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المجلة الصحية لشرق المتوسط

La Revue de Santé de la Méditerranée orientale

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المجلة الصحية لشرق المتوسط

هى المجلة الرسمية التى تصدر عن المكتب الإقليمى لشرق المتوسط بمنظمة الصحة العالمية. وهى منبر لتقديم السياسات والمبادرات الجديدة في الصحة العامة والخدمات الصحية والترويج لها، ولتبادل الآراء والمفاهيم والمعطيات الوبائية ونتائج الأبحاث وغير ذلك من المعلومات، وخاصة ما يتعلق منها بإقليم شرق المتوسط. وهى موجهة إلى كل أعضاء المهن الصحية، والكليات الطبية وسائر المعاهد التعليمية، وكذا المنظمات غير الحكومية المعنية، والمراكز المتعاونة مع منظمة الصحة العالمية والأفراد المهتمين بالصحة فى الإقليم وخارجه.

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EST une revue de santé officielle publiée par le Bureau régional de l'Organisation mondiale de la Santé pour la Méditerranée orientale. Elle offre une tribune pour la présentation et la promotion de nouvelles politiques et initiatives dans le domaine de la santé publique et des services de santé ainsi qu'à l'échange d'idées, de concepts, de données épidémiologiques, de résultats de recherches et d'autres informations, se rapportant plus particulièrement à la Région de la Méditerranée orientale. Elle s'adresse à tous les professionnels de la santé, aux membres des instituts médicaux et autres instituts de formation médico-sanitaire, aux ONG, Centres collaborateurs de l'OMS et personnes concernés au sein et hors de la Région.

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Vol. 28 . 7 – 2022

Editorial

Research articles

Reviews

WHO event addressing public health priorities

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Monkeypox outbreak and response efforts in the Eastern Mediterranean Region

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Monkeypox (MPX) is a viral zoonotic disease that is endemic in some countries of Central and Western Africa. Since 1 January 2022, cases of MPX have been reported to WHO by 74 Member States across all 6 WHO regions. As of 21 July 2022, a total of 15 328 laboratory confirmed cases and 72 probable cases, including 5 deaths, have been reported to WHO (*1*). Most (11 638/15 328, 76%) of the laboratory-confirmed cases were reported by countries of the WHO European Region, 22% (3316/15 328) by the Region of the Americas, 2% (301/15 328) by the African Region, less than 1% (53/15 328) by the Western Pacific Region, less than 1% (18/15 328) by the Eastern Mediterranean Region (EMR) and less than 1% (2/15 328) by the Region of South-East Asia (*1*). All five deaths were reported by the African Region.

Due to this unforeseen widespread of MPX, WHO declared on 23 July 2022 that the global MPX outbreak represents a Public Health Emergency of International Concern (PHEIC) (*2*), signaling a stronger global response to MPX outbreak, which has spread to over 70 countries in just a few weeks.

Since 13 May 2022, a higher proportion of MPX cases has been reported by countries that previously had no documented monkeypox transmission. This is the first time that cases and sustained chains of transmission have been reported in countries without direct or immediate epidemiological links to West or Central Africa. Most of the confirmed cases have no travel history to Western or Central Africa, where the disease is endemic, but have travel history to non-endemic countries, mainly in Europe and North America. WHO assesses the risk in the European Region as high and at the global level as moderate, considering that this is the first time many monkeypox cases and clusters are reported concurrently in many countries in widely disparate WHO geographical areas, balanced against the fact that mortality has remained low in the current outbreak (*1*).

Most reported MPX cases, so far, have been identified while providing sexual health or other health care services in primary or secondary facilities and have involved mainly, but not exclusively, Men who have Sex with Men (MSM) (*1,3,4*). In general, human-to-human transmission of the MPX virus can occur through direct contact with infectious skin or lesions, including face-to-face or skin-to-skin contacts. In the current outbreak, transmission appears to be occurring primarily through close physical contact, including sexual contact (oral, vaginal, and anal) (*3*). More information is needed to better understand other possible modes of transmission such as contact with other body fluids (e.g. breastmilk, semen, vaginal fluid, amniotic fluid, or blood) and other less common transmission routes.

In the current outbreak, 95% of cases with available data are male, median age 34 years (IQR: 28-40) (*1,3*). Males between 18 and 44 years of age continue to be disproportionately affected by the outbreak, as they account for 77% of cases. Among cases with reported sexual orientation, 94% identified as MSM and among those with known HIV status, 59% were HIV-positive. Information about HIV status is not available for the majority of cases, and for those for which it is available, it is likely to be skewed towards those reporting positive HIV results. Of all reported types of transmission, sexual encounter was most commonly reported, accounting for 248 of 269 (92%) of all reported transmission events. Of all settings in which cases were likely exposed, the most common was party setting, involving sexual contacts and accounting for 27 of 59 (46%) of all likely exposure categories. The predominant route of transmission and risk factors in the EMR are not yet fully understood and require further information.

Many cases in the newly affected areas do not present with the classically described clinical symptoms of MPX (fever, swollen lymph nodes, followed by centrifugal rash). Among cases that reported at least one symptom, 68% presented with any rash, referring to one or more rash symptoms (systemic, oral, genital, or unknown location), 44% presented with fever, 27% with any lymphadenopathy, referring to either general or local lymphadenopathy (*1,3*). Generally, severity has been low, with few reported hospitalizations and no recorded death outside the endemic countries. Cases are usually mild and self-limited, and most people recover within a few weeks without treatment. Nonetheless, MPX virus may

cause severe disease in certain population groups (young children, pregnant women, immunosuppressed persons). Genomic sequencing of viral deoxyribonucleic acid (DNA) of the current outbreak of MPX virus is ongoing. Where available, preliminary data from polymerase chain reaction (PCR) assays indicate that the MPX virus detected is related to the West African clade (*1*).

