans, safety inspector autonomy, appropriate funding, experienced inspectors, technological equipment, and sufficient and adequate

safety services such as infrastructure, education, training, research, or even human resources (Sayed, 2022). The actual numbers of occupational injuries are expected to be higher than those reported, as there are inconsistencies with safety concern data reported in the Ministry of Human Resources (Ahram Online, 2013).

In some cases, there is inconsistent worker compliance with safety standards despite employers providing essential safety measures and equipment. A study of health hazards for nurses working with cytotoxic medicines such as chemotherapeutics evaluated existing safety measures used in clinical practice, and assessed nurses' understanding of cytotoxic medications. A large percentage of the nurses tested had some form of adverse health effects possibly associated with toxic exposure and that, despite demonstrating good knowledge of risks, the majority were not following the National Institute for Occupational Safety and Health (NIOSH) safety practices and protective measures in oncology units. There is clearly a need to work further with healthcare workers regarding their safety: assuring their knowledge of and adherence to safety practices (El Hosseini et al, 2019).

3.1.5 National plans for workforce retention

The current national plans for health workforce retention were discussed with representatives of the MOHP in the development of this report. They include both short-term and long-term strategies.

Long-term: direct advantages

1. Introduction of a basic salary (a little higher than current salary) plus a performance-based payment which could be linked to quantitative factors (number of cases, surgical operations, shifts etc) or qualitative factors (performance of the medical facility, commitment to quality standards, KPIs etc). Similar initiatives elsewhere have had a significant positive impact.

   Increasing further financial incentives into the incentives system can be achieved through:

   - Allowing hospital doctors to run evening clinics at competitive prices, with a 50% share of the income going to the hospital
   - Profits from the more profitable departments of the hospital.
   - Civil society organization donations for treatment for some patients who cannot pay
2. A specific health insurance scheme for health sector workers and their families that includes treatment and medicines.
3. Other benefits such as reduced subscriptions for some agencies including travel agencies, dedicated youth centers for staff children, participating in different sports activities, and discounted trips for Hajj and Umrah

Long term: indirect advantages

1. Improving hospital human resources departments to extend their roles from managing workers' affairs and to include a role in skills development and training.
2. Continuous professional development (CPD) recorded electronically in the doctor's file. Currently, not all doctors attend the courses regularly.
3. Connecting with regional universities and expanding the Egyptian fellowship system (or the Egyptian Medical Board) and linking that to promotion processes.
4. Creating new roles that reduce the work pressure on doctors. In the UK, productivity has been increased by creating physician assistants and nursing assistants to carry out some routine or less skilled work. There are further proposals for graduates of social service institutes to participate in care co-ordination, through writing patient histories, follow up with patients by telephone; answering the patient repeated complaints and inquiries.

Short term: direct benefits

Beyond raising salaries, there are other interventions that could prove beneficial:

1. Increasing infection risk compensation (this is limited to workers in hospitals and health units). It is possible to vary the amount payable according to the nature of work, for example to be increased in hospitals specialising in infectious/respiratory diseases and for workers in emergency and critical departments. Payments could also be linked to the number of relevant working hours and KPIs.
2. Providing life insurance policies for healthcare workers.
3. Removing administrative obstacles, for example, difficulties faced by young doctors in navigating bureaucratic processes.

Short term: indirect approaches

1. Clearer and consistent demonstrations of support for medical workers from political leadership, in public messaging and communication.
2. Allocating dedicated beds in hospitals for the care of doctors and their families.
3. Provide medicines free of charge to treat doctors and create a fast-track procedure for treating doctors and their families.
4. Provide a hotline for medical service providers to deal with complaints and inquiries about their medical conditions and different services available for them.
5. Offer supported housing units at affordable prices for young doctors in the Social Housing Fund and in long-term instalments.

Short-term: importance of the media message

1. Psychological and mental support for medical teams
2. Establishment of the Supreme Council for Medical Service Providers under the umbrella of the Egyptian Health Council. This reflects the political leadership's interest in addressing the health sector's needs.
3. Launch of the Presidential Program for Qualifying Leaders of the Health Sector

3.2 Resilience

3.2.1 Education of healthcare workers

The Higher Education Reform Experts in Egypt hosted a workshop in September 2017 to address the design, implementation, and accreditation of CPD in the health sector. It was attended by representatives from Egypt's National Authority for Quality Assurance and Accreditation of Education (the standard-setting body for higher education), the Compulsory Egyptian Medical Training Authority (the authority in charge of CPD accreditation), the relevant sector committees of the Supreme Council of Universities, higher education institutions, health scientific societies, and the medical profession. The workshop recommended that the government establish a national licensing authority, enforce relicensing, and establish an independent accrediting institution for the CPD providers (Moustafa et al., 2022).

In 2019, a new law was introduced requiring medical practice licences to be renewed every five years. This requirement was to be applied to medical graduates who passed the Egyptian medical licensing test, which was administered for the first time in February 2021. Physicians will also be required to get CPD credits, encouraged participatation in certified CPD events. In Egypt, physicians can participate in recognized CPD programs. Egyptian physicians working abroad must earn CPD points to renew their practice licence (Bassiouny & Elhadidy, 2022).

The regulations for certification of online learning platforms for CPD were issued in June 2020. The Medical Association's e-learning platform was the first to receive approval, and by 2022 had supplied 15 online accredited professional development activities for physicians in radiology, infection control, cardiology, and soft skills such as leadership, team management, and communication. To prevent conflicts of interest, the CPD Committee does not construct its own educational programming or accredit its programs (Talaat & Hefny, 2023).

As of March 2022, 112 organizations have received their first accreditation: 72 medical associations, 20 higher education institutions, 14 medical foundations or non-governmental organizations, and 6 healthcare facilities. In addition to general practice, these providers offer services in 17 disciplines, including four major specialties (internal medicine, surgery, obstetrics and gynaecology, and paediatrics) and 13 sub-specialties. Paediatrics has the greatest number of specialist providers. General practitioners offer services across various disciplines, such as medical schools. Some specializations (for example, clinical pathology, nephrology, and pathology) are not covered by specialist doctors, although general practitioners may provide these services (Bassiouny & Elhadidy, 2022).

However, there are challenges to the deployment of the CPD system. While there are numerous professional medical societies, opportunities for workplace learning and interprofessional learning are limited due to insufficient training locations and hands-on training materials. Additionally, there is no system in place to fund CPD participation without commercial assistance, and physicians are hesitant to pay for their CPD without paid study leave or a travel allowance. Another challenge is that fixed salary is the main payment arrangement in the Egyptian public sector. This allows little influence on performance, leading to lower productivity and sometimes migration of HCPs to the private sector where performance-based salaries are usual. Linking performance with salary is known to promote education and productivity, thereby incentivizing better health service coverage and outcomes. Capitation-based payments, for example, involve a predetermined sum per patient for a set of services over a specified time.

3.2.2 Organizational trust, occupational stress, and burnout

Organizational trust is a powerful predictor of work satisfaction and, consequently, commitment. Improved trust, resulting from better working conditions, can enhance staff performance, retention, and leadership credibility, which is crucial in times of crisis such as COVID-19, as well as in the long run.

WHO has identified burnout as an occupational phenomenon of chronic workplace stress (WHO, 2019). Burnout, characterized by exhaustion, diminished productivity, mental detachment, and negative feelings, is a significant global public health concern, particularly among healthcare personnel, especially during pandemics. A cross-sectional study in 2021 surveyed 362 Egyptian frontline HCPs in COVID-19 isolation hospitals, showed that 77% of doctors and 75% of nurses suffered from burnout syndrome (Omar et al., 2021). A 2023 survey found that 71% of 150 emergency medicine resident physicians at Suez Canal University hospitals experienced high burnout rates, leading to substandard patient care practices (Omar et al., 2021).

In Egypt, HCPs, particularly respiratory physicians, anaesthesiologists, intensivists, and tropical medicine specialists experienced profound stress and emotional exhaustion during the COVID-19 pandemic, compromising their professional capabilities and leading to occupational burnout. Furthermore, Egyptian doctors face disparities in burnout, with female doctors reporting higher emotional exhaustion symptoms and lower personal achievement compared to male doctors. (Morgantini et al., 2020; Abdelhafiz et al., 2020).

3.2.2.1 Factors contributing to HCP burnout during the COVID-19 pandemic

Egyptian doctors faced numerous challenges during the COVID-19 pandemic, including inadequate resources, heavy workloads, and insufficient staffing (Abdelhafiz et al., 2020). These factors have led to low job satisfaction and increased risk of burnout (El-Sayed et al., 2023). The pandemic also exacerbated emotional exhaustion and reduced the sense of personal achievement among doctors.

High-exposure doctors in covid-19 isolation hospitals were more concerned about contracting the illness or transmitting it to their families. However, burnout among non-isolation facilities is higher than in isolation facilities due to a lack of well-established protocols and organized facilities (Omar et al., 2021).

The long working hours and night shifts were particularly demanding and stressful for female physicians who bear high expectations of balancing a range of other familial and social responsibilities outside of the workplace. The rise of societal stigma against HCPs dealing with COVID-19 in Egypt has further compounded the situation (Abdelhafiz et al., 2020; El-Sayed et al., 2023; Abdelghani et al., 2021).

Some doctors felt overwhelmed and underprepared, having to care for patients beyond their clinical training and dealing with the emergent nature of the virus. Frontline young resident doctors have experienced sleep deprivation, poor nutrition, and stress from constantly changing clinical protocols. Additionally, young doctors have had to self-quarantine away from their families, removing a vital emotional coping mechanism (Omar et al., 2021).

3.3 Recommendations

RECOMMENDATION 3A

Consider the monetary incentives to retain doctors in their jobs by increasing financial and non-financial incentives.

RECOMMENDATION 3B

Integrate nationally recognized, standardized processes for career advancement, and continuing medical education programs.

RECOMMENDATION 3C

Provide clearly expressed, rational, updated, accepted standard operating procedures, or methods to improve the normative work areas and ensure occupational safety.

RECOMMENDATION 3D

Ensure stakeholder involvement and consistent messaging about internal ownership and supporting organizational trust.

RECOMMENDATION 3E

Provide alternative plans to alleviate the shortage or uneven distribution of healthcare professionals. For example, community health workers can help serve and engage communities, especially in poor and rural areas. Teleconsultations can also help provide coverage of health services to the whole community. Additionally, a task-shifting strategy can help compensate for the physician shortage in emergencies.

4. DOMAIN 4

Medicines and technology

4.1 Sustainability

A key focus of global health policy is the attainment of the Sustainable Development Goals (SDGs), particularly the targets for universal health coverage (UHC), such as target 3.8.1 on service coverage and target 3.8.2 on financial protection. In 2020, the UHC service coverage index for the Eastern Mediterranean region was estimated at 57 out of 100, which fell below the global average of 78 (Khader et al., 2023).

4.1.1 Pharmaceutical spending – opportunities and challenges

Egypt faces numerous challenges in achieving UHC, and these have an influence on the responsiveness of its pharmaceutical market to innovative drugmakers. Factors such as low per capita medicine spending and persistent market access issues contribute to this challenge. Egypt scored 38.6 out of 100 in Fitch Solutions' Innovative Pharmaceuticals Risk/Reward Index, reflecting restrictive market access constraints (Insights10, 2023; Fitch Solutions, 2019).

Strict pricing regulations further impede the introduction of new drugs, leading to shortages and increased prices for critical medications, surpassing global out-of-pocket spending norms. Supply shortages strain pharmaceutical companies and community pharmacies due to reduced profit margins resulting from increased raw material costs (Fasseeh et al., 2022). Economic challenges, including currency devaluation, exacerbate affordability issues, affecting various operational costs (Investing.com, website).

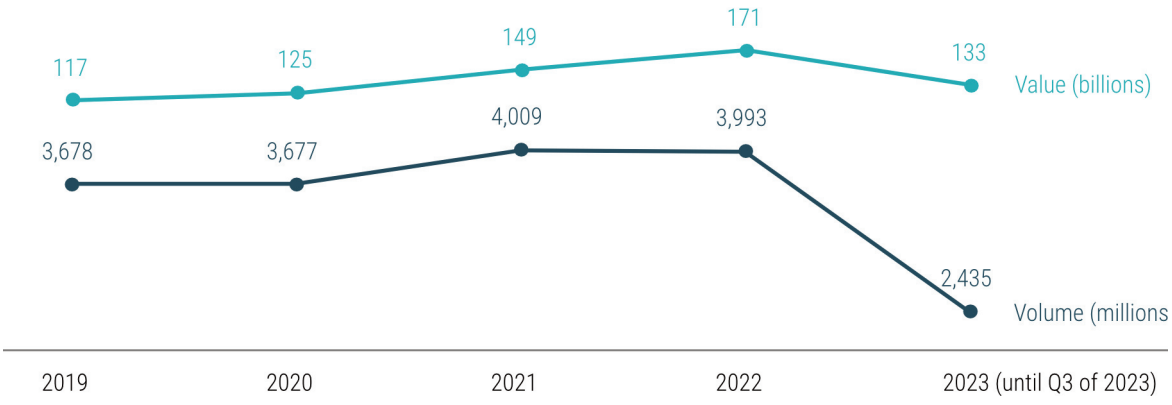
However, Egypt's pharmaceutical market also presents opportunities such as low labour costs, a skilled workforce, and a well-established manufacturing sector comprised of both state-owned and privately-owned companies (Zhengchun He, 2022). Table 5 shows the number of pharmaceutical companies per type, and Figure 7 the overall market size and trends over the last four years.

Table 5: Numbers of pharmaceutical companies by corporate type

Corporate Type	Number
Local/Regional	523
Multinational	278
Total	801

Source: Unpublished data reported to the Chamber Industries of Vaccine and Medical Supplies.

Figure 7: Overall pharmaceutical market value and volume, 2019–2023



Source :Unpublished data reported to the Chamber Industries of Vaccine and Medical Supplies.

To foster partnerships in the pharmaceutical industry, Egypt's Export Council of Medical Industries established EGYCOPP Company in July 2017. This initiative aims to facilitate the entry of Egyptian pharmaceutical products into Africa through contract manufacturing partnerships with both Egyptian and African firms (General Organization for Export and Import Control, website).

4.1.2 Disease burden and drug shortage

Egypt's pharmaceutical market expansion is driven by the increasing burden of chronic diseases resulting from an aging and growing population. Respiratory illnesses, heart disease, and cardiovascular disorders are particularly prevalent, necessitating higher value prescription medicines. Noncommunicable diseases are leading causes of morbidity and mortality in Egypt, with the top 10 causes of Disability-Adjusted Life Years (DALYs) in 2019 being predominantly chronic diseases such as ischemic heart disease, cirrhosis of the liver, stroke, liver cancer, hypertension, heart disease, kidney diseases, diabetes mellitus, and chronic obstructive pulmonary disease (GBD 2019 Diseases and Injuries Collaborators, 2020; WHO Global Health Observatory, database a).

Drug shortages stem from pricing issues, production capacity constraints, and uneven geographical distribution. Another factor behind drug shortages is in the dependence on the importation of active ingredients. Rising drug prices are expected to hinder pharmaceutical sales growth over the next five years, potentially exacerbating shortages. However, efforts to alleviate shortages may inadvertently drive generic medicine sales at the expense of exacerbating shortages in the short term. Table 6 provides examples of essential drugs currently unavailable due to shortages.

Table 6: Examples of essential drugs currently not available or in short supply

Medicines for chronic diseases that are not available	Medicines for chronic diseases that are not available in some geographical areas	Acute/non-repeat medicines with shortages
Adancore	Somatropin vial	Emla cream
Byrianile tab	Norditoprin vial	Xamiol scalp gel
Imdur 60 mg tab	Cosopt eye drop	Daivobet oint
Cervitam cap	Immuran tab	Licid spray and solution
Euthyrox	Ketostrel cap	Ectomethrin
Eltroxin	Pentasa tab	Olfen gel
T4 thyro	Prozac cap	Smecta susp
Thyroxin	Oxypral cap	Corner gel
Midodrin tab	Brain ox cap	Cerebrolysin 1 mg amp
Plaquinil 200 mg tab	Brintalex tab	Ingectamol vial
Pystinone tab	Alphagan p eye drop	Perfelgan vial
Mystinone tab		Gasrofait 1 gm tab
Carbimazole tab		Guinorin tab
Neomercazole tab		Ultavist
Depakin chrono tab		Omnipac
Labiless 100 mg tab		Contractubex gel
Ozimbec		Cetrotide
Yasmin tab		Amrizole suppositories
Methotrexate vial		
Unitrexate vial		

Source: Unpublished data collected from pharmaceutical companies.

The increasing popularity of generic pharmaceuticals is expected to negatively impact sales of proprietary medicines in Egypt in the coming years. Egyptian drugmakers are hesitant to venture into the patented industry, other than the over-the-counter market, due to unresolved concerns regarding pricing policies and regulatory challenges. Consequently, they contribute only minimally to the list of patented products. Additionally, patented products from other countries tend to be more expensive due to import costs, particularly given the weakness of the local currency and their patented status. Egypt and the Middle East, in general, are grappling with a lack of innovation and investment in research and development, but it is anticipated that the high demand for generic medications will stimulate the development of new and more effective drugs.