In addition to enhanced collaboration with health authorities to prevent further spread of the disease, WHO/EMRO and its Member States have made notable progress in strengthening technical capacities to respond to MPX by leveraging lessons from the COVID-19 response, which has catalyzed more resilient health systems for preparedness and response to emergency events. For instance, through response to COVID-19, all 22 Member States in the Region now have the laboratory diagnostic and surveillance capacities to detect, investigate, and confirm MPX virus and provide other critical response interventions (*5*).

WHO continues to issue guidance to help countries enhance their surveillance, laboratory diagnosis, clinical care, infection prevention and control (IPC), and risk communication and community engagement (*4,6-10*) on MPX and other diseases (*11-13*). WHO is working closely with countries, institutions, and technical and financial partners, to strengthen early detection, preparedness, and response and to prevent further disease transmission.

Outcomes of the Emergency Committee

On 23 June 2022, the WHO convened the International Health Regulations (2005) Emergency Committee to discuss whether the current MPX situation constitutes a Public Health Emergency of International Concern (PHEIC) (*14*) and the committee advised that the outbreak did not constitute a PHEIC at that stage. However, the MPX outbreak has continued to grow thereafter and WHO reconvened the Emergency Committee on 21 July 2022 to review the latest data and make recommendations accordingly. On this occasion, the Committee was unable to reach a consensus on whether the outbreak represents a PHEIC.

Under the International Health Regulations (IHR), WHO is required to consider the following 5 elements in deciding whether an outbreak constitutes a PHEIC:

1. The information provided by countries – which in this case shows that this virus has spread rapidly to many countries that have not had cases before.
2. The 3 criteria for declaring a PHEIC under the IHR, which have been met.
3. The advice of the Emergency Committee, which in this case could not reach consensus.
4. Scientific principles, evidence, and other relevant information – which are currently insufficient and leave us with many unknowns.
5. The risk to human health, international spread, and the potential for interference with international traffic.

While WHO assesses the risk in the European Region as high and at the global level as moderate, there is also a clear risk of further international spread, although the risk of interference with international traffic remains low for the moment. For these reasons, WHO declared that the global MPX outbreak represents a PHEIC on 23 July 2022 (*2*).

Accordingly, WHO has made a set of temporary recommendations for 4 different groups of States Parties, based on their epidemiological situation, patterns of transmission, and capacities (*2*). All temporary recommendations are expected to be implemented in full respect of established principles of human rights, inclusion, and the dignity of all individuals and communities.

Situation and response in the Eastern Mediterranean Region

In the WHO EMR, 5 countries have reported 18 confirmed cases (United Arab Emirates: 13, Kingdom of Saudi Arabia: 2, Morocco: 1, Lebanon: 1, Qatar: 1) with no reported deaths as of 21 July 2022 (*1*). The regional office and country offices continue to closely monitor the situation, and to support regional coordination and information sharing with and between Member States and partners. The Regional Director has activated the incident management system for MPX, to effectively coordinate and support preparedness, readiness, and response activities for the outbreak at country and regional levels. At the same time, Member States have established their own multisectoral coordination mechanisms for comprehensive response, including case finding, contact tracing, laboratory investigation, isolation, clinical management, and implementation of IPC measures.

For instance, United Arab Emirates reported the first MPX case in a person who arrived from West Africa on 24 May 2022, and the country immediately took some public health measures to mitigate the outbreak and prevent further spread of the virus (*15*). These measures include the development of a national MPX epidemic plan, a risk assessment with periodic updates, active case finding, extensive contact identification and monitoring, strengthening of laboratory diagnostics, and ensuring the availability of IPC supplies and therapeutics for severe cases.

In the Kingdom of Saudi Arabia, the first MPX case was detected on 14 July 2022 in Riyadh in a person returning from outside the Kingdom (*16*). The Ministry of Health (MOH) stated that the case was under medical observation using the adapted health measures, in addition to contacts investigation. The country has been closely monitoring the situation, pledging to handle any detected cases transparently, highlighting its readiness to deal with any development of the disease. The MOH has called upon its citizens and residents to comply with the health guidelines, especially during travel, in cooperation with its official channels, and to contact the call center for any inquiries about the MPX disease.

WHO has extended technical support to priority countries in the Region for the development of their national case management guidance and testing protocols, followed by practical training. Through event-based surveillance, WHO, in collaboration with the Member States, can detect signals related to MPX and verify them in collaboration with the health authorities. Member States have been requested to report suspected, probable, and confirmed cases through the existing International Health Regulations (2005) channels (*6*), however, not all countries are currently reporting cases regularly.

Key WHO recommendations and way forward in EMR

In addition to the guidance and public health recommendations provided to Member States, WHO recommends that Member States:

- Continue to enhance and sustain early warning surveillance, contact tracing, isolation, and laboratory capacities to detect and confirm circulating MPX virus in the community, while sharing relevant data on suspected, probable, and confirmed cases with WHO in a timely manner. Rt-PCR and sequencing capacities for MPX should be maintained in all reference laboratories and essential test kits should be prepositioned.
- Adapt and strengthen care pathways with appropriate clinical management and IPC practices at health care facilities and in the community to prevent transmission and improve patient outcomes.
- Consider the context of the current multi-country outbreak of MPX and convene respective national immunization technical advisory groups to review available evidence and develop policy recommendations for the use of vaccines as relevant to the national context (*8*).
- Emphasize the importance of effective risk communication to raise awareness and prevent stigmatization.
- Ensure availability and accessibility of medical countermeasures (therapeutics and vaccines) under a research framework and regional/global collaboration and coordination to enhance the multi-country emergency response.

WHO/EMRO and its Member States are implementing comprehensive, evidence-based preparedness and response to control the current MPX outbreak. However, delayed or underreporting of suspected cases is of concern, considering the cultural sensitivities across the Region regarding the predominantly suspected and reported route of transmission, which is sexual contact among MSM. Risk communication and community engagement should be prioritized to reduce stigma and ensure that sexual and primary health care services are accessible and approachable to everyone affected. Further, due to the sensitivity of reporting a full list of sexual contacts, identification of all contacts of probable and confirmed cases has proven to be challenging to date, which may limit collective efforts in containing the virus and preventing further transmission across the Region.

WHO/EMRO is determined to provide full support to its Member States to tackle these challenges (*11-13*). As addressed in its *Vision 2023 Eastern Mediterranean Region: health for all by all: a call for solidarity and action* (*17*), success can be achieved by focusing on cross-cutting regional strategic priorities and transforming the way we address the challenges while upholding WHO's principles of the right to health and the responsibility of governments for the health of their people.

These approaches are completely applicable to strengthen preparedness and response to the current MPX outbreak, and essential to successfully control the spread of the virus in the Region. WHO, once again, would like to emphasize the importance of implementing the WHO/EMRO regional strategic priorities in countries – particularly active surveillance, timely information sharing, laboratory confirmation, enhanced IPC and case management, risk communication and community engagement, and regional solidarity in preventing, detecting, and containing the MPX outbreak.

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The impact of the COVID-19 pandemic on service delivery for noncommunicable diseases in the Eastern Mediterranean Region

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Abstract

Background: The COVID-19 pandemic has adversely affected the delivery of noncommunicable diseases (NCDs) services globally as health systems are overwhelmed by the response to the pandemic.

Aims: The World Health Organization (WHO) Regional Office for the Eastern Mediterranean conducted an assessment to evaluate the impact of COVID-19 on NCD-related services, programmes, funding and consideration of NCDs in COVID-19 response.

Methods: Data were collected from countries of the WHO Eastern Mediterranean Region (EMR) in mid-2020 through a web-based questionnaire on NCD services-related infrastructure, policies and plans, staffing, funding, NCD services disruptions and their causes, disruption mitigation strategies, data collection on comorbidity, surveillance, and suggestions for WHO technical guidance. The data were exported into *Microsoft Excel* and summarized. Countries were grouped according to socioeconomic level.

Results: Nineteen of the 22 countries in the EMR responded: 95% had NCD staff reallocated to support their COVID-19 response. Lower-income countries were less likely to include NCDs in their pandemic response plans and more likely to report disruption of services. The most commonly disrupted services were hypertension management (10 countries 53%), dental care (10 countries 53%), rehabilitation (9 countries 47%), palliative care (9 countries 47%) and asthma management (9 countries 47%).

Conclusion: The COVID-19 pandemic has disrupted the continuity of NCD-related services in EMR countries. The ability to mitigate service disruptions varied noticeably between countries. The mitigation measures implemented included triaging of patients, novel NCD medicines supply chains and dispensing interventions, and the use of digital health and telemedicine. Guidance and support for systems resilience, preparedness and response to crises are recommended.

Keywords: NCDs services, COVID-19 response, WHO Eastern Mediterranean Region

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Introduction

The ongoing COVID-19 pandemic is having a heavy toll on people living with noncommunicable diseases (NCDs) (*1*). From the early stages of the pandemic, it became evident that people living with NCDs are at higher risk of experiencing a severe impact from the disease caused by the novel coronavirus and that they are more likely to die from it (*1,2*). The burden of NCDs has been considered an indicator for country-level vulnerability to COVID-19 in addition to other vulnerability factors (*3*). Owing to these increased risks, people living with NCDs have been strongly advised to practise higher levels of vigilant preventive behaviours, including staying at home and maintaining physical distancing (*4*). Further, access to health care services for people living with NCDs in particular has been adversely affected by restrictions applied on population movements and lockdowns which were imposed in most countries to mitigate the effects of the pandemic on health systems and to "flatten the epidemic curve" (*5*).

Globally, health systems have been struggling with, and in some cases have been overwhelmed by, the dramatically increasing numbers of COVID-19 cases (*6*). In response, countries had to reorient services and to reallocate resources to defend against the pandemic, including reassignment of health care providers. In some countries, nonemergency health services were put on hold, with a complete shut-down of the health facilities providing these services (*1*). All these factors combined have disproportionately affected how the pandemic has jeopardized the sustainability of NCD services during the pandemic (*7,8*).

Therefore, amid mounting concerns that many people living with NCDs in the World Health Organization (WHO) Eastern Mediterranean Region (EMR) might not be receiving appropriate treatment or access to medicines during the pandemic, the Regional Office conducted a rapid assessment survey to get a snapshot of the situation. The survey was conducted to fully understand the impact of COVID-19 on NCD-related services and programmes as well as to evaluate the scale of consideration of NCDs in COVID-19 response plans in countries of the Region.

Methods

The EMR has an estimated population of about 679 million people (*9*) in 22 countries and territories which are classified into 3 groups by WHO to better account for the socioeconomic disparities in the Region. Group 1 countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) have the highest level of socioeconomic development. Group 2 countries (Egypt, the Islamic Republic of Iran, Iraq, Jordan, Lebanon, Libya, Morocco, the West Bank and Gaza Strip, the Syrian Arab Republic and Tunisia) are the next most developed and Group 3 countries (Afghanistan, Djibouti, Pakistan, Somalia, Sudan and Yemen) are at the lowest level of development (*10*).