The global crisis triggered by the COVID-19 pandemic underscored systemic deficiencies in drugs supply, necessitating long-term solutions. In response, the government started developing an action plan, drawing lessons from the COVID-19 pandemic, commencing in October 2020. These strategies encompass eight key goals: securing sustainable funding for local policies; enhancing accessibility and affordability of drugs and vaccines; ensuring effective supply chains; supporting the national regulatory authorities; promoting rational drug use; fostering local manufacturing of high-quality pharmaceuticals and vaccines; and establishing robust cooperation structures. Moreover, Egypt is collaborating with international organizations in clinical research and developing new tools in the healthcare system to facilitate equitable access to orphan drugs for patients with rare diseases. However, Egypt still needs to establish an epidemiology database and disease registries, including for rare diseases, and incentivize pharmaceutical firms to conduct research on rare diseases to develop orphan medications (Taha et al., 2023).

The Comprehensive Health Insurance Law (Law No. 2/2018) aims to ensure fair distribution of medicines, implemented gradually across six geographic areas, with the government contracting with pharmaceutical companies to provide drugs through the insurance system (Khalifa et al., 2022).

4.1.3 Regulatory and quality concerns

Effective collaboration between government, regulators, businesses, and academia is crucial for realizing the potential of the pharmaceutical industry and meeting patient needs. The Egyptian Drug Authority is implementing several policies to enhance the industry. These include a transition to 'Value Leadership' (a strong regulatory framework that stresses patient-centricity and encourages transition from volume to value leadership); 'Balancing Access, Affordability, and Innovation', and encouraging long-term investments in research and innovation by providing a stable policy environment.

There have been some successes in the regulatory system. Successful localization and manufacturing of the first local analogue of Opzelura® cream (treatment of non-articular vitiligo), at a price equivalent to only 10% of the original product abroad, demonstrate strides in innovation and regulation. More broadly, the Egyptian Drug Authority achieved maturity level 3 for vaccine regulation, indicating a stable and integrated regulatory system. It is included in the list of "transitional" World Health Organization Listed Authorities (tWLA). Upon successful completion of the WLA evaluation procedure, a regulatory authority is promoted from the tWLA list to the permanent WLA list (WHO Eastern Mediterranean Region, website; WHO Eastern Mediterranean Region, 2022a).

However, challenges persist in the ineffective regulatory monitoring of counterfeit and sub-standard pharmaceuticals, alongside inconsistencies in the production process, prompting concerns about drug safety and efficacy. Financial constraints on Egyptian generic medication manufacturers also impact quality and availability (Bashir et al., 2020).

4.2 Resilience

4.2.1 Egypt disease patterns and pharmaceutical companies' challenges

Essential and non-essential medicines lists are developed by the Ministry of Health. Egypt exhibits disease patterns typical of developed countries, with noncommunicable diseases accounting for over 75% of mortality in 2017. The essential medicines list includes antibiotics and medications for prevalent diseases such as diabetes and cardiovascular conditions (MOHP, 2017; El-Saadani et al., 2021).

To address the need in these disease areas there are a few local pharmaceutical companies, including Egyptian International Pharmaceutical Industries (EIPICO) and Amoun Pharma, Pharco, Medical Union Pharmaceuticals (MUP), and South Egypt Drug Industries (SEDICO). Most Egyptian pharmaceutical companies are partially or totally privately owned. Public production is by the state-owned holding company for pharmaceuticals (HOLDIPHARMA). Leading multinational companies that are expanding their business in Egypt include Pfizer, GlaxoSmithKlein, and AstraZeneca.

4.2.2 Local manufacturing and research opportunities

To mitigate the challenges posed by currency devaluation, importation hurdles, quality issues, and drug shortages in emergencies, various initiatives have been undertaken to invest in local manufacturing, promote research and development, and leverage technology and innovation to address these issues.

Prioritizing the local manufacturing sector is pivotal for establishing a resilient healthcare system. While the local production of generic drugs continues to meet most of the local demand, patented medications hold a larger market share in terms of value. However, domestic enterprises heavily rely on imported raw materials, leaving them susceptible to fluctuations in the Egyptian currency and having to absorb devaluation costs without being able to pass them on through price adjustments. The pricing policy for pharmaceuticals is determined during the registration process, often leading to disputes and refusals by pharmaceutical companies to comply with suggested prices, resulting in pricing ambiguity. The mandatory pricing regime, compounded by the devaluation of the Egyptian pound, has significantly impacted pharmaceutical firms, leading to severe shortages of various medications. Consequently, there is a need to review both the government's drug pricing regulations and the dominance of private multinational corporations in the market (Egyptian Drug Authority, 2023).

Efforts to promote local vaccine production are also underway. The Holding Company for Biological Products and Vaccinations (VACSERA) is spearheading the local production of eight essential vaccines for the populace. Notably, the establishment of Egypt's first plant for manufacturing pentavalent hepatitis B vaccines, operational since March 2023, marks a significant milestone. Through a partnership between the state-owned VACSERA and the Serum Institute of India, up to 100 million doses of the vaccine can be produced annually, consolidating five antigens into a single shot (Gebba, 2023). Another initiative aimed at achieving self-sufficiency in plasma derivatives is the national plasma donation campaign, which is expected to bolster the supply of medications for various chronic diseases, liver and kidney disorders, and burns (Grifols Egypt, website).

One of the challenges faced is that local pharmaceutical companies primarily focus on generic and over-the-counter medications, contributing minimally to the production of patented drugs. Consequently, imported patented drugs incur higher costs due to import expenses, unfavourable exchange rates, and patent-related factors. Innovation and R&D efforts in Egypt are currently insufficient to meet market demands.

To bridge this research gap, the government has provided research grants for innovative projects resulting in the development of pharmaceutical products using domestic expertise, production of

pharmaceutical raw materials, manufacturing of interferon and insulin, and early detection of viral diseases such as hepatitis. Licensed production of drugs from foreign manufacturers is prevalent, aiding local enterprises in adopting Good Manufacturing Practice (GMP) standards, thereby enhancing export competitiveness. However, further efforts are needed to achieve internationally recognized standards across the sector.

To further incentivize research, the government has established the GYPTO Pharma scientific research and development campus (The City of Medicine). This project aims to consolidate state-of-the-art industrial and technological capabilities in the pharmaceutical sector. It is anticipated that this initiative will improve access to high-quality and secure medical treatments for citizens, mitigate monopolistic practices in the market, and better manage drug pricing crises. The first phase of the medical city was launched on April 1st, 2021, and signalled the need to enhance industrial and technological capabilities in this critical sector. Positioned as the largest pharmaceutical hub in Egypt and the Middle East and North Africa (MENA) region, GYPTO Pharma specializes in the production of various medicines and vaccines, particularly cancer medications. Situated in Khankah, Qalyubiyah, north of Cairo, the campus spans a total area of 180,000 square meters (Domat, 2021).

Additionally, there are initiatives aimed at introducing innovative technological solutions through pioneering institutions. One such institution is Children's Cancer Hospital Egypt – 57357 (CCHE), which utilizes cutting-edge technologies like Cyberknife, among others, enabling its teams to engage in global research and generate high-quality scientific data. However, the distribution of advanced technology machines, including Cyberknife, predominantly favours private hospitals, leading to disparities in access to such technologies between private and public healthcare providers (CCHE, website a).

4.2.3 Technology and digitalization vision

Presently, the implementation of health system digitalization is progressing slowly due to several challenges. These include the unavailability of required data platforms, a shortage of specialized manpower, and occasional resistance to change from authorities or clinical staff. Addressing these obstacles is a focal point of Egypt's Vision 2030, which highlights the significance of digitalization across various sectors, including healthcare. To improve the effectiveness, accessibility, and quality of healthcare services, specific targets for digitalization have been set within the healthcare sector. A primary objective of Vision 2030 is the establishment of an extensive electronic health record (EHR) system. This technology aims to streamline the sharing of patient information among healthcare professionals, ensuring continuity of treatment and reducing medical errors. Additionally, Vision 2030 seeks to introduce telemedicine and remote patient monitoring systems to serve individuals in remote and underdeveloped regions (Stadelmann, 2012; Gamal et al., 2021).

Egypt has formulated regulations to promote the adoption of digital health technology in alignment with the digitalization objectives of Vision 2030. One such policy is the National Health Information Infrastructure (NHII), established by the Universal Health Insurance Authority (UHIA), which provides the framework for secure health information exchange across various healthcare bodies. The NHII supports data standardization and interoperability, laying the groundwork for a robust digital health ecosystem (Ministry of Communications and Information Technology, 2009).

The establishment of the Egyptian Health Information Exchange (EHIE) is a pivotal initiative in this regard. EHIE serves as a centralized platform facilitating the secure exchange of health information among patients, government organizations, and healthcare providers. It enables real-time access to patient records, test results, and X-rays, promoting more cohesive care and informed clinical decision-making (Egypt Today, 2019).

Furthermore, the Ministry of Health and Population has launched the eHealth Egypt initiative, aimed at digitizing healthcare operations and services nationwide. This initiative encompasses the development of electronic prescription services, online appointment scheduling platforms,

and mobile health applications. By embracing digital technologies, the government endeavours to enhance patient satisfaction and improve access to healthcare services (eHealth, website; Mursi et al., 2021).

The creation of mobile health applications is another noteworthy digital health initiative. These applications offer a range of services, including appointment scheduling, prescription reminders, and access to health education resources. By promoting preventive care and early intervention, mobile health applications empower individuals to actively manage their health. Additionally, they facilitate the collection of vital health information for disease surveillance and population health research (El Hadi, 2022).

While digitalization efforts are still in their nascent stages and may subject to some trial and error, Egypt is steadily progressing toward establishing a comprehensive digital health system. Integration of EHR systems, telemedicine services, and mobile health applications paves the way for seamless data exchange, improved care coordination, and enhanced patient outcomes. Egypt must focus on developing requisite infrastructure, ensuring data privacy and security, and fostering digital health literacy among medical personnel and patients as the digital health landscape evolves (Ghweeba et al., 2022; Insights10, 2022).

4.3 Recommendations

RECOMMENDATION 4A
Ensure availability of both adequate domestic government funding and international donor support for vital medicines and vaccines according to national priorities. Additionally, incentivize pharmaceutical companies to dedicate some of their budget to improve drug accessibility and avoid drug shortage.

RECOMMENDATION 4B
Promote and generalise the application of certificate of need system to optimise the medicines usage and to implement rational drug use based on monitoring consumption, defining targets, avoiding expiry of medicines that can be utilised in other districts and applying stewardship policies.

RECOMMENDATION 4C
Improve the research and development capacities within the Egyptian market through having a clear policy framework, a coordinated industrial and health strategy, strong intellectual property protection, and an atmosphere that stimulates stakeholder collaboration.

RECOMMENDATION 4D
Create a new area of investment in pharmaceutical production, for example cultivation of lands to produce new plants that contain active pharmaceutical ingredients and can be used in alternative medicine.

RECOMMENDATION 4E
Market control policies need to be implemented in order to control the expiry and counterfeit medicines and to Implement penalties against companies that don't restrict to the quality control and quality assurance steps.

RECOMMENDATION 4F
Coordinate different available technology platforms to be able to track need and invest to build more platforms. Data management and health information systems need to be available to help track and solve the gaps.

5. DOMAIN 5
Service delivery

Healthcare services in Egypt are provided through a multi-sectoral approach aimed at maintaining the sustainability of health service delivery. This approach encompasses the public sector, the private sector, and civil society. Public health services are primarily delivered through the Ministry of Health and Population (MOHP) hospitals, specialized medical centres, and teaching universities' hospitals and clinics. Currently, the MOHP is Egypt's largest provider of primary, preventative, and curative care, operating over 5,000 health institutions and more than 80,000 beds distributed across the country (MOHP et al., 2003). Hospital services are diversified, including general hospitals, teaching universities' hospitals, specialty hospitals, and integrated facilities offering primary healthcare alongside specialized medical services (MOHP et al., 2003). The private sector primarily offers specialized health services through secondary and tertiary care hospitals and clinics, employing a fee-for-service model. With approximately 2,024 inpatient facilities and around 22,647 beds, the private sector contributes around 16% of Egypt's total inpatient bed capacity (MOHP et al., 2003). Additionally, civil society, represented by non-governmental organizations (NGOs), offers specialized health services free of charge, supported by philanthropic donations.

5.1 Sustainability

5.1.1 Quality of care

The quality of healthcare services is regulated and monitored by the General Authority for Healthcare Accreditation and Regulation (GAHAR), ensuring both quality and sustainability (GAHAR, website). GAHAR's mandate covers two core areas: (1) accrediting health service providers, mainly hospitals, based on clinical quality and patient safety standards, and (2) regulating and monitoring adherence to national quality standards (GAHAR, website). Quality improvement efforts are enforced through GAHAR's accreditation and re-accreditation processes.

GAHAR accreditation for quality of care is a prerequisite for inclusion as a healthcare provider in the universal health insurance program, ensuring the sustainability of high-quality healthcare services in Egypt. During accreditation, key quality indicators such as waiting times, medication management, patient safety, clinical effectiveness, and infection control are assessed (GAHAR, 2021). While there are no direct financial incentives for meeting quality standards in primary and secondary care, GAHAR accreditation ensures eligibility for coverage by the national health insurance system. Entities failing to obtain or maintain GAHAR accreditation risk exclusion from insurance coverage.

In 2022, the establishment of the Egyptian Health Council introduced unified treatment guidelines for various disease areas, enhancing clinical services' sustainability through improved disease management and clinical governance (Egyptian Health Council, 2023; El-Mazary & Okaily, 2022).

5.1.2 Efficiency measure

The Egyptian healthcare system heavily relies on hospitals, accounting for nearly 30% of total health expenditure (EGP 73 billion in fiscal year 2019/2020) (WHO Eastern Mediterranean Region, 2023a). The MOHP has initiated several measures to enhance efficiency in this area of expenditure. Notably, the waiting list elimination initiative targeted eleven medical specialties, including cerebral angiography, kidney transplants, cochlear implants, cardiac catheterization, ophthalmology surgeries, oncology surgery, vascular surgery, neurosurgery, liver transplant, cardiac surgery, and orthopaedic surgery (State Information Service, 2022a). This initiative provided hospitals with necessary supplies and modern equipment while offering continuous staff training (State Information Service, 2022a).

The initiative's outcomes, reflected in reduced waiting times for surgeries, demonstrated its impact on service delivery sustainability. Additionally, it proved cost-effective from both payer and societal perspectives (Khalifa et al., 2023). Expanding such initiatives to more services and integrating them into broader efforts for health system sustainability is recommended (Khalifa et al., 2023).

5.1.3 Role of primary care

The role of primary health care (PHC) in Egypt is less institutionalized in most cities (governorates) due to the legacy health insurance system however, in the six governorates covered by the new universal health insurance (UHI) system, primary health care services are provided by the public health sector. This includes general practitioners (GPs) and family doctors, who typically serve as the first point of contact and act as gatekeepers to specialist care.

Currently, the MOHP provides primary care and family medicine through PHC units serving various districts and communities, offering free consultations, basic tests, and medicines (Soliman & Hopayian, 2019). These PHC units promote service sustainability by providing acute and chronic disease care, immunizations, maternity and childcare, contraception, and antenatal care, mainly through public hospital outpatient clinics (Soliman & Hopayian, 2019). Additionally, primary care services are offered by university hospitals, NGOs, and some military hospitals in Egypt (Soliman & Hopayian, 2019).

The provision of primary care services through the public sector ensures service and financial sustainability, as these services are provided free of charge under the UHI system. In contrast, the private sector relies on out-of-pocket spending (OOPS) based on a fee-for-service payment system, which may exhibit bias in referring patients to specific specialized centres due to conflicting interests. In public PHC units, there are measures and incentives to ensure that GPs and/or family physicians are the patients' first point of contact with the health system instead of being directly seen and treated by specialized physicians in secondary or tertiary care units/centres.

5.1.4 Coordination of care and new care models

Timely and efficient coordination among primary, secondary, and tertiary care services is crucial for maintaining care continuity and promoting service sustainability. In the six governorates covered by the new UHI system, GPs and family physicians at PHC units refer patients needing specialized healthcare services to secondary or tertiary care through electronic referral systems. These referral networks consider factors such as patient distribution, availability of needed specialized health services, and patient socioeconomic status. However, explicit referral mechanisms are lacking in cities not covered by the new UHI program (MOHP et al., 2003).

MOHP service delivery units are organized based on various models of care coordination, including functional (maternal and child health centers), structural (health units, health centers, and hospitals), geographic (rural and urban), or programmatic (such as immunization) (MOHP et al., 2003). Primary care units in the public sector alleviate pressure on specialized hospitals (secondary/tertiary care) by handling non-urgent cases that do not require specialized interventions urgently.

Current coordination between the public health sector and the private sector through public–private partnerships reduce the burden on the public sector and ensures the delivery of high-quality, sustainable health services without care interruptions. NGOs also play a significant role in providing specialized healthcare services, presenting innovative care models and successful funding schemes in Egypt, which alleviate the disease and financial burden on the public health sector. An exemplary instance is the Children's Cancer Hospital Egypt – 57357 (CCHE), which treats around 40–50% of all children with cancer in Egypt for free through donations (CCHE, website b).

5.1.5 Distribution of and access to health service

The distribution of healthcare services in Egypt can vary depending on geographical region (urban/rural), type and complexity of health services (primary versus specialized care), socioeconomic factors, and variations in disease burden (Gericke et al., 2018). Nevertheless, despite rural-urban healthcare discrepancies, the MOHP endeavours to provide a wide range of healthcare services to all areas of Egypt and there are national efforts aim to extend health services to rural areas of Upper Egypt to mitigate access inequalities (Gericke et al., 2018).