The data collection for the assessment of service delivery for NCDs during the COVID-19 pandemic was conducted through a web-based questionnaire that was developed by WHO in the early phases of the pandemic to conduct a global rapid assessment of the disruption of NCD services (*11*). The questionnaire was shared with NCD focal points in ministries of health in all EMR countries in May 2020. The questionnaire was divided into 5 main sections to cover: infrastructure, policies and plans, NCD-related health services, surveillance, and suggestions. It was designed to assess the effects of the pandemic from different angles including: NCD staffing, services provision, funding of national COVID-19 response plans, levels and causes of service disruption, mitigation strategies implemented, data collection on comorbidity at the country level, and suggestions for WHO technical guidance.

The collected data were exported to *Microsoft Excel* workbooks and were checked for completeness and validity. Data were summarized as percentages of either the total number of countries which responded to the survey or a of their corresponding country group as described above.

Results

Survey response

Nineteen of the 22 (86%) countries in the EMR responded to the survey: all 6 Group 1 countries, 9 countries (90%) in Group 2 (missing response from Egypt), and 4 countries (67%) in Group 3 (missing responses from Pakistan and Somalia).

Infrastructure

Regarding the shifting of NCD-allocated staff and funding to the COVID-19 response, 95% of countries in the Region had some or all NCD staff supporting COVID-19 response efforts, either full- or part-time. Regarding the reallocation of NCD funds by governments to non-NCD services, only the United Arab Emirates reported that some NCD funds had been reallocated to support COVID-19 response efforts. However, at the time of data collection, 8 countries (42%) reported that they did not know if NCD funds had been reallocated to support the pandemic efforts.

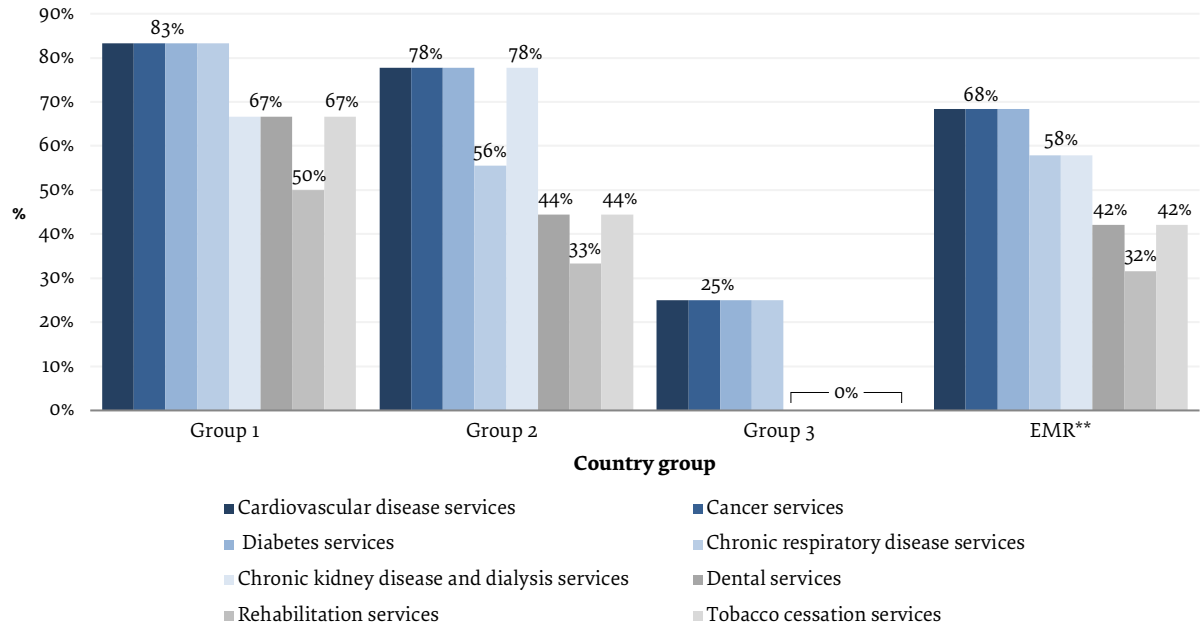
Policies and plans

On the inclusion of NCD services in countries' national COVID-19 preparedness and response plans, 12 of the EMR countries (63%) reported that they had included NCD services in their plans. Nevertheless, there were notable differences between country groups, with 6 of the 9 countries in Group 2 (67%) and 1 of the 4 countries in Group 3 (25%) being less likely to include NCDs in their COVID-19 response plans compared with 5 of the 6 countries in Group 1 (83%). The inclusion of NCD services in the list of essential health services during the pandemic was lowest in Group 3 countries; only a quarter of these countries reported implementing some services. Furthermore, at the regional level, countries reported diverse levels of consideration of specific NCD-related services in their plans. Services to address cardiovascular diseases, cancer, diabetes (13 countries, 68%) and chronic respiratory diseases (11 countries, 58%) were those most frequently included in the COVID-19 response plans in the EMR countries. However, dental services (8 countries, 42%), rehabilitation (6 countries, 32%) and tobacco cessation activities (8 countries, 42%) were not as widely included in the response plans as the 4 main NCDs (Figure 1). Furthermore, 2 countries (11%) in the Region reported the inclusion of additional services such as mental health and counselling services in their COVID-19 response plans. When restricting the analysis to countries that considered NCD services in their national COVID-19 response plans (n = 12), all of them included cardiovascular disease, cancer and diabetes services.