However, there are no disparities in the distribution of or access to health services based on nationality, ethnicity, or religion. Both nationals (Egyptians) and non-nationals (non-Egyptians) are offered the same public health services and included in universal health coverage without discrimination. Only in the private sector do variations in access to care and service quality largely depend on ability to pay.

The new UHI system aims to eliminate disparities in healthcare access based on affordability by extending universal health coverage to all residents (nationals and non-nationals), regardless of socioeconomic status. Policies and procedures are in place to fully implement universal health insurance, covering the entire population with the quality health services they require without hardship (Elsayed, 2023).

5.1.6 Emphasis on prevention and management of chronic diseases

In Egypt, preventive care accounted for only 1.5% of the total healthcare expenditures for the fiscal year 2019/2020 (WHO Eastern Mediterranean Region, 2023a). While the MOHP has recently initiated efforts to prioritize the prevention of chronic diseases, there is little expenditure on preventative medicine (WHO Eastern Mediterranean Region, 2023a).

In Egypt, preventive care services and health promotion initiatives encompass various measures aimed at averting injuries and illnesses or mitigating their impact, including immunization programs, epidemiological surveillance, early detection, and disease control initiatives (WHO Eastern Mediterranean Region, 2023a).

As part of Egypt's healthcare reform agenda, the MOHP has launched several health promotion awareness campaigns targeting the prevention of chronic diseases, aiming to bolster the sustainability of healthcare services delivery by implementing cost-effective public health measures (State Information Service, 2022b). One notable initiative, "100 Million Seha" (100 Million Healthy Lives), launched in 2018, aimed to reduce Hepatitis C prevalence in Egypt, succeeded in reducing the rate to less than 1% by 2023 (Egypt Today, 2022). Additionally, various health promotion campaigns have focused on initiatives such as improving childhood nutrition among school students, enhancing women's health, early detection of genetic diseases in newborns, identifying nephropathy early, and treating children with spinal muscular dystrophy (Egypt Today, 2022). Furthermore, there have been concerted efforts to screen and detect cancers, including breast, cervical, colon, and lung cancers. Sustaining such disease prevention campaigns over the long term is crucial to ensuring the continuity of preventive services for chronic diseases.

5.2 Resilience

5.2.1 Sustaining services during a crisis

The COVID-19 pandemic severely disrupted health service delivery in Egypt, particularly at the beginning of each new wave of the pandemic. A key challenge was the insufficient availability of inpatient hospital beds for severe cases. In response to these disruptions, the MOHP partially repurposed certain hospitals to treat chest infections to meet the high demand for COVID–19 inpatient and outpatient services. This was facilitated by the swift response from Egypt's Ministry of Finance, which allocated resources to the health sector, provided targeted assistance to the worst-affected areas, enhanced service delivery capacity, and extended social safety net measures to protect the most vulnerable (Haidar, 2022). Additionally, the United States Agency for International Development (USAID)/Egypt COVID-19 Response program supported Egypt's COVID–19 response by supplying vaccines, aiding in case prevention and early detection, training community health workers, and maintaining financial and social protection measures (USAID, website).

Overall, the Egyptian healthcare system demonstrated considerable adaptability and resilience in absorbing the shock of the COVID-19 crisis, thanks to collaborative efforts among national and international stakeholders. This was evident in the MOHP-led COVID-19 vaccination campaign, which saw the establishment of over 400 vaccination centres to ensure widespread coverage, including among refugees and migrants (WHO Eastern Mediterranean Region, 2021). Throughout the pandemic, nine vaccines received approval for use in Egypt (COVID-19 Vaccine Tracker, website), with a total of 112,673,535 vaccine doses administered as of May 2023 (WHO Health Emergencies Programme, website).

5.2.2 Coordinating care during a crisis

The resilience of the Egyptian healthcare system was further bolstered by coordinated efforts in service delivery across the public sector, private sector, and civil society organizations, including NGOs. During the COVID–19 pandemic, the private sector and NGOs provided complementary health services, easing the burden on MOHP hospitals and university teaching hospitals.

5.3 Recommendations

RECOMMENDATION 5A
Implement a value-based healthcare program in Egypt and promoting value in service delivery through measuring health outcomes achieved relative to the money spent.

RECOMMENDATION 5B
Standardize reporting of health outcome measures in a patient-centred approach through the establishment of health outcomes measurement system.

RECOMMENDATION 5C
Encourage public-private partnerships, where private investments in healthcare should be based on real-world evidence from local contexts in Egypt about the disease burden, economic burden, and health outcomes that need improvement.

RECOMMENDATION 5D
Strengthen referral networks from primary care to secondary/tertiary care services, through electronic referral systems to make resource allocation based on the geographic distribution, availability of health services, and patients' needs.

6. DOMAIN 6

Population health

6.1 Sustainability

6.1.1 Indicators of population health

6.1.1.1 Population and age profile

The Egyptian population has been steadily growing annually, surpassing 105 million and exhibiting a growth rate of over 3% since 2021 (CAPMAS, 2023). This growth aligns with that of the North African and Middle Eastern populations, which have experienced a similar growth rate of 2.89% over the same period (World Bank, Databank). Projections indicate that Egypt's population is expected to reach 160 million by 2050 (World Bank, World Bank, Databank). As reported by CAPMAS, the total fertility rate in Egypt stood at 2.8 in 2021 (CAPMAS, 2023), consistent with fertility rates observed in other North African and Middle Eastern countries, where the fertility rate was 2.7 in 2017 (IHME, database).

62.5% of the Egyptian population falls within the 15–64 age bracket, with more than a third of the population falling within the 0–14 age group. Individuals over the age of 65 represent only 5% of the population. The broader Middle Eastern and North African population exhibits comparable percentages across the same age groups: 64.9% for the 15–64 age group, 29.5% for 0–14, and 5.5% for 65 and above (World Bank, DataBank).

6.1.1.2 Measures of mortality and health

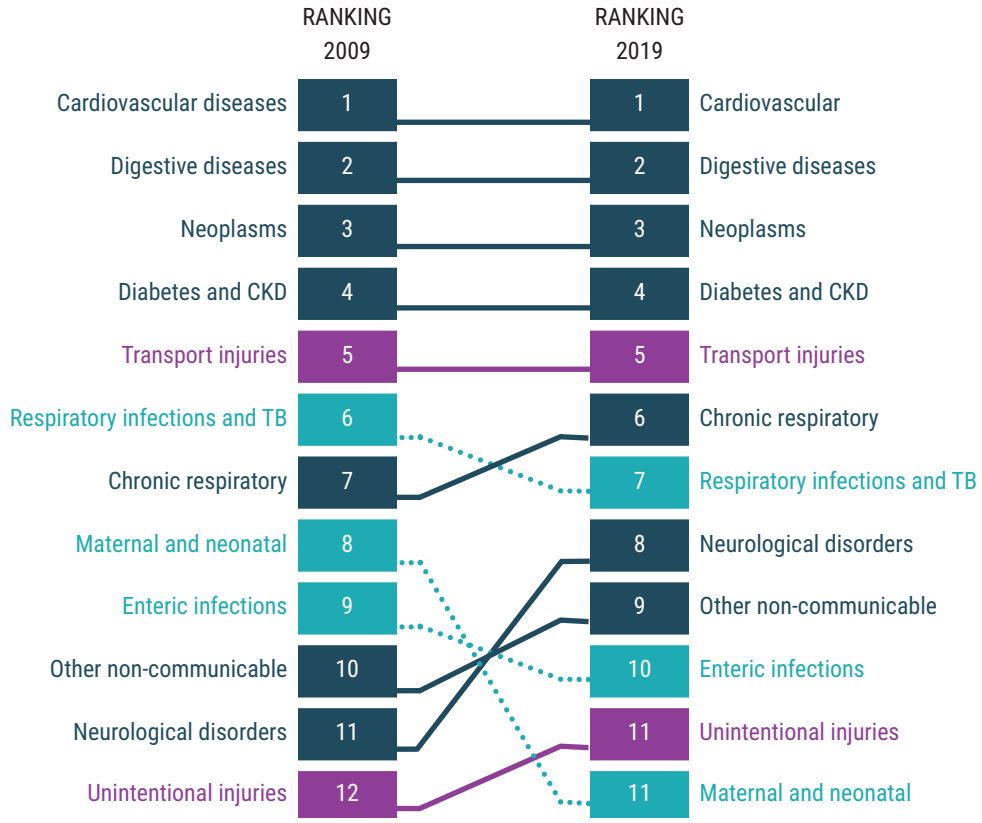
According to the World Bank, the total life expectancy at birth in Egypt was 70.2 years in 2021, slightly lower than the average of 71.9 years for the Middle East and North Africa region. In the same year, life expectancy at birth for women in Egypt was 72.6 years, while for men, it was 67.9 years. A decade earlier, in 2011, life expectancy at birth for women was the same, while for men, it was slightly lower at 67.3 years, with an overall average of 70.2 years (World Bank, Gender Data Portal a). However, the Ministry of Health and Population (MOHP) report suggests a higher life expectancy of 74 years in 2021 (MOHP et al., 2023). The peak value of life expectancy at birth in Egypt was 71.4 years in 2019, followed by a decline, possibly due to the COVID-19 pandemic.

The period 2012 to 2021 saw an increase in the infant mortality rate per 1,000 live births from 15.6 in 2012 to 17.8 in 2021. Furthermore, the under-five mortality rate increased from 19.7 to 21.8, and the neonatal mortality rate rose from 6.5 to 9.3 during the same period. However, the maternal mortality rate per 100,000 live births decreased from 50 in 2012 to 49 in 2020 (CAPMAS, 2023).

The crude death rate stood at 7.3 in 2021, marking an increase of 1 per 1000 since 2012 (CAPMAS, 2023). Throughout this decade, non-communicable diseases were the leading causes of death (IHME, database). The top five causes of death remained consistent between 2009 and 2019, with cardiovascular diseases ranked highest, followed by digestive diseases and neoplasms (see Figure 8). In 2021, the top five causes of death were cardiovascular diseases (48.6%), respiratory system diseases (18%), infectious and parasitic diseases (4.5%), digestive system diseases (4.4%), and neoplasms (4.3%) (CAPMAS, 2023).

The top five causes of death in the North African and Middle Eastern region and Egypt are similar, albeit with differing rankings. Figure 8 shows that in 2019 cardiovascular diseases were the leading cause of death, although with a 25% higher rate in Egypt. Neoplasms ranked second in the region, and third in Egypt with 15% lower rate. Egypt had almost double the mortality rate due to gastrointestinal diseases compared to the region. This could be explained by the high prevalence of hepatitis C cases in Egypt, which was once considered the country with the highest number of cases in the world – in 2015, the prevalence was 7% – before the launch of the National Hepatitis Eradication program as part of the 100 Million Healthy Lives campaign (Hassanin et al., 2021; Waked, 2022).

Figure 8: Top 12 causes of death in Egypt, 2009 and 2019



Source: WHO Global Health Observatory, database b.

6.1.1.3 Behavioural determinants of health

Data and trends regarding Egyptian determinants of health are presented below. The primary areas of concern are the high prevalence of smoking among men and obesity among females, which are contributing factors to the elevated rates of diabetes and hypertension among the population. Additionally, there is a notable concern regarding relatively high malnutrition rates among children under the age of five.

Tobacco Smoking

High tobacco usage is prevalent among men in Egypt, with 48.1% reported as smokers in 2020. The overall percentage of adults using tobacco was 24.3%, with only 0.4% being females (World Bank, Gender Data Portal b). While World Bank research indicates a steady smoking rate in Egypt over the years, a 2017 Egyptian survey suggests an increase in male smoking rates between 2017 and the 2020 World Bank figures. The 2017 survey showing 43.4% for males and 0.5% for females, with 22.7% of adults smoking tobacco (WHO et al., 2017). A similar Egyptian survey in 2012 indicated that 24.4% of adults were smokers, showing some fluctuation over the decade (WHO, 2012).

Egypt exhibits a significantly higher smoking rate compared to other Middle Eastern and North African countries, where the average of adults smoking stands at 19.2%. Women in the region smoke at higher rates than in Egypt (regional figure: 2.9%), whereas men smoke at lower rates (regional figure: 35.1%) (World Bank, Gender Data Portal b). The average age of initiation of smoking was 18.1 for males and 22.6 for females.

The basis for all later tobacco laws was provided by Law No. 52 of 1981 Concerning the Prevention of the Adverse Effects of Tobacco. This law covered tobacco-free regulations, packaging and labelling, advertising, and penalties. In the same year, penalties were introduced for smoking in

workplaces by Law No. 137 of 1981. Subsequent laws in 2002, 2007, and 2008 built upon Law No. 52 of 1981. One measure employed by Egypt to reduce tobacco use is the adoption of the WHO recommendation to impose taxes on tobacco products, amounting to at least 70% of retail prices. Additionally, visual and text health warnings must occupy half the space on tobacco product packaging (Tobacco Control Laws, website). In 2023, the Ministry of Health banned smoking in all healthcare facilities, in accordance with Law No. 154 of 2007, which prohibits smoking in government, education, health, social, and sports institutions, with violations incurring fines (State Information Service, 2023). However, enforcement of this ban remains inconsistent in practice.

Obesity

The prevalence of obesity among adults has risen over the years. In 2006, it was 34.3% in females and 16.4% in males, while a decade later, the figures stood at 41.1% for females and 22.7% for males (World Bank, Gender Data Portal c). A survey on non-communicable risk factors conducted in Egypt in 2017 revealed that 35.7% of the population was obese (48.8% females and 24.8% males), with 90.3% of those surveyed consuming fewer than five servings of fruits or vegetables per day. Additionally, 24.9% of adults were deemed to have insufficient physical activity (WHO et al., 2017). Furthermore, the economic burden of obesity in Egypt is estimated to be around EGP 62 billion annually (Aboulghate et al., 2021).

Nutrition

Malnutrition rates were relatively high in 2014. A report indicated that 6% of children under the age of five were underweight, 8% were wasting, 15% were overweight, 21% were stunted, and 27% were anaemic (MOHP et al., 2015). However, there was progress by 2021, with the respective percentages falling to 4%, 3%, and 13% for underweight, wasting, and stunting (CAPMAS, 2023).

An Egyptian study conducted from 2018 to 2020 on 33,150 children aged 6 to 11 showed that the prevalence of anaemia in children was 26%, while anaemia with stunting was 9.9% (El-Shafie et al., 2020). In 2021, the percentage of children with anaemia rose sharply to 43%. The most significant increase was observed in urban governorates, where the percentage affected by anaemia was 20% in 2021 compared to 3.9% in 2014 (CAPMAS, 2023). Anaemia and anaemia with stunting were more prevalent in girls, rural residents, and individuals with low socioeconomic status.

Efforts to reduce malnutrition among children are a priority for the country. In September, the Egyptian country office of WHO, in collaboration with the Ministry of Health and Population and the National Nutrition Institute, finalized the National Food and Nutrition Strategy 2023–2030 (WHO Eastern Mediterranean Region, 2023b). One of the objectives is to decrease children's stunting, wasting, and obesity by expanding nutrition and health promotion and providing essential services to women, children, and other vulnerable groups.

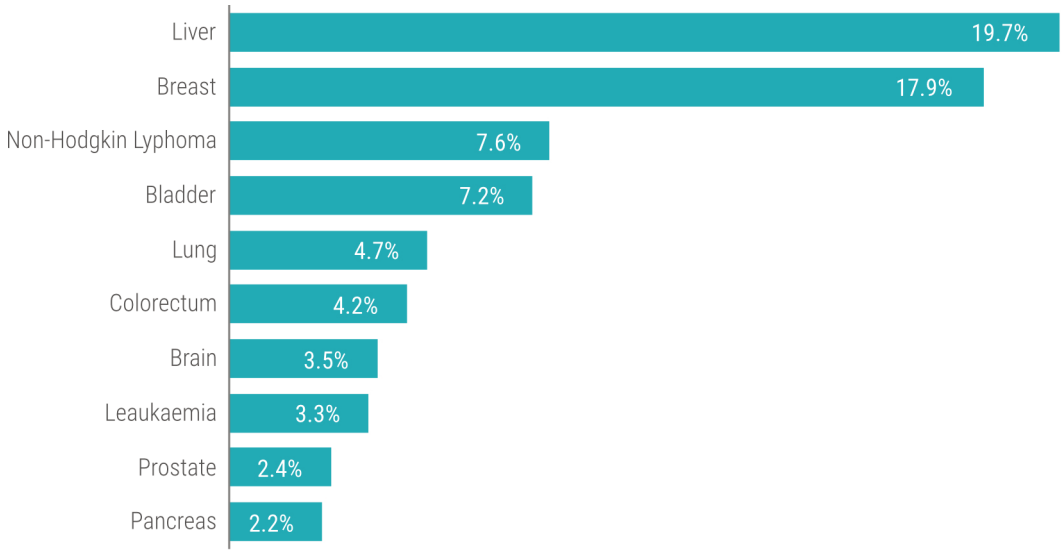
Non-communicable diseases

Egypt faces a burden a range of non-communicable diseases. In 2018, the rates of the five most common forms of cancer in Egypt, were: liver cancer at 19.7%, breast cancer at 17.9%, Non-Hodgkin lymphoma at 7.6%, and bladder cancer at 7.2% (Figure 9).

Hypertension poses a significant challenge to the Egyptian population; its prevalence was 29.2% (17.8 million) among adults aged 15–69 in 2017. More than half of adults aged 45–59 and 65.1% of adults aged 60–69 had hypertension, with 15.4 million having uncontrolled hypertension (WHO, 2020b; WHO et al., 2017). By 2019, the prevalence of hypertension among adults aged 30–79 increased to 38%, with rates among females at 41% and among males at 36% (WHO, 2023a).

According to the diabetes country profile in 2016, the prevalence of diabetes was 16.2%, with a higher prevalence among females at 18.2% compared to males at 14.2% (WHO, 2016). In 2021, the prevalence in adults was 18.4%, surpassing the prevalence in the North Africa and Middle East region (16.2%) (International Diabetes Federation, 2021).

Figure 9: Cancer incidence rates in Egypt, 2018



Source: World Health Organization, 2020b.

6.1.1.4 Initiatives to address behavioural determinants of health

Aware Program "Waai"

Launched in February 2020 by the Ministry of Social Solidarity (MOSS) in collaboration with the United Nations Development Programme, the Awareness Program (Waai) targets families registered in the "Takaful and Karama" social protection program (United Nations Development Agency, 2020). It aims to enhance health literacy and economic empowerment among marginalized families, focusing on twelve different issues. These include children and young women's welfare, such as addressing female genital mutilation, child marriage, maternal and child health, positive discipline, domestic violence, and marriage education. The program also offers protection to vulnerable groups such as persons with disabilities, the homeless, and the elderly. Additionally, it educates families about the consequences of drug use, illegal immigration, and over-population. Outreach efforts include social media campaigns and engagement with community leaders to disseminate messages effectively. For instance, the Minister used social media to announce a campaign in October 2023 aimed at raising awareness of precautions to reduce the incidence of winter diseases, complemented by various campaigns and workshops over recent years (MOSS 2022).

Mass media campaign "Their Dream Starts with You"

In conjunction with the Waai program, the MOHP and the Strengthening Egypt's Family Planning Program (SEFPP) by United States Agency for International Development (USAID) collaborate on a mass media campaign called "Their Dream Starts with You" (JSI, 2023). This campaign aims to raise awareness among Egyptians about the benefits of family planning, issues related to overpopulation, and dispelling misinformation about reproductive health. SEFPP delivers key messages about family planning and gender equality to 40% of the Egyptian population aged 18 to 45 through various media channels, including a soap opera aired in early 2023. This addressed topics such as the appropriate age for marriage and childbearing. Additionally, the campaign uses digital platforms to broadcast short episodes on family planning hosted by prominent figures and features billboards to reinforce its messaging.

Supporting healthy lifestyle initiatives

Egypt initiated the "100 Million Healthy Lives" (100 Million Seha) program in 2018 to promote healthy living and raise awareness about risk factors for non-communicable diseases, such as tobacco consumption and poor nutrition. The initiative also focuses on improving knowledge about the spread and prevention of infectious diseases, such as hepatitis C. Activities under this initiative include television and radio advertisements, street advertisements, awareness campaigns, and social media outreach. Financial support is provided to patients, and screening for non-communicable diseases, including hepatitis C, is conducted. Egypt has made significant strides in combating hepatitis C, achieving the golden tier status in 2023 by meeting requirements aimed at reducing infection rates and related deaths (Hassanin et al., 2021; WHO Eastern Mediterranean Region, 2023b).

6.1.1.5 Health disparities among population groups

Looking at disparities in Egyptian family health indicators as an example, this section analyses from the Egyptian Family Health Survey for 2021 to investigate the sources of health disparities existing within various population groups including infants, children, and women of childbearing ages. The analysis disaggregates data by place of residence and educational levels, which are crucial determinants of socioeconomic status.

The overall fertility rate decreased from 3.5 births per woman in 2014 to 2.85 in 2021, largely attributed to increased contraceptive use. As shown in Table 7, fertility rates varied by educational attainment, with fewest births per woman among those who completed high school or higher. Overall female genital mutilation (FGM) prevalence decreased from 92.3% to 85.6%, with higher rates in Upper Egypt than Lower Egypt. Additionally, FGM rates decreased with higher educational levels.

Table 7: Maternal health indicators by place of residence and education level, 2014 and 2021

	Fertility rates		Contraceptive use (%)		FGM in females who were married before (%)	
	2014	2021	2014	2021	2014	2021
RESIDENCE						
Urban governorates	2.5	2.2	62.6	70.5	81.7	75.8
Urban Lower Egypt	3.0	2.4	62.5	70.3	86.4	76.7
Rural Lower Egypt	3.6	2.8	64.1	71.8	94.7	86.6
Urban Upper Egypt	3.2	2.5	58.9	63.1	92.1	86.6
Rural Upper Egypt	4.1	3.6	46.7	57.4	97.0	93.4
Frontier governorates	3.9	3.4	55.0	65.3	69.5	62.0
EDUCATION						
Never been educated	4.3	3.4	59.2	66.0	97.2	94.9
Did not complete primary education	4.2	3.6	57.7	65.0	97.3	89.8
Completed primary school/ did not complete high school	3.8	3.1	54.7	62.3	94.0	85.9
Completed high school or higher	3.2	2.6	59.6	68.0	88.8	81.4

Source: CAPMAS, 2022b.

Vaccination rates for infants increased in rural areas due to vaccination campaigns, while declining in urban areas possibly due to preferences for private clinics where vaccinations are not recorded in government data (Table 8).

Table 8: Child and infant health indicators by place of residence and education level, 2014 and 2021

Residence	Infants (18–29 months) receiving all required vaccinations (%)		Children with moderate anaemia (%)	
	2014	2021	2014	2021
Urban governorates	93.0	80.0	3.9	20.0
Urban Lower Egypt	89.0	92.0	9.5	19.8
Rural Lower Egypt	94.0	94.0	11.6	18.9
Urban Upper Egypt	93.0	85.0	5.2	17.8
Rural Upper Egypt	88.0	91.0	10.0	24.2
Frontier governorates	95.0	92.0	14.7	23.5

Source: CAPMAS, 2022b.

6.2 Resilience

6.2.1 The national response to the COVID-19 pandemic

The Egyptian government swiftly responded to the COVID-19 pandemic, implementing various measures to mitigate its spread. These measures included the closure of venues hosting large gatherings, mandatory face mask mandates in public spaces, and the temporary suspension of schools and universities (El Rabbat et al., 2022). Additionally, the government promoted remote work for the first time within the government sector. The MOHP took proactive steps even before the first case was detected in February 2020, by implementing the Acute Respiratory Infection Preparedness Plan, initially developed in 2007 and updated in August 2020 (El Rabbat et al., 2022).

6.2.1.1 Case management, surveillance, and public information

The MOHP established a command-and-control system, which included a call centre for telemedicine to handle inquiries and case reports. Cases were assessed by onsite doctors, and patients were either advised on home quarantine or directed to hospitals (Figure 9). Additionally, a WhatsApp chatbot was deployed to assist COVID-19 patients with diabetes in self-management (Goodyear-Smith et al., 2022). An electronic tracking system was introduced to monitor patient transportation and bed availability in isolation hospitals and ICUs. COVID-19 surveillance was integrated into the National Electronic Disease Surveillance System. Medical staff across all governorates received training on infection control and management guidelines. A comprehensive public awareness campaign was launched through various media channels.

6.2.1.2 Health system: hospital care and testing capacity

The government expanded hospital and laboratory capacity to handle the surge in COVID-19 cases. Isolation hospitals were designated in different governorates, and hotels and dormitories were repurposed to isolate mild cases. Private hospitals were eventually included in the plan, adhering to government-set guidelines. Temporary isolation facilities were set up in coordination with the Ministry of Civil Aviation. Laboratory capacity was significantly increased, with 57 testing centres

established across the country. Other sectors also implemented policies to address COVID-19's impact, particularly on vulnerable populations such as irregular workers (El Rabbat et al., 2022).

6.2.1.3 Vaccination

Egypt collaborated with the Chinese government in participating in Phase III clinical trials for COVID-19 vaccines, involving 3,000 eligible subjects. The MOHP initiated public vaccination in January 2021, authorizing vaccines from various pharmaceutical companies under emergency use. There were 414 vaccination sites nationwide, and home vaccination was available for specific cases. Priority was given to healthcare and non-medical workers, the elderly, and finally, the general population, including refugees and foreign residents. Special attention was given to vaccinating workers in the tourism sector. In July 2021, Egypt moved towards local COVID-19 vaccine manufacturing. Despite extensive media campaigns and incentives, vaccine hesitancy persisted (Elareed et al., 2023). Certain regulations, such as access restrictions to government institutions and universities without vaccination certificates, were implemented to encourage vaccination uptake.

6.2.2 Impact of the COVID-19 pandemic on the health of the population

As of May 20, 2023, the total administered vaccine doses in Egypt reached 112,673,535, with 516,023 reported cases and 24,830 deaths (WHO COVID-19, 2023). The highest infection rate occurred on January 31, 2022, with 15,872 confirmed cases, while the peak in deaths was observed on June 15, 2020 (WHO COVID-19, 2023). Despite the country's larger population, Egypt reported lower case and mortality rates than neighbouring countries like Morocco, Tunisia, and Saudi Arabia (WHO COVID-19, 2023). While under-reporting was suspected, Egypt did not experience significant spikes in cases, suggesting effective government interventions (Assaad et al., 2022).

The impact of the pandemic extended beyond infection rates and fatalities, affecting various population groups. Studies conducted during the COVID-19 pandemic revealed psychological distress and behavioural changes among different population groups (Table 13).

Table 13: Impact of COVID-19 on different population groups

Population group	Impact of COVID-19
Whole population – Abdelkawy et al., 2023; Arafa et al., 2021; Elkayal et al., 2022.	Increased levels of depression, distress, and anxiety, accompanied by changes in physical activity and dietary habits.
Women – Abu-Elenin et al., 2022; Omar SS et al., 2021.	Heightened sexual stress among married women and increased incidence of violence towards women, particularly in low-education couples.
Youth – Alamrawy et al., 2021.	Elevated levels of anxiety, depression, and insomnia.
Children – AboKresha et al., 2021; El Refay et al., 2021.	Reports of sleep disorders and anxiety. Increased exposure to violent disciplinary practices.
University students – Ghazawy et al., 2020.	Higher prevalence of anxiety and depression, especially among women, students lacking familial or institutional psychological support, those with pre-existing chronic illnesses, and individuals in close proximity to infected persons. Notably, medical and allied health students exhibited higher rates of depression.
Medical workers – Elkholy et al., 2021; Shaker et al., 2021.	Increased stress, particularly due to concerns about transmitting the virus to their families. Anxiety, depression, and insomnia were prevalent.

6.3 Public health infrastructure

6.3.1 Egyptian Centre for Disease Control and Prevention (EgyCDC)

Established as an independent public health entity by the Egyptian Ministry of Health and Population in mid-2023, the Egyptian Centre for Disease Control and Prevention (EgyCDC) addresses global health challenges, particularly in response to the COVID-19 pandemic.

Functioning as a comprehensive centre, EgyCDC employs advanced diagnostic, treatment, research, and capacity-building approaches to combat communicable and non-communicable diseases. It oversees critical health system partners, ensures transparency and accountability, and fosters the development of a skilled healthcare workforce for effective national responses to health threats. Employing evidence-based decision-making, EgyCDC aims to enhance public health strategies, reduce mortality and infection rates, improve health indicators, and promote sustainable development goals.

The centre is responsible for formulating disease control guidelines, clinical protocols, and health promotion initiatives to raise public awareness. Furthermore, EgyCDC offers technical support for epidemic control, addresses the economic burden of chronic diseases, collects data for health policy formulation, supports clinical and applied research, and utilizes artificial intelligence for early detection and treatment of health challenges.

EgyCDC comprises two sub-entities: the Hospital for Rare Diseases and Resistant Infections, and the National Public Health Institute. It operates six departments including Central Laboratory, Logistics Management, Non-Communicable Diseases, Communicable Diseases, Research Methodology, and the Egyptian Network for International and Global Public Health (MOHP, 2023b).

6.3.2 Population health and disease surveillance

The Egypt Health Issues Survey (EHIS), part of the Ministry of Health and Population's toolkit, collects data on key health concerns, including hepatitis, hypertension, smoking, and obesity, which are major risk factors for non-communicable diseases (NCDs) such as diabetes and cardiovascular diseases.

Despite Egypt having the world's highest rate of hepatitis C infection and NCDs ranking among the top causes of mortality, the government has made significant strides towards elimination of the disease. Egypt's efforts were recognized by WHO, acknowledging it as the first country to achieve the "gold tier" status on the path to hepatitis C elimination. EHIS, funded by the United States Agency for International Development (USAID) with support from United Nations Children's Fund (UNICEF) and the United Nations Population Fund (UNFPA), shares a national sample with the Egypt Demographic and Health Survey (EDHS). Together, EHIS and EDHS data provide the Ministry of Health and Population with valuable insights to enhance healthcare service delivery in Egypt (MOHP et al., 2015).

6.4 Strategies and policies for population health sustainability and resilience

6.4.1 Major policy initiatives and programs addressing the social determinants of health

The social determinants of health encompass non-medical factors influencing individuals' health outcomes and quality of life, such as their birth circumstances, growth environment, working conditions, living standards, and aging process (US Department of Health and Human Services, website). This section highlights significant policy initiatives and programs in Egypt aimed at enhancing the population's health by tackling key social determinants (Decent Life Initiative, webpage), including:

- **Decent housing and infrastructure**: upgrading houses and extending essential services such as clean water supply, electricity, and sewage systems in villages.
- **Access to healthcare services**: establishing hospitals, equipping them, and staffing them with medical personnel. Launching 'medical convoys' to provide healthcare services to under-served areas.
- **Access to education**: establishing literacy classes for adults. Building new schools and nurseries to improve educational access.
- **Economic empowerment**: providing training and employment opportunities through micro-, small-, and medium-sized enterprises (MSMEs), especially targeting youth.
- **Social and community engagement programs**: offering subsidized food baskets for individuals in need. Assisting with orphan marriages and group weddings to promote social cohesion.

With the long-term goal of enhancing population health, Egypt initiated the Universal Health Coverage (UHC) scheme in 2018, introducing the Universal Health Insurance Law No. 2/2018. This law safeguards vulnerable populations from financial hardships and ensures equitable access to healthcare services. To implement the UHC scheme, Egypt has embarked on establishing more health facilities across all governorates from 2018 to 2032. Additionally, three governing bodies were instituted to support the UHC scheme, comprising the General Authority of Comprehensive Health Insurance, the General Authority of Health Care, and the General Authority of Accreditation and Supervision, which sets healthcare quality standards and facility accreditation criteria.

Moreover, recognizing the pivotal role of civil society in development and health promotion, the National Alliance for Civil Development Work (NACDW) was established in March 2022. It is the largest independent coordination body for community organization and mobilization in Egypt, bringing together 30,000 civil associations to foster development, social protection, and economic empowerment programs. Providing primary healthcare to the population through medical convoys and affiliated health facilities, NACDW plays a crucial role in enhancing community well-being.

Two major policy initiatives, namely the "Haya Karima – Decent Life Initiative" and the "Takaful & Karama – Solidarity & Dignity Initiative," have been implemented on a large scale to address the social determinants of health for approximately 58 million Egyptian citizens (Decent Life Initiative, webpage; Takaful & Karama Program, webpage).

Table 14: Large-scale national initiatives tackling social determinants of health

Haya Karima – Decent Life Initiative	
Launched	January 2, 2019, by President Abdel Fattah El-Sis
Goals	• Improve living standards for marginalized populations in rural and urban areas, ensuring dignified living • Alleviate poverty by enhancing social, economic, and environmental conditions for the most vulnerable families • Foster shared responsibility among development partners to align initiatives in urban and rural areas
Target population groups	• Economically disadvantaged families in rural areas, older adults, individuals with special needs, volunteers, female heads of households, divorced women, orphans, and youth capable of working
Outputs until October 2022	• Implementation of 90% of the 30,000 targeted projects in the initiative's first phase across 8 governorates • Establishment of 61 governmental service complexes and 127 schools • Construction of 51 fixed medical units and launch of 175 mobile medical convoys • Establishment of 3,000 nurseries and 26 youth centres, with 132,000 housing units upgraded

Continued on next page.

Table 14 (continued): Large-scale national initiatives tackling social determinants of health

Takaful & Karama – Solidarity & Dignity Initiative	
Launched	2015 by the Ministry of Social Solidarity (MOSS).
Goals	• Protect vulnerable populations from short-term economic reform impacts while investing in future generations' health and education
Target population groups	• Takaful program: Impoverished households with children under 18 (maximum of three children per household) • Karama program: People with disabilities, individuals above 65, and orphans
Impacts of Takaful Cash Transfers	• Increased food consumption among beneficiaries • Enhanced dietary quality • Increased household spending on school supplies and transportation

Sources: Decent Life Initiative (website); Takaful & Karama Program (website); Breisinger et al., 2018; El-Enbaby et al., 2023.

6.4.2 Health in All Policies approach and multisectoral collaboration to improve population health

The Egyptian government is implementing the Takaful scheme using the "Health in all Policies" approach, fostering inter and multisectoral collaboration while considering social determinants of health to promote population health, equity, and sustainable development (WHO Regional Office for Africa, 2014).