On the other hand, only 2 countries (11%) in the Region reported allocating additional funding for NCDs in the government budget for the COVID-19 response. Group 3 countries reported the highest proportion, with 1 out of 4 countries (25%) in the group allocating additional funding, followed by Group 1 with 1 out of 6 countries (17%). However, none of the countries in Group 2 reported allocation of additional funds for NCDs.

Postponement of NCD activities during the pandemic was reported by 80% of EMR countries (15 out of 19 countries). Over 60% of the countries (12 countries) reported postponing public screening programmes. Implementation of NCD surveys was postponed by 7 countries (37%) and mass communication campaigns by 8 countries (42%). Postponement of the WHO Package of Essential Noncommunicable Disease Interventions (WHO PEN) was reported by 3 of the Group 3 countries (75%), 4 of the Group 2 countries (42%) and none of the Group 1 countries. Five of the 19 countries reported disruption to additional services such as finalizing their multisectoral cancer strategies and holding conferences, workshops, campaigns and summits relevant to NCDs.

Figure 1 Distribution of Eastern Mediterranean Region country groups reporting inclusion of noncommunicable disease services on the list of essential health services in their COVID-19 response plans, 2020 (Group 1: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates; Group 2: Iraq, Islamic Republic of Iran, Jordan, Lebanon, Libya, Morocco, Syrian Arab Republic, Tunisia, West Bank and Gaza Strip; Group 3: Afghanistan, Djibouti, Sudan, Yemen) **Egypt, Pakistan and Somalia not included



Noncommunicable disease-related health services

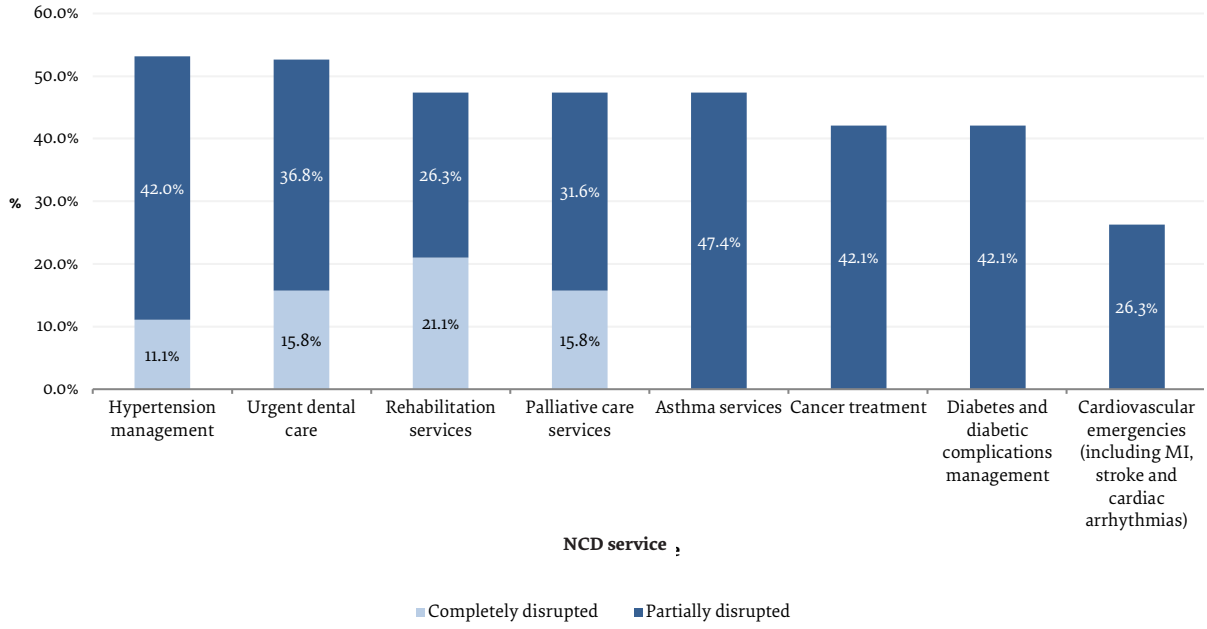
Regarding government policies on access to essential inpatient and outpatient NCD services during the pandemic, at the primary, secondary and tertiary care levels, 13 (68%) of the countries reported that NCD outpatient services had either been closed or were open but with limited access and/or staff, or in alternative locations with different modes. Three of the 4 Group 3 countries reported that outpatient services were open with limited access, and the same proportion reported that inpatient NCD management services were open for emergencies only. Additionally, 10 (53%) of the countries in the Region reported that inpatient NCD management services were open for emergencies only. At the time of data collection during the early stages of the pandemic, 3 out of 5 countries in the EMR with community transmission of the virus (60%) reported that outpatient services were either closed or restricted to some degree, and 10 of the 19 countries (53%) reported that inpatient NCD management services were open for emergencies only.

In addition to policies on access to inpatient and outpatient services, many countries reported more specifically on disruptions to a number of NCD-related services which had been partially or completely disrupted. Services were partially or completely disrupted in10 of the 19 countries surveyed for hypertension treatment and urgent dental care, in 9 countries for rehabilitation services, palliative care services and asthma services, and in 8 countries for treatment for diabetes and cancer management (Figure 2). The most commonly disrupted services in Group 3 were cancer services and asthma services (3 of the 4 countries), while diabetes services were the most commonly disrupted services (5 of the 9 countries) in Group 2 (Figure 3).