An exemplary illustration of this approach is the health conditionality component integrated into the Takaful conditional cash transfer program, which was initiated five years ago. In 2018, health and educational conditionalities were incorporated into the Takaful program, with various ministries collaborating to ensure its success. The Ministry of Social Solidarity manages smart card beneficiaries, the Ministry of Finance funds cash transfer schemes, the Ministry of Education ensures eligible children attend school, and the Ministry of Health and Population ensures beneficiaries utilize reproductive, maternal, and child health services (Breisinger et al., 2018; El-Enbaby et al., 2023).

A case study that highlights the health conditionality component of the Takaful (Solidarity) Conditional Cash Transfer Program is included in in Section 8

6.4.3 Challenges affecting the sustainability and resilience of national population health programs

Expert consultations have identified significant challenges within the Egyptian health system that impact population health programming and outcomes:

Lack of financial resources: insufficient funds to implement the universal health insurance scheme, leading to challenges in incentivizing the health workforce.

Fragmentation of the health system: multiple service providers and funding sources contribute to high out-of-pocket expenditure due to incomplete implementation of universal health coverage schemes across all governorates.

Economic hardships and political tensions: economic challenges like inflation and currency devaluation, alongside global political tensions, hinder national health system reform efforts.

Governance issues: mediocre governance and inadequate accountability systems within the healthcare sector impede effective management.

Shortage of healthcare workforce: constant brain drain of doctors from Egypt threatens healthcare service continuity, particularly in rural areas.

Reliance on specialist healthcare: societal norms favour reliance on specialist healthcare services over primary healthcare, impacting healthcare utilization patterns.

Insufficient follow-up management: lack of adequate follow-up management for patients after chronic disease screenings in public health initiatives undermines long-term sustainability.

Inadequate EMR utilization: primary health facilities' inadequate utilization of Electronic Medical Records (EMR) hampers patient record digitalization efforts.

6.6 Recommendations

Recommendations for planning and preparing for health crises

RECOMMENDATION 6A
Establish a unified clinical decision-making body to establish management and prevention protocols for health emergencies and epidemics.

RECOMMENDATION 6B
Reproductive health services are usually overlooked during any crisis, so a contingency plan needs to be in place to ensure the continuity and sustainability of the services.

Recommendations for resourcing the population health programs

RECOMMENDATION 6C
Data accuracy, availability and accessibility: It is recommended that accurate and consistent population health datasets be made publicly available and accessible via the official websites of the Egyptian government.

RECOMMENDATION 6D
Health infrastructure related-resources: Expand support to civil society organizations as health service providers by waiving or reducing water, gas, and electricity bills, and reducing taxes on health facilities associated with non-governmental organizations.

RECOMMENDATION 6E
Sustainable financial resources: Diversify the financing sources for health programs by capitalizing on building a sustainable public-private partnership model for financing health programs.

RECOMMENDATION 6F
Sustainable financial resources: Consider innovative financing opportunities for health programs such as ear-marked taxation on high sugar-sweetened beverages and Tobacco products to fund health promotion initiatives “Health Promotion Levy” that are payable by the manufacturers.

Recommendations for implementing population health programs:

RECOMMENDATION 6G
Promoting decentralization of population health programs: Decentralize the implementation of the population health programs and health services convoys based on health priorities at the level of the governorates, particularly in rural areas with limited access to health services.

RECOMMENDATION 6H

Seeking community engagement and consensus on the national population health programs: National population health programs and strategies should be discussed through civil society representatives as a part of the established national dialogue to build consensus on the implementation plans and ensure the social acceptance of such plans (e.g. gaining consensus on the rollout of family planning programs in villages).

CASE STUDY

The Takaful Program

Health in All Policies approach – the Takaful conditional cash transfer program

Context

Financial incentives, such as conditional cash transfer (CCT) programs, are used to alleviate poverty, promote development, and increase the uptake of health services, particularly reproductive, maternal, and child health services – ultimately improving population health. A CCT program encourages households or individuals to adopt and maintain certain behaviours prescribed by the program, thereby reducing social exclusion and promoting upward social mobility for future generations (Bassani et al., 2013; Neelsen et al., 2021).

In March 2015, the Takaful program (Solidarity) was launched as a CCT scheme by the Egyptian Ministry of Social Solidarity (MOSS) to provide cash to poor households with children under eighteen years old. In 2018, health and educational conditionalities were introduced, including requirements for school attendance, health unit visits by mothers, child growth monitoring, and participation in nutritional awareness sessions (Breisinger et al., 2018). The official Takaful media campaign used advertisements with the slogan "What begins with a condition ends with cash in a card" to inform households of these conditionalities.

Goal

The health conditionality component of the Takaful program aims to improve reproductive, maternal, and child health indicators by raising health awareness and promoting healthy dietary patterns among families. It also encourages the use of primary health care services (PHC) provided by the Ministry of Health and Population (MOHP), particularly child and maternal health, thereby increasing demand for these services and alleviating poverty among recipient households.

Relevant domains

Domain 6: Population Health

The case

To reduce rates of malnutrition diseases, the Takaful Program plans to promote healthy behaviours, raise awareness of breastfeeding and proper nutrition, and improve women's skills in preparing and cooking healthy food. The MOSS has partnered with the MOHP in providing PHC services to improve maternal and child health in beneficiary families. These services include early detection of disability causes, vaccinations, growth monitoring for children, family planning, pregnancy and postpartum care, reproductive health services, health awareness sessions, and nutrition counselling. To encourage uptake of the services, cash payments are linked to certain health conditions, targeting pregnant women up to the time of childbirth and beyond, as well as children up to five years of age, with a particular emphasis on the first two years of life, to address (MOSS, Takaful, and Karama Unit, 2023).

Health conditions of the program involve mandatory health centre visits, for all family members, for prescribed health services. These conditionalities include:

- Visits to a pregnancy clinic during the first three months of pregnancy
- Visits to a paediatric clinic during the first week of birth and for subsequent child growth monitoring
- Adherence to the immunisation schedule.
- Attendance of health education seminars is also recommended at least once every three months.

(MOSS, Takaful and Karama Unit, 2023)

Analysis

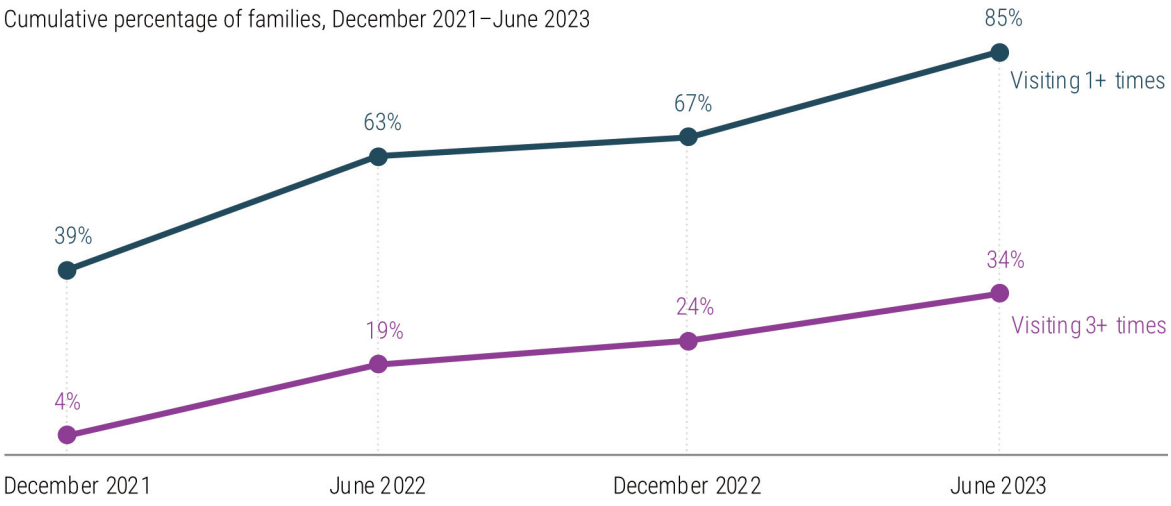
The health conditionality component of the program exemplifies the integration of health policies into social protection policies, showing promising outcomes. The MoSS evaluated the program's effectiveness over the two years commencing December 2021. This showed that, among the 2,628,022 eligible Takaful families, there was significant uptake of health services. As of June 2023:

- 78,840 pregnant women received prenatal care
- 131,401 mothers visited paediatricians for child growth monitoring
- 735,846 women used family planning services
- 289,082 individuals accessed reproductive health services
- 1,261,450 utilised other miscellaneous health services

(MOSS, Takaful and Karama Unit, 2023).

Figure 10 shows a steady rise in the percentage of families visiting PHC centres, from 39% in December 2021 to 85% in June 2023. Moreover, there was an increase in the proportion of families visiting these centres three times or more, from 4% in 2021 to 34% in 2023.

Figure 10: Family visits to PHCs upon application of the Takaful program health conditionality component



Source: Ministry of Social Solidarity, Takaful and Karama Unit, 2023.

Recommendations for the Ministry of Social Security

RECOMMENDATION A

Implement a mid-term impact assessment study to evaluate the effectiveness of the Takaful CCT program on increasing health service utilisation and evaluate the role of health conditionalities by statistically quantifying the effect size for each condition.

RECOMMENDATION B

Collaborate with the Ministry of Health and Population (MOHP) to provide high-quality primary healthcare services, encompassing family planning and nutrition, to optimize the impact of increased utilization of health services by families (El-Enbaby et al., 2023).

RECOMMENDATION C

Reduce the emphasis on the Takaful Conditionality that mandates child health monitoring, until healthcare workers receive adequate training to accurately assess children's growth and provide nutritional guidance (El-Enbaby et al., 2023).

RECOMMENDATION D

Augment conditionalities with alternative approaches to ensure their net benefit lies in increased utilization of health services and ultimately enhanced population health outcomes. This can be accomplished through various means, such as reducing or subsidizing monetary costs (e.g., user fees) and addressing non-monetary barriers like negative staff attitudes (Forde at al., 2011).

RECOMMENDATION E

Present information related to health conditionalities in a manner that makes clear the user's entitlement to accessible, effective, and acceptable health services as a fundamental and enforceable right (Forde at al., 2011).

Limitations

The attribution of health outcomes to the financial component of cash transfer programs can be complex due to the potential for conditionality to act as a confounder influencing the outcomes. Moreover, these programs are not designed to facilitate separate evaluations. For example, evidence indicates that health education activities within the program can independently improve health service utilization beyond the financial incentive (Bassani et al., 2013).

The effectiveness of the health conditionality strategy relies on the availability of efficient primary health services and infrastructure in the targeted regions. Inadequate universal health insurance coverage and primary healthcare centres lacking electronic medical records may impede the ability to quantify the impact of health conditionalities.

7. DOMAIN 7

Environmental sustainability

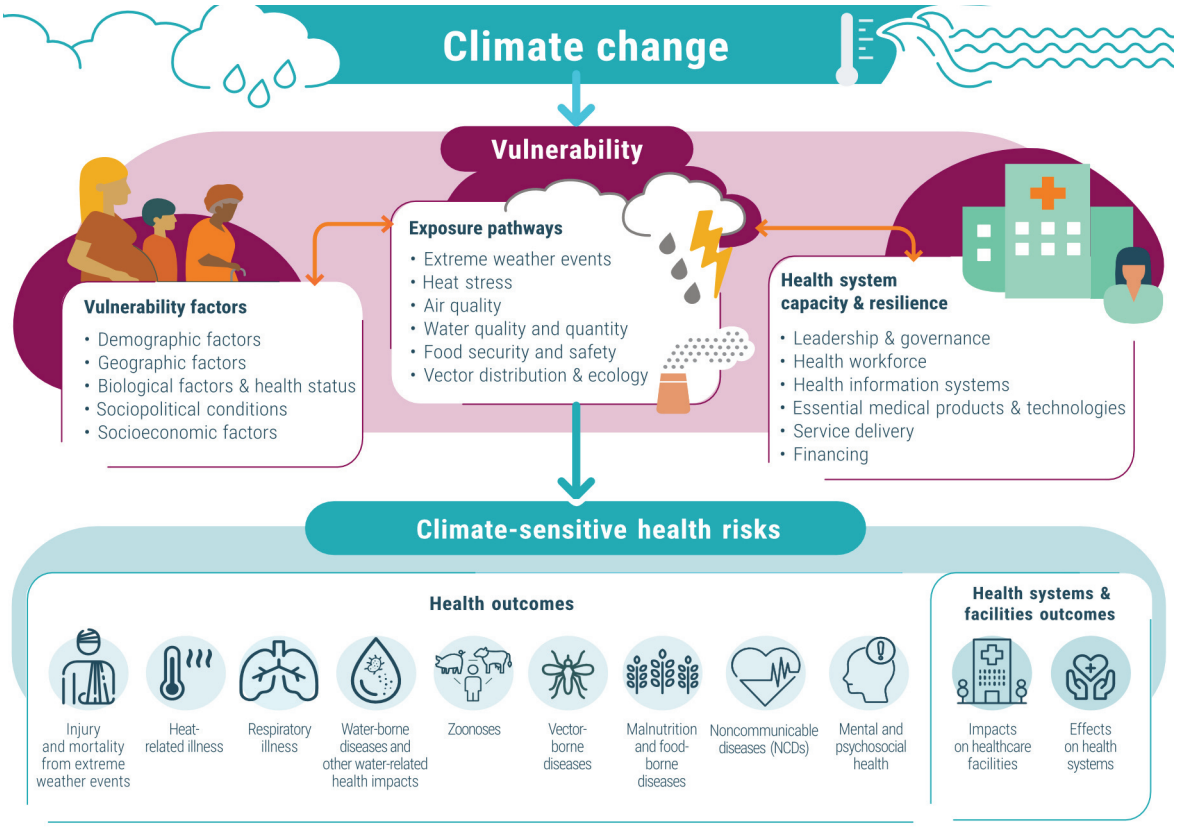
Climate change is defined as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (United Nations, 1992). It is recognized as a major global health threat, with human activities contributing to environmental pollution and loss of biodiversity. This leads to the emergence of new diseases and the redistribution of existing ones, challenging healthcare systems' ability to protect individuals (Paterson, 2014). Ecological and social elements interact through bidirectional interactions and feedback loops, affecting environmental resilience and sustainability (Gain et al., 2020).

Environmental hazards account for approximately 23% of the total burden of disease in the WHO Eastern Mediterranean Region, rising to about 30% in children. These hazards contribute to communicable diseases (19%), noncommunicable diseases (53%), and injuries (28%). Annually, about 1 million premature deaths in the region are attributed to unhealthy environments, with 50% linked to air pollution, while the rest is due to chemicals and other occupational exposures, lack of access to proper water and sanitation, and other environmental hazards (WHO, 2022b).

Climate or environmental resilience addresses the ability of a specific population or system to recover from a shock (Furze, 2022). The type of impacts outlined above can be mitigated by building climate-resilient health systems that prioritize risk reduction, preparation, response, and recovery.

Healthcare facilities in many countries in the region lack appropriate infrastructure, trained personnel, and energy supply, along with issues in water, sanitation, and waste management. Addressing these factors is crucial for building resilience and achieving environmental sustainability.

Figure 11: An overview of climate-sensitive health risks, their exposure pathways and vulnerability factors



Source: Adapted from WHO, 2023b.

The Egyptian context

In Egypt, environmental hazards contribute to the burden of non-communicable diseases, primarily driven by poorly controlled risk factors such as air pollution. Fine particulate matter ($PM_{2.5}$) can penetrate the lungs and bloodstream, leading to cardiovascular and respiratory diseases such as stroke, lung cancer, and COPD. Non-communicable diseases (NCDs) account for an estimated 82% of all deaths and 67% of premature deaths in Egypt.

Prenatal exposure to air pollution has been linked to child development issues and psychological problems like ADHD, anxiety, and depression, further straining the healthcare system (UNICEF, 2017). Understanding and addressing these environmental health challenges is essential for promoting sustainability and resilience in Egypt's healthcare sector.

Greater Cairo exhibits high levels of outdoor $PM_{2.5}$ pollution, with significant economic costs (estimate of EGP 47 billion, equivalent to 1.35% of GDP (Larsen B, 2019)).

In Egypt, environmental regulations and laws play a crucial role in addressing environmental hazards and promoting sustainability. However, gaps in enforcement and implementation may hinder their effectiveness. Examining these regulations and laws can provide insights into areas for improvement.

7.1 Sustainability and resilience

Environmental sustainability is an important pillar of overall health system sustainability. Key connections exist between pollution, climate change, poor waste management, and population health outcomes. For instance, air pollution significantly contributes to morbidity and mortality from non-communicable diseases in Egypt (World Bank, 2021). Moreover, water quality and sanitation issues are responsible for over 50% of diarrheal deaths (WHO, 2023c).

Healthcare facilities themselves also exert environmental pressures as generators of both general and hazardous waste. The necessity for improved healthcare waste management has been long recognised, with the Egyptian National Environmental Action Plan (2002/17) (Ministry of Environment, 2001) advocating strategies such as segregation, cleaner treatment technologies, and guidelines for clinics and hospitals. Achieving environmental sustainability across Egypt's healthcare system depends upon comprehensive policy measures, legal enforcement, infrastructure upgrades, and adequate financing. This national plan was revised and updated with the respect to the global recommendation in 2022 (Egypt National Climate Change Strategy (NCCS) 2050)[5].