The reported disruption of NCD-related services in countries of EMR had many underlying causes. The most common causes were the closure of disease-specific outpatient consultation clinics and the decrease in inpatient volume due to the cancellation of elective care (both 47%, 9 countries). Staffing problems were also a common issue, with 5 countries listing the fact that staffing was not sufficient to provide services and 6 deploying NCD-related clinical staff to provide COVID-19 services. Insufficient supplies of personal protective equipment for health care providers was one of the main reasons for discontinuation of services, affecting Group 3 (2 of the 4 countries) and Group 2 (2 of the 9 countries) but none in Group 1.

In response to the pandemic control measures and disruption of services, countries have been putting in place a range of strategies to maintain health service delivery. The survey revealed that alternative strategies have been established in most countries to allow groups at higher risk, including people living with NCDs, to continue receiving treatment. Nine countries in the Region (47%) reported the implementation of triaging and prioritization of patients, 42% used novel supply chains and/or dispensing approaches for NCD medicines, and 6 countries (32%) redirected and referred patients with NCDs to alternative health care facilities (Figure 4). Furthermore, 5 countries were using telemedicine to replace in-person consultation. The most commonly

Figure 2 Distribution of disruption to the noncommunicable disease services reported in the countries of the Eastern Mediterranean Region, 2020 (Egypt, Pakistan and Somalia not included)



used alternative strategies among Group 2 countries were triaging and redirecting patients to alternative facilities; the use of novel supply chains was reported by all countries in Group 3 (Figure 4).

Noncommunicable disease surveillance

Data on NCD comorbidity among COVID-19 patients were collected in 15 (79%) of the EMR countries surveyed, including all countries in Group 1, 6 (67%) in Group 2 and 3 (75%) in Group 3.

Suggestions for technical support

Countries were invited to provide suggestions for NCD-related technical guidance which WHO might provide during the COVID-19 outbreak. This was an open-ended query, and responses were numerous and diverse, but a few themes for proposals emerged from the data:

- prevention and management of COVID-19 in people living with NCDs and provision of ambulatory essential NCD services during a lockdown without jeopardizing the safety of patients or health care providers (cited 4 times);
- technical guidance on the provision of services for people living with NCDs through mHealth, telemedicine and virtual consultations (cited 3 times);
- promotion of mental health and provision of services for both the public and health care workers (cited 1 time);
- modification of the HEARTS technical packages and the WHO PEN protocol for NCDs (cited 1 time);
- integrating NCDs into public health emergencies, with a particular focus on mental illness (cited 1 time).

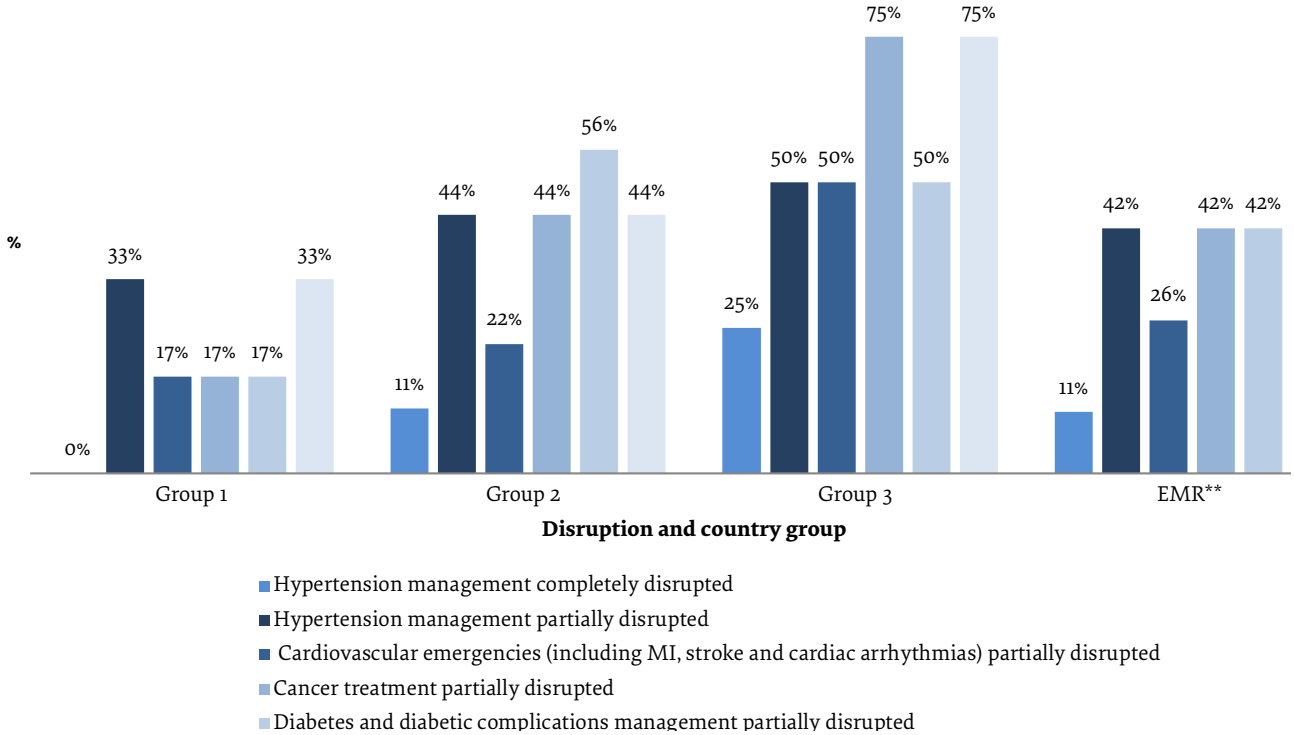
Discussion

This assessment was conducted during the early stages of the COVID-19 pandemic, hence, the responses and measures implemented by countries might have changed over the course of the pandemic and the rollout of vaccines (*12*,*13*). The findings on the different indicators from the EMR are comparable to those reported by WHO at the global level and from the other WHO regions (*11*); the service disruption experienced in the EMR was part of a global phenomenon. The most commonly disrupted services globally were for hypertension, diabetes and asthma, with values ranging from 48% to 53%. Disruption levels in the EMR were comparable to those occurring in the other regions.

On the reallocation of resources, NCD staff being reassigned/deployed to help with COVID-19 response was reported in most of EMR countries consistent with the rate reported at the global level. However, globally, 21% of countries reported that some NCD funds had been reallocated; compared with only one high-income country in the EMR (5%) has reallocated funds, which was the lowest compared with the other WHO regions (*11*). This is reflective of the limited and diverse availability of funds and prioritization of NCD prevention and management across the globe (*14*).

Implementation of the EMR policies and plans was fairly similar to those at global level, with 66% of countries reporting that they had included NCD services in their national COVID-19 preparedness and response plans (*11*); the European Region (74%) reported the highest level and the African Region the lowest (59%) (Table 1). However, the EMR reported a slightly lower level than the global average regarding the allocation of additional funding for NCDs (Table 1). With regard to the government policies

Figure 3 Distribution of disruption of services for the main noncommunicable diseases reported in the country groups of the Eastern Mediterranean Region, 2020 (Group 1: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates; Group 2: Iraq, Islamic Republic of Iran, Jordan, Lebanon, Libya, Morocco, Syrian Arab Republic, Tunisia, West Bank and Gaza Strip; Group 3: Afghanistan, Djibouti, Sudan, Yemen) **Egypt, Pakistan and Somalia not included



on access to essential NCD services, the regional estimate on policies adversely affecting NCD services, was slightly higher than the global average (*11*). Besides, while just above a third of countries at the global level reported that inpatient NCD management services were open for emergencies only, this was reported for more than half the countries of the EMR. Staffing problems were a consistent issue at both global and regional levels with around a quarter of countries at both levels reporting insufficient staff to provide services (*11*). At the global level, 24% of the countries have reported that one of the main reasons for discontinuing services was insufficient supplies of personal protective equipment available for health care providers to deliver services which was slightly higher than the regional estimate of 21% (*11*).

In response to these disruptions, triaging of patients was the most common strategy used by almost half of countries to overcome service disruption at both global and regional levels followed by telemedicine

Figure 4 Approaches used to overcome noncommunicable disease service disruptions in the country groups of the Eastern Mediterranean Region, 2020 (Group 1: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates; Group 2: Iraq, Islamic Republic of Iran, Jordan, Lebanon, Libya, Morocco, Syrian Arab Republic, Tunisia, West Bank and Gaza Strip; Group 3: Afghanistan, Djibouti, Sudan, Yemen) **Egypt, Pakistan and Somalia not included

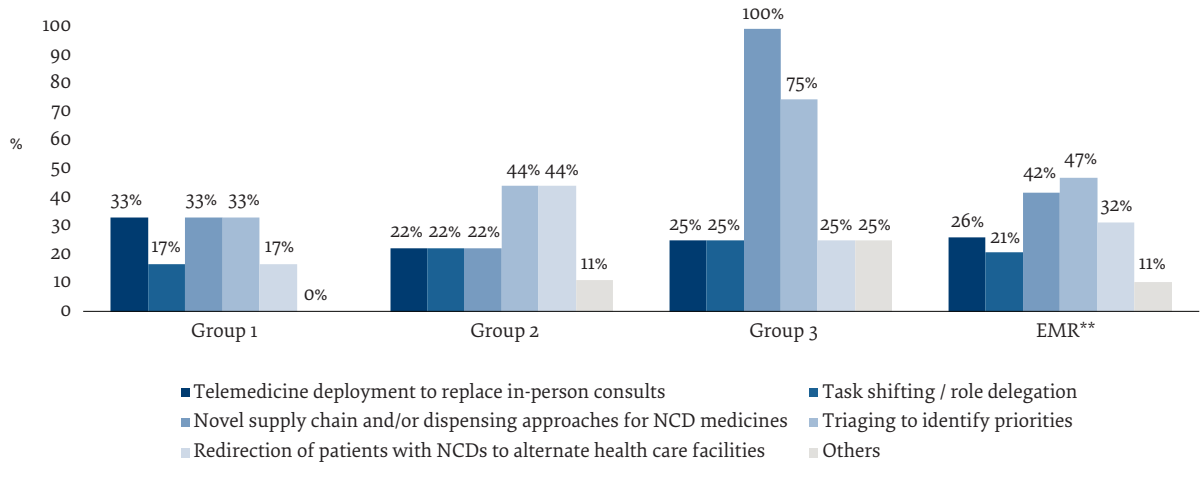


Table 1 Comparison of noncommunicable disease service disruption and response at global and WHO regional levels (14)