7.1.1 Egyptian laws and regulations

Egypt has broad environmental policies aimed at regulating the environmental impact of industry. the environmental impact of industries. Among these regulations is the Environmental Law (Law 4 of 1994), which established the Environmental Affairs Agency (EEAA) to enforce requirements and procedures controlling land, air, and water pollution. This law mandates that companies involved in oil exploration, extraction, refinement, storage, and transport undergo environmental impact assessment procedures during their licensing process. Firms holding permits for oil and gas operations are required to maintain a register of information detailing their environmental impact, including regular testing and reporting on emissions, as well as implementing follow-up procedures and environmental safety measures. The law underwent amendments by law 9/2009 and partial amendments by law 105/2015, primarily consisting of terminology changes and the addition of new articles.

[5] Retrieved from https://beta.sis.gov.eg/en/media-center/strategies/egypt-national-climate-change-strategy-nccs-2050

Additionally, in October 2020, Egypt enacted the Waste Management Law (Law No.202 of 2020), on regulating waste management, excluding nuclear and radiological activities (regulated by Law No.7 of 2010). This law aims to establish integrated management of different types of waste, ensure safe disposal, reduce waste generation, promote reuse and recycling, and ensure appropriate treatment and final disposal methods that minimize harm to public health and the environment. The Egyptian Ministry of Health and Population has expressed its commitment to enhancing the climate resilience and environmental sustainability of its healthcare systems and facilities (WHO, 2022b). However, a significant challenge is the substantial gap between research needs and the funding priorities of health institutions and organizations.

Environmental studies have been prerequisites for obtaining licenses for healthcare facilities since 2010. An environmental impact assessment study identifies environmental factors that may be affected by the construction of the facility in the area, such as indoor air quality, noise, heat, etc., which could impact both workers and patients. It also assesses exterior and surrounding environmental challenges that the healthcare facility may encounter. A second environmental study is conducted after the healthcare facility begins operations.

7.1.2 Current assessment and reports

A World Bank report estimated that the combined effects of inadequate water, sanitation, air pollution, and hygiene on health cost Egypt approximately 2.5% of its GDP in 2016/2017 (Larsen, 2019).

In June 2023, the World Health Organization published the health and environment scorecard for Egypt, summarizing the state of health and environment (WHO, 2023c). The scorecard evaluates three main indicators (extent of the problem, health impact, and policies) across seven domains (air pollution, WASH, climate change, chemicals, radiation, occupational health, and healthcare facilities). Although the scorecard acknowledges the presence of relevant policies, it highlights that 27% of deaths from stroke and ischemic heart disease are attributable to air pollution, while 52% of deaths from diarrhoea are linked to unsafe drinking water, sanitation, and inadequate personal hygiene. Additionally, Egypt has the highest annual rate in the Eastern Mediterranean region of individuals of working age dying from diseases due to occupational risks – unfortunately, there is no comparable data on the environmental impact of healthcare facilities in health. The scorecard also notes the absence of a recently conducted climate change and health vulnerability and adaptation assessment, as well as the lack of a health national adaptation plan.

On the other hand, according to an international progress on climate action briefing published by the Office of European Parliamentary Research Service, Egypt was responsible for 0.73% of global greenhouse gas (GHG) emissions in 2019, and its emissions of 3.5 tonnes CO_2 equivalent per capita were below both the EU and global averages (European Parliamentary Research Service, 2022).

Egypt's hosting of the 2022 UN climate change conference (COP27) serves as evidence of its political intentions and commitment to enhancing the country's environmental credentials, and its transition to a low-carbon economy. The government has led several initiatives, starting with the National Strategy for Adaptation to Climate Change and Disaster Risk Reduction (Egyptian Government, 2011), and extending to the Environmental and Social Management Framework (ESMF) as part of the transformation of Egypt's healthcare system project (MOHP, 2018a). However, Egypt receives a medium overall rating in the Climate Change Performance Index, with mixed ratings across categories: very low for renewable energy, medium for climate policy, and high for greenhouse gas (GHG) emissions (European Parliamentary Research Service, 2022). Additionally, individual carbon footprints for healthcare facilities are unavailable. Only two hospitals with green accreditation (as described above) measure their carbon footprints, consequently, the carbon footprint of the whole healthcare system remains poorly understood.

In conclusion, extensive efforts are being made by the Egyptian government, in collaboration with various international organizations and key stakeholders, to achieve global environmental protection

targets and mitigate the risks and negative consequences of climate change. However, gaps persist in the implementation of regulations and policies due to the lack of a robust and comprehensive monitoring and evaluation system, integrated and consistent multisectoral procedures at various levels, and the need to build workforce capacity and efficiently manage financial resources.

7.1.3 Climate resilience and environmentally sustainable healthcare facilities and green hospital

Pollution emissions from healthcare facilities in Egypt constitute approximately 2% of total emissions. Although this percentage is relatively small, the Egyptian government aims to reduce it. Collaborating with WHO, the Ministry of Health and Population (MOHP) has initiated efforts to address the effects of climate change on the health sector by transitioning healthcare facilities to be more climate resilient and environmentally sustainable. This initiative commenced in six governorates: Cairo, Al-Sharkia, Damietta, Qena, Luxor, South Sinai, and notably, Sharm El-Sheikh. These selected governorates represent various climatic zones affected by climate change, including floods and extreme weather events. Three key activities were undertaken in the healthcare facilities of these governorates.

- Their resilience was assessed to ensure continued service provision even in adverse conditions.
- Vulnerability and adaptation assessments were conducted to understand their fragility and response to climate change. These assessments covered a range of aspects guided by WHO recommendations (WHO, 2020c) and included facility location, accessibility, and human resources.
- The carbon footprint of selected hospitals was measured for presentation at COP28.

In addition, vulnerability and adaptation assessments of communities in the six governorates were conducted to anticipate impacts on surrounding populations. Data collected from these assessments will be integrated into the national plan for climate change adaptation and utilized in drafting a health adaptation plan to mitigate expected health impacts. Furthermore, the MOHP is raising awareness among healthcare workers in climatically vulnerable zones about the impact of climate change on health and the potential spread of diseases in previously unaffected areas.

Recently, the General Authority for Healthcare Accreditation and Regulation (GAHAR) in Egypt has established guidelines for accrediting green hospitals. Presently, Egypt has two green hospitals: Shefaa Al-Orman Oncology Hospital, accredited by GAHAR, and Sharm El-Sheikh International Hospital, accredited by Excellence in Design for Greater Efficiencies (EDGE), which certifies resource-efficient and zero-carbon buildings. While these hospitals were accredited for their green operational practices, the new Magdi Yacoub Global Heart Centre, still under construction, has attained a Leadership in Energy and Environmental Design (LEED) certificate, signifying its design aligns with environmental sustainability goals. Moreover, the Ministry of Environment may provide incentives to hospitals transitioning to greener operations, such as waste treatment devices or solar panels.

7.1.4 Waste management

According to Law 192/2001, infectious, chemical, and radiological wastes are classified as hazardous, and the government has developed specific strategies for their management and disposal. Conversely, non-medical general waste is subjected to fewer regulations and is typically disposed of through agreements with waste management companies.

Law 202/2020 mandates that any new medical facility, hazardous waste transportation facility, and waste disposal company must comply with new licensing regulations, while existing facilities must adhere to regulations during license renewal to avoid termination. Recently, the Waste Management Regulatory Authority (WMRA) and Egyptian Environmental Affairs Agency (EEAA) have conducted joint audits of hospitals to ensure maintenance of their waste management systems.

The WMRA, established by Law 202/2020, mandates that each healthcare facility must implement an integrated management system for hazardous waste disposal. They are required to classify hazardous waste and contract with licensed institutions and companies specializing in hazardous waste management, registered with WMRA, for disposal. The disposal of radiological waste is subject to stricter regulations, guided by recommendations from the Egyptian Atomic Energy Authority.

Healthcare leaders in the private sector have raised concerns about the high costs associated with incinerators, which are predominantly found in governmental hospitals. These high costs have resulted in illegal waste disposal practices, with estimates indicating that up to 50% of hazardous waste is improperly disposed of, despite existing regulations. Moreover, incinerators contribute to pollution by releasing various carcinogenic emissions, particularly improper incinerators emitting persistent organic pollutants. Consequently, the Ministry of Environment and the MOHP have expressed their intent to collaborate with the private sector for hazardous waste disposal, ensuring compliance with ministry regulations.

Another challenge facing healthcare facilities is the absence of comprehensive occupational health records documenting physical incidents and chemical exposures among healthcare workers. Additionally, there is a lack of awareness among healthcare workers about the proper use of disinfectants, as evidenced during the COVID-19 pandemic when prohibited chemicals were mistakenly used. Furthermore, there were problems with the disposal of large volumes of medical waste and face masks during COVID-19, underscoring a lack of awareness among patients and their families regarding appropriate waste disposal protocols.

7.1.5 Antimicrobial resistance surveillance

Egypt joined the Centres for Disease, Control and Prevention (CDC) in 2016, involving 39 MOHP hospitals and their affiliates to implement smart surveillance for hospital-acquired infections, focusing on ICU and surgical suite infections. The initiative used antibiograms (tables showing the susceptibility of various organisms to different antimicrobials) for microorganisms present in hospitals. It also included those prevalent in the community to distinguish between hospital-acquired and community-acquired infections. During the assessment of the surveillance, it was observed that antimicrobial resistance (AMR) was increasing, prompting further investigation into resistance patterns among various microorganisms.

The MOHP, in collaboration with the Veterinary Medicine in the Ministry of Agriculture, undertook an evaluation of antibiotic use in animals to develop a unified National Action Plan for Antimicrobial Resistance (2018–2022) (MOHP & WHO, 2018). However, the assessment did not initially include soil and water environmental elements. Subsequently, the MOHP recommended evaluating air quality in healthcare facilities and investigating resistance patterns within plumbing systems. Additionally, the implementation of surveillance for AMR stewardship (programs to promote the appropriate use of antimicrobials) in inpatient care was deemed imperative.

Several challenges impede the effectiveness of AMR surveillance efforts. The limited participation of governmental hospitals – only 39 out of 68 – undermine the validity of the results. Antibiotic misuse and the absence of regulations governing antibiotic usage in the community have contributed to high levels of resistance. Additionally, outpatient AMR stewardship surveillance requires a lengthy period, emphasizing the need for robust mechanisms to assess AMR alongside inpatient surveillance. This is particularly crucial in the community context, where antibiotics are sometimes dispensed over the counter, without physician prescriptions.

7.1.6 One Health National Strategy

In 2009, Egypt put its first Egyptian Influenza Pandemic Plan – established in 2007 – to the test during the H1N1 pandemic response (MOHP, 2018b). From 2011 to 2016, a collaborative committee addressing the influenza pandemic was established involving the MOHP, the Ministry of Agriculture, WHO, and the Food and Agriculture Organisation of the United Nations (FAO) (the 4-way linking). However, in 2018/2019, the MOHP shifted its focus from pandemics to a more comprehensive approach that encompassed all related diseases under the One Health concept.

Although, the COVID-19 pandemic delayed the release of this plan, in April 2023, Egypt introduced the "One Health National Strategic Framework 2023–2027" as a joint action plan for the One Health approach involving the Ministries of Health and Population, Agriculture and Land Reclamation, and Environment. This initiative, in collaboration with WHO, FAO, and the FAO in Egypt, aims to unify efforts across sectors (MOHP, 2023). Same ref as that in the source below figure 10. The five themes of the framework are depicted in Figure 12.

Figure 12: Themes of National One Health Strategic Framework

The framework stresses the importance of political commitment and national ownership, along with legislation that facilitates environmental inclusion, budget allocation, and endorsement. Active engagement of all relevant sectors at every level is highlighted in the planning, design, and execution of One Health-related programs. This entails strengthening the workforce and adopting a community-centred approach to ensure community involvement in all stages of program development and implementation. Additionally, a gender- and vulnerability-sensitive approach is emphasized. It also highlights the importance of partnerships with civil society organizations and experts in relevant fields (WHO Eastern Mediterranean Region, 2022b).

Effective coordination under the One Health approach can strengthen health system sustainability by reducing the burden of zoonotic, vector-borne, and foodborne diseases, as well as monitoring and mitigating environmental and occupational health hazards. The full implementation of Egypt's One Health strategy has the potential to improve health outcomes and system efficiency through preventive and proactive approaches aligned with ecological realities. However, realizing this potential will require overcoming challenges such as bureaucratic silos, governance complexities, data limitations, and financial constraints across the agencies involved.

The MOHP has a surveillance system for 42 human diseases, including zoonotic diseases. Central laboratories are also included in the system. The current system was launched in 2012 and became fully operational as an online portal accessible to all MOHP hospitals in 2016. However, not all institutions, including some private, police, and military hospitals, use the system, potentially leading to underreporting. The Ministry of Agriculture's veterinary medicine sector carries out surveillance

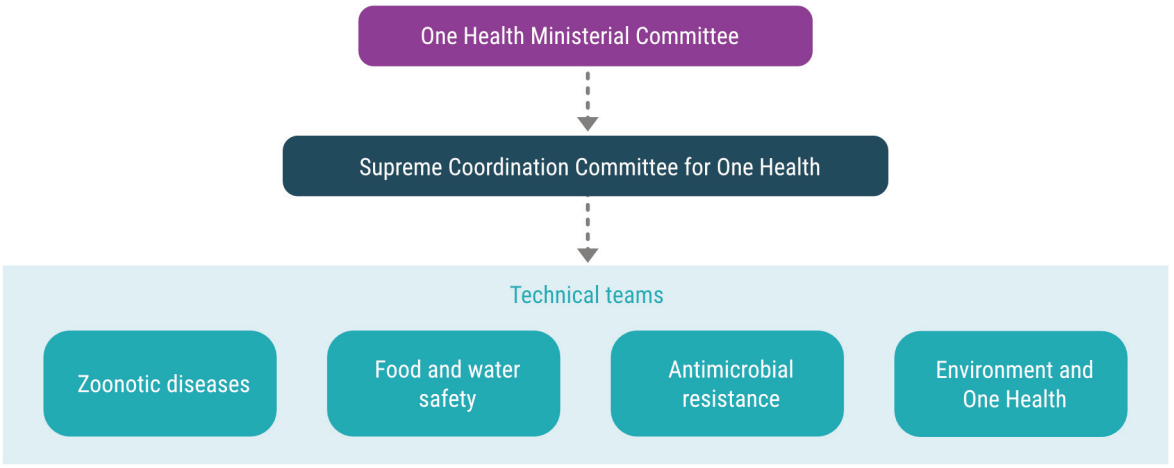
for animal diseases and vector populations, maintaining an updated map of vectors, particularly mosquitoes. The two ministries share specific data when there is a high incidence of a particular disease. In the event of an outbreak, the government notifies WHO. The One Health approach aims to integrate these surveillance systems by 2025/26 to facilitate data sharing between the ministries and integrate the Ministry of Environment.

The operational directions within the One Health framework are provided through seven technical pillars (Figure 13), ensuring system integration under the five themes illustrated in Figure 10. The most challenging pillar, according to experts, is surveillance, primarily due to data sharing challenges. To address this, the ministries are delegating authority to the One Health team to request specific necessary data.

Figure 13: Technical pillars of the One Health National Strategic Framework

A national multi-sectoral group of representatives from various ministries has been proposed, with the One Health Ministerial Committee serving as the highest level of oversight, decision-making, and policy adoption, while technical teams provide feedback and evaluate One Health activities (Figure 14). The committee is currently drafting a five-year operational strategy.

Figure 14: Proposed governance structure for One Health



While there is a clear and comprehensive plan in place, experts highlight challenges that may hinder meeting targets on time, such as resource scarcity and the need to account for Egypt's large population and geographic expanse. Funding from NGOs or UN organizations may be limited to the initial project phase without clear plans for sustaining resources to expand initiatives nationwide.

7.2 Recommendations

RECOMMENDATION 7A

Systematizing the collection of data concerning the environmental impact of healthcare facilities, setting practical objectives and goals, and launching reward and punishment mechanisms for those who succeed or fail to meet the carbon footprint targets.

RECOMMENDATION 7B

Lobbying on all levels to raise the priority of the healthcare system's environmental resilience and sustainability in the national budget setting.

RECOMMENDATION 7C

Raising awareness of healthcare professionals on health and environmental sustainability, occupational hazards and proper waste disposal through training and education in all governorates.

RECOMMENDATION 7D

Setting clear policies and regulations for data sharing among departments and ministries. These policies should be added with the assistance of several ministries, so that each can add their perspectives and identify their constraints.

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References

Abdelghani MJ28 et al. (2021). Exploring the factors associated with coronaphobia among physicians during the COVID-19 outbreak in Egypt, *The Egyptian Journal of Neurology, Psychiatry and Neurosurgery* 57, 105. https://doi.org/10.1186/s41983-021-00357-6.

Abdelhafiz AS et al. (2020) Prevalence, associated factors, and consequences of burnout among Egyptian physicians during COVID-19 pandemic, *Frontiers in Public Healt*h 8. https://doi.org/10.3389/fpubh.2020.590190.

Abdelkawy K et al. (2023). Changes in dietary habits during Covid-19 lockdown in Egypt: the Egyptian COVIDiet study, *BMC Public Health* 23(1). https://doi.org/10.1186/s12889-023-15777-7

Abo Ghanema MH et.al. (2023). Developing an occupational Work-related Safety Guideline for Nurses Working at General Intensive Care Units, *Egyptian Journal of Health Care* 14(2): 425–445. https://doi.org/10.21608/ejhc.2023.297444

AboKresha S, Abdelkreem E and Ali R (2021). Impact of COVID-19 pandemic and related isolation measures on violence against children in Egypt, *Journal of the Egyptian Public Health Association* 96(1). https://doi.org/10.1186/s42506-021-00071-4

Aboulghate M et al. (2021). The burden of obesity in Egypt, *Frontiers in Public Health*, 9. https://doi.org/10.3389/fpubh.2021.718978

Abu El Sood H et al. (2021). The impact of implementing the Egypt pandemic preparedness plan for acute respiratory infections in combating the early stage of the COVID-19 pandemic, February–July 2020: Viewpoint. *JMIR Public Health and Surveillance* 7(5), e27412. https://doi.org/10.2196/27412

Abu-Elenin MM et al. (2022). Domestic violence against married women during the COVID-19 pandemic in Egypt, *BMC Women's Healt*h 22(1). https://doi.org/10.1186/s12905-022-01674-5

Ahmed Y, Ramadan R, Sakr MF (2021). Equity of health-care financing: a progressivity analysis for Egypt, *Journal of Humanities and Applied Social Sciences* 3(1): 3–24. https://doi.org/10.1108/JHASS-08-2019-0040

Ahram Online (2013). Work-related injuries, deaths under-reported in Egypt: experts. *Ahram Online*. https://english.ahram.org.eg/NewsContent/3/12/70417/Business/Economy/Workrelated-injuries,-deaths-underreported-in-Egyp.aspx

Alamrawy RG, Fadl N and Khaled A (2021). Psychiatric morbidity and dietary habits during COVID-19 pandemic: a cross-sectional study among Egyptian Youth (14–24 years), *Middle East Current Psychiatry* 28(1). https://doi.org/10.1186/s43045-021-00085-w

Arafa A et al. (2021). Psychological impacts of the COVID-19 pandemic on the public in Egypt, *Community Mental Health Journal* 57(1): 64–69. https://doi.org/10.1007/s10597-020-00701-9

Assaad R et al. (2022). *Egypt COVID-19 Country Case Study*. International Labour Organization, Economic Research Forum. www.ilo.org/wcmsp5/groups/public/—-africa/—-ro-abidjan/—-sro-cairo/documents/publication/wcms_838226.pdf

Bashir A et al. (2020). Community pharmacists' perceptions, awareness and practices regarding counterfeit medicines: a cross-sectional survey in Alexandria, Egypt. *East Mediterranean Health Journal* 26(5): 556–564. https://doi.org/10.26719/emhj.19.058

Basiony B & Ahmed R (2023). Intent to migrate among nurses in selected hospitals at Beni Suef Governorate: pushing and pulling factors, *Assiut Scientific Nursing Journal* 11(37): 165–174. https://doi.org/10.21608/asnj.2023.214532.1604.

Bassani DG et al. (2013). Financial incentives and coverage of child health interventions: a systematic review and meta-analysis, *BMC Public Health* 13(Suppl 3): S30. https://doi.org/10.1186/1471-2458-13-s3-s30

Bassiouny MR & Elhadidy AR (2022). Continuing professional development system for healthcare professions, Egypt. *Bulletin of the World Health Organisation* 100, 402–408. https://doi.org/10.2471/blt.22.287963

Breisinger C et al. (2018). *Egypt's Takaful and Karama Cash Transfer Program: Evaluation of Program Impacts and Recommendations. IFPRI Policy Brief.* Washington DC, USA: International Food Policy Research Institute. https://doi.org/10.2499/9780896295964

CAPMAS (2022a), Press release: International day of older persons. www.capmas.gov.eg/Admin/News/PressRelease/2022929134228_333.pdf

CAPMAS (2022b). *Egypt Family Health Survey 2021*. https://censusinfo.capmas.gov.eg/Metadata-en-v4.2/index.php/catalog/665/overview

CAPMAS (2023). *Births and Deaths (Analytical Report)*. www.capmas.gov.eg/Pages/Publications.aspx?page_id=5104&YearID=23544

CCHE (website a). www.57357.org/en/cyberknife/technology

CCHE (website b). www.57357.org/en/home-page

CEIC (database). Egypt Household Expenditure per Capita. www.ceicdata.com/en/indicator/egypt/annual-household-expenditure-per-capita

COVID-19 Vaccine Tracker (website). Egypt – 9 Vaccines Approved for Use in Egypt (last updated 2 December 2022). https://covid19.trackvaccines.org/country/egypt/

Decent Life Initiative (webpage). Decent Life Initiative. https://beta.sis.gov.eg/en/projects-initiatives/initiatives/decent-life-initiative

Domat C (2021). Egypt opens massive new pharmaceuticals facility. *Global Finance*. https://gfmag.com/news/egypt-opens-pharmaceuticals-facility

Dovlo D (2003). *The Brain Drain and Retention of Health Professionals in Africa.* Case Study prepared for a regional training conference on improving tertiary education in Sub-Saharan Africa: Things That Work! https://docplayer.net/10944515-The-brain-drain-and-retention-of-health-professionals-in-africa.html

Egypt Today (2019). Digitizing Health Information Exchange. *Egypt Today*. www.egypttoday.com/Article/15/71784/Digitizing-Health-Information-Exchange

Egypt Today (2022) World Health Organization lauds Egypt's 100 million Seha initiative. *Egypt Today* www.egypttoday.com/Article/1/119390/World-Health-Organization-lauds-Egypt%E2%80%99s-%E2%80%98100-Million-Seha%E2%80%99-initiative

Egyptian Drug Authority (2023). *Guideline on Dossier Requirements for Registration and Re-Registration*. www.edaegypt.gov.eg/media/ef3pm2sj/guideline-on-dossier-requirement-of-human-pharmaceutical-product_2.pdf

Egyptian Government (2011). *Egypt's National Strategy for Adaptation to Climate Change and Disaster Risk Reduction*. https://faolex.fao.org/docs/pdf/egy141200.pdf

Egyptian Health Council (2023). Tr*eatment Guidelines*. https://lms-staging.ehc.gov.eg/?redirect=0&lang=en

El Hadi M (2022). Digital healthcare supported by artificial intelligence with emphasis on Egypt. *Journal for the* Egyptian Society for Information Systems and Computer Technology 27: 5–17. مجلة الجمعية المصرية لنظم المعلومات وتكنولوجيا الحاسبات 27 ,5–17. https://doi.org/10.21608/jstc.2022.229890

El Hosseini DM et al. (2019). Health hazards, occupational safety measures and knowledge assessment among nurses exposed to chemotherapy drugs in Ain Shams University Hospitals, Egypt. *Egyptian Journal of Occupational Medicine* 43(3): 361–377. https://doi.org/10.21608/ejom.2019.47849

El Rabbat M et al. (2022). *Egypt: A Primary Health Care Case Study in the Context of the COVID-19 Pandemic*. Geneva: World Health Organization. https://iris.who.int/handle/10665/366314?&locale-attribute=de

El Refay ASE-S et al. (2021). Sleep quality and anxiety symptoms in Egyptian children and adolescents during COVID-19 pandemic lockdown, *Bulletin of the National Research Centre* 45, 134. https://doi.org/10.1186/s42269-021-00590-2

El-Enbaby H et al. (2023) *Egypt's Takaful Cash Transfer Program: Impacts and Recommendations from the Second Round Evaluation*. IFPRI Policy Brief. Washington DC, USA: International Food Policy Research Institute. https://doi.org/10.2499/9780896294387

El-Mazary A & Okaily N (2022). The Egyptian Health Council: A step forward in the right way. *Annals of Neonatology* 4(2): 1–8.

El-Saadani S, Saleh M, Ibrahim SA (2021). Quantifying non-communicable diseases' burden in Egypt using State-Space model. *PLoS One* 16(8): e0245642. https://doi.org/10.1371/journal.pone.0245642

El-Sayed RS et al. (2023) Impact of burnout on self-reported patient care among resident physicians in Suez Canal university hospitals, T*he Egyptian Journal of Hospital Medicine* 91(1): 4945–4951. https://doi.org/10.21608/ejhm.2023.301770.

El-Shafie A.et al. (2020). Prevalence of short stature and malnutrition among Egyptian primary school children and their coexistence with Anemia, *Italian Journal of Pediatrics* 46, 91. https://doi.org/10.1186/s13052-020-00855-y

El-Sokkary at al. (2021). Compliance of healthcare workers to the proper use of personal protective equipment during the first wave of the COVID-19 pandemic. *Journal of Infection and Public Health* 14(10): 1404–1410. https://doi.org/10.1016/j.jiph.2021.07.017

eHealth (website). Embracing Digital Agility for Better Results. https://ehealth.com.eg

Elareed HR et al. (2023). Public opinion towards COVID-19 vaccination in Egypt, *The Egyptian Journal of* Community Medicine 41(1): 27–35. https://doi.org/10.21608/ejcm.2022.135572.1214

Elkayal MM, Shahin MAH and Hussien RM (2022). Psychological distress related to the emerging COVID-19 pandemic and coping strategies among the general population in Egypt, *Journal of the Egyptian Public Health Association* 97(1). https://doi.org/10.1186/s42506-021-00100-2

Elkholy H et al. (2021). Mental health of frontline healthcare workers exposed to COVID-19 in Egypt: A call for action, I*nternational Journal of Social Psychiatry* 67(5): 522–531. https://doi.org/10.1177/0020764020960192

Elsayed O & Anwar W (2015). *Governance in Healthcare System – Case Study from Egypt*. Fourth Global Conference on Public Policy and Administration in the Middle East, Cairo, Egypt.

Elsayed R (2023). The road to Universal Health Coverage in Egypt: New expectations and hopes. International Health Policies. www.internationalhealthpolicies.org/featured-article/the-road-to-universal-health-coverage-in-egypt-new-expectations-and-hopes

Essam El-Din G (2021). Egypt's parliament approves bill establishing a fund to spend on medical emergency services, *Ahram Online*. https://english.ahram.org.eg/NewsContent/1/64/413278/Egypt/Politics-/Egypts-Senate-approves-new-bill-establishing-a-fun.aspx

European Parliamentary Research Service (2022). International Progress on Climate Action. European Parliamentary Research Service. www.europarl.europa.eu/RegData/etudes/BRIE/2022/733598/EPRS_BRI(2022)733598_EN.pdf

Fasseeh A et al. (2022). Healthcare financing in Egypt: a systematic literature review. *Journal of the Egyptian Public Health Association* 97, 1. https://doi.org/10.1186/s42506-021-00089-8

Fathalla Y (2020). Coronavirus Exposes the Extreme Disparity between Rich and Poor in Egypt. LSE, Middle East Centre. https://blogs.lse.ac.uk/mec/2020/04/08/coronavirus-exposes-the-extreme-disparity-between-rich-and-poor-in-egypt

Fitch Solutions (2019). *Egypt Pharmaceuticals & Healthcare Report*. https://nations-emergentes.org/wp-content/uploads/2019/02/egypt-pharmaceutical-survey.pdf

Forde I, Bell R and Marmot M (2011). Using conditionality as a solution to the problem of low uptake of essential services among disadvantaged communities: a social determinants view, *American Journal of Public Health* 101(8): 1365–1369. https://doi.org/10.2105/ajph.2011.300140

Fouad YA et al. (2014). Egyptian future physicians are packing to leave but may be willing to return, *International Health* 7(3): 190–194. https://doi.org/10.1093/inthealth/ihu072

Furze JN at al. (2022). *Earth Systems Protection and Sustainability Volume 2*. Switzerland: Springer Nature.

Gadalla M (2016). *Country Profile on Ageing: Egyptian Case Study*. United Nations, Department of Economic and Social Affairs, www.un.org/esa/socdev/ageing/documents/workshops/Vienna/egypt.pdf

GAHAR (website). www.gahar.gov.eg/page/p/%D9%85%D9%86-%D9%86%D8%AD%D9%86

GAHAR (2021). *GAHAR Handbook for Hospital Standards*. www.gahar.gov.eg/upload/gahar-handbook-for-hospital-standards-edition-2021-secured—1.pdf

Gain AK et al. (2020). Sustainability of complex social-ecological systems: methods, tools, and approaches. *Regional Environmental Change* 20(10). https://doi.org/10.1007/s10113-020-01692-9

Gamal A, Barakat S, Rezk A (2021). Toward a universal electronic health record system (letter to editor – response from author). *Journal of Biomedical Informatics* 117: 103770. https://doi.org/10.1016/j.jbi.2021.103770

GBD 2019 Diseases and Injuries Collaborators (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet* 396(10258): 1204–1222. https://doi.org/10.1016/S0140-6736(20)30925-9

Gebba W (2023). Egypt opens hepatitis B and pentavalent vaccine production line. *Ahram Online* https://english.ahram.org.eg/NewsContent/1/1236/492405/Egypt/Health/Egypt-opens-hepatitis-B-and-pentavalent-vaccine-pr.aspx

General Organization for Export and Import Control (website). Ministry of Trade and Industry, Arab Republic of Egypt. www.goeic.gov.eg/en

Gericke CA, Britain K, Elmahdawy M, Elsisi G (2018). Health System in Egypt. In: van Ginneken E, Busse R (eds) Health Care Systems and Policies. *Health Services Research*. New York, NY: Springer. https://doi.org/10.1007/978-1-4614-6419-8_7-1

Ghazawy ER et al. (2020). Psychological impacts of COVID-19 pandemic on the university students in Egypt, *Health Promotion International* 36(4): 1116–1125. https://doi.org/10.1093/heapro/daaa147

Ghweeba M et al. (2022). The attitudes of Egyptian web-based health information seekers toward health information provided through the internet: qualitative study. *JMIR Formative Reearch* 6(2): e30108. https://doi.org/10.2196/30108

Goodyear-Smith, F. et al. (2022) 'International examples of primary care COVID-19 preparedness and response: a comparison of four countries,' *Family Medicine and Community Health* 10(2), p. e001608. https://doi.org/10.1136/fmch-2022-001608

Grifols Egypt (website). www.grifolsegyptplasma.com/en/home

Haidar J (2022). How did Egypt soften the impact of Covid-19? In: Arezki R, Djankov S and Panizza U. *Shaping Africa's Postcode Recovery*. https://scholar.harvard.edu/files/haidar/files/how_did_egypt_soften_the_impact_of_covid-19-.pdf

Hashish EAA & Ashour HMA (2020). Determinants and mitigating factors of the brain drain among Egyptian nurses: a mixed-methods study, *Journal of Research in Nursing* 25(8): 699–719. https://doi.org/10.1177/1744987120940381.

Hassanin A et al. (2021). Egypt's ambitious strategy to eliminate hepatitis C virus: a case study, *Global Health, Science and Practice* 9(1): 187–200. https://doi.org/10.9745/ghsp-d-20-00234

Health Affairs (2022). Value-based Payment as a Tool to Address Excess US Health Spending, *Health Affairs Research Brief*. www.healthaffairs.org/do/10.1377/hpb20221014.526546

Hossny et al. (2022). Management of the COVID-19 pandemic: challenges, practices, and organizational support. *BMC Nursing* 21, 196 https://doi.org/10.1186/s12912-022-00972-5

IHME – Institute for Health Metrics and Evaluation (database). *Egypt*. www.healthdata.org/research-analysis/health-by-location/profiles/egypt

Insights10 (2022). *Egypt Artificial Intelligence in Healthcare Market Report 2022 to 2030* [updated May 2023]. www.insights10.com/report/egypt-artificial-intelligence-ai-in-healthcare-market-analysis

Insights10 (2023). *Egypt Pharmaceutical Market Analysis Report 2022 to 2030* [updated 4 October 2023]. www.insights10.com/report/egypt-pharmaceutical-market-analysis

International Diabetes Federation (2021). *IDF Diabetes Atlas, 10th edition*. Brussels, Belgium. https://diabetesatlas.org/atlas/tenth-edition

Investing.com (website). USD EGP Historical Data, 2023. www.investing.com/currencies/usd-egp-historical-data

JSI (2023). Awareness on the Importance of Family Planning through 'Their Dream Starts with You' Mass Media Campaign. www.jsi.com/resource/raising-awareness-on-the-importance-of-family-planning-through-their-dream-starts-with-you-mass-media-campaign

Kabbash IA et al. (2021). The brain drain: why medical students and young physicians want to leave Egypt, *Eastern Mediterranean Health Journal* 27(11): 1102–1108. https://doi.org/10.26719/emhj.21.050.

Khader Y at al. (2023). Strengthening primary healthcare in Jordan for achieving universal health coverage: a need for family health team approach. *Healthcare* 11(22): 2993. https://doi.org/10.3390/healthcare11222993

Khalifa A at al. (2022). Purchasing health services under Egypt's new universal health insurance law: What are the implications for universal health coverage? *International Journal of Health Planning and Management* 37: 619–631. https://doi.org/10.1002/hpm.3354

Khalifa A et al. (2023). Egypt's initiative to eliminate waiting lists: an assessment of its impact on health, economy, and financial protection of Egyptian households (abstract). International Health Economics Association congress.

Larsen B (2019). *Arab Republic of Egypt: Cost of Environmental Degradation*. The World Bank. https://openknowledge.worldbank.org/entities/publication/0f982bee-6368-5895-a501-75f8dabfefcf

Loza N & Sorour E (2016). Brain drain: the issues raised for Egypt by the emigration of psychiatrists, *BJPsych International* 13(3): 59–61. https://doi.org/10.1192/s2056474000001239.

Ministry of Communications and Information Technology (2009). *Business Monitor International Report: Egypt IT Market on the Rise.* https://mcit.gov.eg/en/Media_Center/Latest_News/News/625.

Ministry of Environment (2001). *The National Environmental Action Plan of Egypt 2002/17*. www.eeaa.gov.eg/Uploads/Reports/Files/20221113130533437.pdf

MOHP (2017). *Egypt National Multisectoral Action Plan for Prevention and Control of Noncommunicable Diseases 2017–2021 (EgyptMAP-NCD)*. https://extranet.who.int/nutrition/gina/sites/default/filesstore/EGY%202017%20NCDMAPEgypt21March2017%20FINAL%20%20RS_0.pdf

MOHP (2018a). *Transforming Egypt's Healthcare System Project*. Ministry of Health and Population, Egypt.

MOHP (2018b). *Preparedness Plan for Influenza Pandemic*. www.emro.who.int/images/stories/csr/documents/nippp-egypt-_english_final_dec_2018.pdf?ua=1

MOHP (2023a). *Strategic directions, Framework for health in Egypt 2023–2030 for Community dialogue* (Internal document).

MOHP (2023b). Public Health Initiatives and Policies Sector. Unpublished reports in Arabic

MOHP et al. (2023). *One Health National Strategic Framework*. Ministry of Health and Population, Ministry of Agriculture and Land Reclamation, Ministry of Environment, Ministry of Higher Education and Scientific Research, Ministry of Local Development, Egyptian Drug Authority, National Food Safety Authority, World Health Organization, & Food and Agriculture Organization of the United Nations www.sis.gov.eg/Story/178823/Egypt-Launches-One-Health-National-Strategic-Framework?lang=en-us

MOHP, El-Zanaty Associates, ICF International (2015). *Egypt Demographic and Health Survey 2014*. Cairo, Egypt and Rockville, Maryland, USA: Ministry of Health and Population and ICF International.

MOHP, El-Zanaty Associates, ORC Macro (2003). Overview of the health system in Egypt. In: *Egypt Service Provision Assessment Survey 2002*. Calverton, Maryland. https://dhsprogram.com/pubs/pdf/SPA5/SPA5.pdf

MOHP & WHO (2018). *National Action Plan for Antimicrobial Resistance 2018–2022*. https://faolex.fao.org/docs/pdf/egy204655E.pdf

Ministry of Planning, Monitoring and Administrative Reform (2016). *Sustainable Development Strategy: Egypt Vision 2030*. Cairo, pp 157– 170. https://faolex.fao.org/docs/pdf/egy216331E.pdf

Ministry of Planning, Monitoring and Administrative Reform (website). Sustainable Development Strategy: Egypt Vision 2030 | Reports. http://sdsegypt2030.com/category/reports-en/?lang=en

MOSS (2022). Waai Community Development Program organizes the fourth edition of a workshop entitled "For Development and a Decent Life". www.moss.gov.eg/ar-eg/Pages/news-details.aspx?nid=2751

MOSS, Takaful and Karama Unit (2023). Internal report reviewed by research team.

Morgantini L et al. (2020). Factors contributing to healthcare professional burnout during the COVID-19 pandemic: a rapid turnaround global survey, *PLOS ONE*, 15(9): e0238217. https://doi.org/10.1371/journal.pone.0238217

Mosallam R et al. (2015). Turnover intention among intensive care unit nurses in Alexandria, Egypt, *Journal of the Egyptian Public Health Association* 90(2): 46–51. https://doi.org/10.1097/01.epx.0000464696.41556.eb

Moustafa N at al. (2022). Education 2.0: a vision for educational transformation in Egypt. In: Reimers FM et al. (eds) *Education to Build Back Better*. Cham: Springer, pp. 51–74. https://link.springer.com/chapter/10.1007/978-3-030-93951-9_3

Mursi MFM, Salama MA, Galal SE (2021). Towards a secure e-health system for public healthcare sector in Egypt using HL7. *Mansoura Engineering Journal* 46(2): 11–22. https://doi.org/10.21608/bfemu.2021.176376

Nature Middle East (2020). Egypt's health system problems laid bare. *Nature Middle East* www.natureasia.com/en/nmiddleeast/article/10.1038/nmiddleeast.2020.72

Neelsen S et al. (2021). *Financial Incentives to Increase Utilization of Reproductive, Maternal, and Child Health Services in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis*. Policy Research Working Paper, World Bank. https://doi.org/10.1596/1813-9450-9793

Omar DI, Hani BM, Abd-Ellatif EE (2021). Burnout among physicians in Egypt during COVID-19 pandemic, *The Egyptian Journal of Hospital Medicine* 82(4): 599–608. https://doi.org/10.21608/ejhm.2021.150385.

Omar SS et al. (2021). Psychological and sexual health during the COVID-19 pandemic in Egypt: are women suffering more? *Sexual Medicine* 9(1): 100295. https://doi.org/10.1016/j.esxm.2020.100295

Paterson J et al. (2014). Health care facilities resilient to climate change impacts, *International Journal of Environmental Research and Public Health* 11(12): 11097–13116.

Saadawi ASE-S et al. (2020). Relationship between workplace violence and turnover intention among staff nurses at EL-Fayoum University Hospitals, *Egyptian Journal of Health Care* 11(4): 1341–1353. https://doi.org/10.21608/ejhc.2020.274803.

Said N at al. (2019). Occupational Health and Safety Implementation Issues in Egypt / مشكلات تطبيق الصحة والسلامة المهنية في مصر. Papers, Posters, and Presentations. https://fount.aucegypt.edu/studenttxt/79

Saleh BM (2023). *Cognitive Assessment of Health-care Workers Exposed to Ionizing Radiation and the Assessment of Radiation Safety Awareness in Different Radiation Oncology Hospitals in Egypt.* AUC Knowledge Fountain, theses and dissertations. https://fount.aucegypt.edu/etds/2033.

Sayed MHE (2022). Policies to Protect Healthcare Providers in Public Hospitals in Egypt Amid the First Wave Covid-19 Crisis: A Case Study. AUC Knowledge Fountain, theses and dissertations. https://fount.aucegypt.edu/etds/1933

Schumann M et al. (2019). Doctors on the move: a qualitative study on the driving factors in a group of Egyptian physicians migrating to Germany, *Globalization and Health* 15, 2. https://doi.org/10.1186/s12992-018-0434-x.

Selwaness I & Ehab M (2019). *Social Protection and Vulnerability in Egypt: A Gendered Analysis*. Economic Research Forum, Working Paper No. 1363. https://erf.org.eg/publications/social-protection-and-vulnerability-in-egypt-a-gendered-analysis

Serour GI (2009). Healthcare workers and the brain drain, *International Journal of Gynaecology & Obstetrics* 106(2): 175–178. https://doi.org/10.1016/j.ijgo.2009.03.035.

Shaker NM et al. (2021). Predictors of stress among a sample of Egyptian healthcare providers during the COVID-19 pandemic, *Middle East Current Psychiatry* 28(1). https://doi.org/10.1186/s43045-021-00164-y

Soliman S & Hopayian K (2019). Egypt: on the brink of universal family medicine, *The British Journal of General Practice*, 69(679): 182.

Stadelmann J (2012). A*ssessing Readiness for E-health in Egypt: A Case Study of Cairo University Hospitals.* Semantic Scholar. https://api.semanticscholar.org/CorpusID:68242125

State Information Service (2022a). Presidential Initiative to End Waiting Lists. www.sis.gov.eg/Story/173154/presidential-initiative-to-end-waiting-lists?lang=en-us

State Information Service (2022b). Egypt's Initiatives. www.sis.gov.eg/section/0/9539?lang=en-us

State Information Service (2023). The Minister of Health issued a decision banning smoking in all its forms in various health facilities. https://mediadr.sis.gov.eg/handle/123456789/29770

Sweed H (2014). Egypt aging population, *Egyptian Journal of Geriatrics and Gerontology* 1(1): 1–9. https://ejgg.journals.ekb.eg/article_5330_91475a5e3de06bf97c85610b30019a96.pdf

Taha T at al. (2023). A brief insight into the rare diseases in Egypt. *Journal of Rare Diseases* 2, 6. https://doi.org/10.1007/s44162-023-00010-1

Takaful & Karama Program (webpage). https://beta.sis.gov.eg/en/projects-initiatives/initiatives/takaful-karama-program

Talaat W & Hefny H (2023). Historical Milestones of Continuing Professional Development System for Health Professionals in Egypt. *Suez Canal University Medical Journal* 26, 9–19. https://doi.org/10.21608/scumj.2023.308720

The Africa Report (2023). Egypt: Brutal beatings, poor pay push doctors abroad in search of better jobs. *The Africa Report*. www.theafricareport.com/301563/egypt-brutal-beatings-poor-pay-push-doctors-abroad-in-search-of-better-jobs

The Arab Republic of Egypt Presidency (2019). The Universal Health Insurance Project. www.presidency.eg/en/المشاريع-القومية/المشروع-القومي-للتأمين-الصحي-الشامل

Thomas S et al. (2020). *Strengthening Health Systems Resilience: Key Concepts and Strategies (Policy Brief, No. 36)*. Copenhagen (Denmark): European Observatory on Health Systems and Policies. www.ncbi.nlm.nih.gov/books/NBK559803

Tobacco Control Laws (website). Legislation by country/jurisdiction, Egypt (last updated 2022). www.tobaccocontrollaws.org/legislation/egypt

United Kingdom (2023). Doctor training. *Hansard Parliamentary Debates (House of Commons)*, 726, cols 27–51. https://hansard.parliament.uk/commons/2023-01-17/debates/F6AFE6A8-00A8-4DAC-9A25-880C66969A87/DoctorTraining

UNICEF (2017). *Danger in the Air: How Air Pollution Can Affect Brain Development in Young Children*. New York: UNICEF, Division of Data, Research and Policy www.unicef.org/sites/default/files/press-releases/glo-media-Danger_in_the_Air.pdf

United Nations (1992). *United Nations Framework Convention on Climate Change*. Retrieved from the audiovisual library of international law: https://legal.un.org/avl/ha/ccc/ccc.html

United Nations Development Programme (2020). Ministry of Social Solidarity, UNDP Launch New Programme Tackling Social Protection Issues. https://egypt.un.org/en/36195-ministry-social-solidarity-undp-launch-new-programme-tackling-social-protection-issues

US Department of Health and Human Services (website). Social Determinants of Health https://health.gov/healthypeople/priority-areas/social-determinants-health

USAID (website). USAID/Egypt COVID-19 Response. www.usaid.gov/egypt/covid-19-response

Waked I (2022). Case study of hepatitis C virus control in Egypt: impact of access program, *Antiviral Therapy* 27(2): 135965352110675. https://doi.org/10.1177/13596535211067592

Werner RM et al. (2021). *The Future of Value-based Payment: A Roadmap to 2030 (White Paper)*. https://repository.upenn.edu/entities/publication/53dadd14-870d-4ab9-a470-0052e37a6cc4

Wise S at al. (2021). Paying for value: options for value-based payment reform in Australia, *Australian Health Review* 46(2): 129–133. www.publish.csiro.au/AH/AH21115

WHO (database). Health Expenditure Profile: Egypt. Global Health Expenditure Database. https://apps.who.int/nha/database/country_profile/Index/en

WHO (2012). *Egypt STEPS Survey 2011–11*. https://cdn.who.int/media/docs/default-source/ncds/ncd-surveillance/data-reporting/egpyt/steps/2011-2012-egypt-factsheet.pdf

WHO (2016). *Diabetes Egypt 2016 Country Profile*. www.who.int/publications/m/item/diabetes-egy-country-profile-egypt-2016.

WHO (2019). Burnout an "occupational phenomenon": International Classification of Diseases. *WHO Departmental News*. www.who.int/news/item/28-05-2019-burn-out-an-occupational-phenomenon-international-classification-of-diseases.

WHO (2020a). *Global Strategy on Human Resources for Health: Workforce 2030.* Geneva: WHO. www.who.int/publications-detail-redirect/9789241511131.

WHO (2020b). *Cancer Egypt Country Profile 2020*. https://cdn.who.int/media/docs/default-source/country-profiles/cancer/cancer-egy-2020.pdf

WHO (2022a). M*ental Health Atlas 2020 Country Profile: Egypt*. Technical document. https://cdn.who.int/media/docs/default-source/mental-health/mental-health-atlas-2020-country-profiles/egy.pdf?sfvrsn=4c708821_6&download=true

WHO (2022b). *Ambient (Outdoor) Air Pollution*. www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health

WHO (2020c). *WHO Guidance for Climate Resilient and Environmentally Sustainable Health Care Facilities*. Geneva: World Health Organization. www.who.int/publications/i/item/climate-resilient-and-environmentally-sustainable-health-care-facilities

WHO (2023a). *Hypertension Egypt Country Profile 2023*. www.who.int/publications/m/item/hypertension-egy-2023-country-profile

WHO (2023b). *Zero Regrets: Scaling up Action on Climate Change Mitigation and Adaptation for Health in the WHO European Region*. https://iris.who.int/bitstream/handle/10665/368161/WHO-EURO-2023-3198-42956-69520-eng.pdf?sequence=3

WHO (2023c). *Health and Environment Scorecard, Egypt*. https://cdn.who.int/media/docs/default-source/country-profiles/environmental-health/environmental-health-egy-2023.pdf

WHO, CAPMAS and MOHP (2017). *Egypt National STEPwise Survey for Non-communicable Diseases Risk Factors Report 2017*. https://cdn.who.int/media/docs/default-source/ncds/ncd-surveillance/data-reporting/egpyt/steps/egypt-national-stepwise-survey-for-noncommunicable-diseases-risk-factors-2017-report.pdf

WHO COVID-19 (2023). WHO Coronavirus Disease (COVID-19) Dashboard: Egypt. https://covid19.who.int/region/emro/country/eg

WHO Eastern Mediterranean Region (2016). Informal Expert Consultation on Health Professionals' Education, Cairo, Egypt, 3 June 2016. www.emro.who.int/health-workforce/meetings-events/informal-expert-consultation-on-health-professionals-education.html

WHO Eastern Mediterranean Region (2021). Egypt receives third batch of 1,766,400 AstraZeneca vaccines through the COVAX Facility. www.emro.who.int/media/news/egypt-receives-third-batch-of-1-766-400-astrazeneca-vaccines-through-the-covax-facility.html

WHO Eastern Mediterranean Region (2022a). Egyptian national regulatory authority reaches second highest level in WHO classification. www.emro.who.int/media/news/egyptian-national-regulatory-authority-reaches-second-highest-level-in-who-classification.html

WHO Eastern Mediterranean Region (2022b). Advancing the implementation of One Health in the Eastern Mediterranean Region. https://applications.emro.who.int/docs/Advancing-One-Health-D-eng.pdf

WHO Eastern Mediterranean Region (2023a). *Egypt National Health Accounts establishing an expenditure baseline to support Egypt's health care reform 2019/2020*. Cairo: WHO Regional Office for the Eastern Mediterranean, License: CC BY-NC-SA 3.0 IGO.

WHO Eastern Mediterranean Region (2023b). Egypt becomes the first country to achieve WHO validation on the path to elimination of hepatitis C. www.emro.who.int/media/news/egypt-becomes-the-first-country-to-achieve-who-validation-on-the-path-to-elimination-of-hepatitis-c.html

WHO Eastern Mediterranean Region (website). National essential medicines lists. www.emro.who.int/essential-medicines/publications/national-essential-medicines-list.html

WHO Global Health Observatory (database a). Global health estimates: Leading causes of DALYs. www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/global-health-estimates-leading-causes-of-dalys

WHO Global Health Observatory (database b). *Global health estimates: Leading causes of death* www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/ghe-leading-causes-of-death

WHO Health Emergencies Programme (website). WHO COVID-19 Dashboard. https://covid19.who.int

WHO Health Workforce Team (2023). *WHO Report on Global Health Worker Mobility*. Geneva: World Health Organization. www.who.int/publications/i/item/9789240066649

WHO Regional Office for Africa (2014). Health in All Policies Framework for Country Action www.afro.who.int/publications/health-all-policies-framework-country-action

World Bank (2021). *Supporting Pollution Reduction Efforts to Protect the Health of Egyptians and Spur Economic Recovery.* www.worldbank.org/en/news/feature/2021/04/22/supporting-pollution-reduction-efforts-to-protect-the-health-of-egyptians

World Bank (Data). Current health expenditure (% of GDP) – Egypt, Arab Republic. https://data.worldbank.org/indicator/SH.XPD.CHEX.GD.ZS?locations=EG

World Bank (DataBank). Population estimates and projections. https://databank.worldbank.org/source/population-estimates-and-projections.

World Bank (Gender Data Portal a). Life expectancy at birth (years). https://genderdata.worldbank.org/indicators/sp-dyn-le-00-in?groups=MEA&view=bar

World Bank (Gender Data Portal b). Prevalence of current tobacco use (% of adults). https://genderdata.worldbank.org/indicators/sh-prv-smok?groups=MEA&view=bar

World Bank (Gender Data Portal c). Prevalence of obesity (% of population ages 18+) https://genderdata.worldbank.org/indicators/sh-sta-ob-18-zs?geos=EGY&view=bar&year=2016

World Economic Forum (2018). *The Future of Jobs Report 2018.* www.weforum.org/publications/the-future-of-jobs-report-2018

Zhengchun He (2022). *Egypt Pharma Market*. www.linkedin.com/pulse/eygpt-pharma-market-zhengchun-harry-he