Indicator	World[a] %	Eastern Mediterranean[b] %	Africa %	Americas %	Europe %	South-east Asia %	Western-Pacific %
NCD services partially or completely disrupted							
Hypertension management	53	53	61	45	66	60	27
Cardiovascular emergencies	31	26	51	17	26	20	27
Cancer treatment	42	42	59	28	32	70	38
Diabetes management	49	42	59	52	58	50	23
Asthma	48	47	66	28	61	50	23
Ministry of Health (or equivalent) staff with responsibility for NCDs/NCD risk factors reassigned/deployed to help with COVID-19 response	94	95	88	97	97	100	96
Countries reporting reallocation of NCD funds to nonNCD services due to COVID-19 response efforts							
Some funds	21	5	22	7	23	60	26
Don't know	30	42	22	34	44	10	19
None/not yet	50	53	56	59	33	30	56
Countries reporting that ensuring continuity of NCD services was included on list of essential health services in their COVID-19 response plan							
No/don't know	34	37	41	28	26	40	41
Yes	66	63	59	69	74	60	62
Countries reporting that additional funding has been allocated for NCDs in the government budget for the COVID-19 response							
Don't know	23	32	22	24	28	0	19
No	59	58	63	62	54	80	48
Yes	17	11	15	10	15	20	33
Approaches used to overcome the service disruptions to NCD management and prevention in public sector health facilities							
Telemedicine deployment to replace in-person consultations	45	26	27	52	67	50	48
Task-shifting/role delegation	30	21	22	28	36	50	37
Novel supply chain and/or dispensing approaches for NCD medicines	35	42	24	48	26	30	44
Triaging to identify priorities	48	47	49	59	59	10	33
Redirection of patients with NCDs to alternate health care facilities	35	32	32	41	31	50	37
Countries where ministries of health collect or collate data on NCD-related comorbidities in COVID-19 patients	75	79	71	86	87	40	63

[a] *Occupied Palestinian territory not included.*
[b] *Egypt, Pakistan and Syrian Arab Republic not included.*
Data on global level and other WHO regions derived from the report on "The impact of the COVID-19 pandemic on noncommunicable disease resources and services: results of a rapid assessment" (14).

and the use of novel supply chains and/or dispensing approaches for NCD medicines through other channels, at global and regional levels respectively (Table1) (11). It is worth mentioning that countries of the EMR already had previous experiences in the use of technology and Digital Health Interventions (DHIs) for tackling NCDs and NCD risk factors to build on, including interventions for tobacco cessation and other behavioural change interventions (15). The Region was no exception from the global thrive in remote health service provision to bridge disruptions during the COVID-19 pandemic (16,17). Additionally, on NCD surveillance activities, 79% of

countries reported collection of data on COVID-19 NCD-related comorbidity, which is just above the global level of 75%, with the highest level in the European Region and the Americas and lowest in South East Asia (Table1) (*11*).

As previously described (*7*), this COVID-19 crisis is in fact a "syndemic" rather than a pandemic, where the effect of the pandemic is far beyond the transmission of the virus but is rather determined by interactions with deeply rooted inequalities, especially when it comes to people living with NCDs (*4,7,18*). This is also linked to the disparities observed in this assessment in the ways that countries have responded to COVID-19. COVID-19 and NCDs have synergistic effects on one another and disproportionately impact the poorest and the most vulnerable groups, exacerbating inequalities (*19*). At the regional level, it has been observed that Group 3 countries are less NCDs-responsive compared to Group 1 countries, with more disruption of services and less consideration to NCD services in COVID-19 response plans. Paradoxically, the response from most of the countries of EMR was that they did not know or have not reallocated funds from NCDs to other services at the time of the data collection, and this can be due to the limited resources for NCDs to begin with, especially in Group 3 countries, were major disruptions of NCD services have taken place. This also can explain efforts of Group 3, compared to Group 2 and 1 countries, to allocate the already limited resources to NCDs during the pandemic to mitigate the extensive disruptions and the parallel crisis in NCD services provision. The United Arab Emirates, the only country that reported reallocation of funds while it is one of the Group 1 countries which also have reported no postponement of the WHO PEN and limited reallocation of staff. This may indicate that this re-allocation of funds had limited effect on the WHO PEN and NCD services in the country.

Emergency preparedness depends primarily on strong and resilient health systems and a qualified, well-resourced health workforce. Resilience is defined as "the ability to prepare for, manage (absorb, adapt and transform) and learn from shocks" (*19*), and it is significantly linked to the strength and the capacities of health systems and hence to income levels. The stronger the health systems in terms of all the building blocks: leadership/governance, financing, health workforce, service delivery, access to essential medicines, and the health information systems, the more able the country to absorb shocks and to maintain and secure essential services including NCD services during crises like the COVID-19 pandemic (*6*). This pandemic has also been described as a wake-up call for strengthening health systems as it has evidently exposed the fragility of health systems especially in low- and middle-income countries (*8*).

Recommendations

Countries of the EMR need to strengthen NCD prevention and control measures and to reinforce health systems resilience for NCDs during crises beyond the COVID-19 pandemic. The following policies, strategies and plans are recommended for the EMR countries:

- Strengthening national governance to include NCDs in national emergency response plans for the ongoing COVID-19 and other challenging and disruptive crises, through the development and adoption of practical guidance on and monitoring of the continuity of essential services for NCDs especially during crises. This includes the use and mainstreaming of DHI innovations for remote NCD prevention, management, and self-care interventions.
- Strengthening health system resilience especially in low-income countries, to help in coping with crises, through reinforcement of governance and leadership, sufficient flexible funding, human and physical resources, in addition to responsive service delivery using innovative approaches and DHIs.
- Prioritization of NCDs care and access to NCDs service as a fundamental pillar to achieving Universal Health Coverage and to combat inequities. In addition to addressing underlying inequalities through the adoption of the "build back better" strategy and plans for Disaster Risk Reduction.
- Build bridges between national humanitarian emergency plans and national programmes, to develop comprehensive strategies on NCD responses including safeguarding continuity and resumption of NCD services.

Conclusion

COVID-19 pandemic has adversely affected the continuity of NCD services in countries of the EMR. Disruption of NCD services has occurred at all levels of care, primary secondary, and tertiary as part of a global occurrence. The ability of countries to respond to the disruption of services due to the implemented mitigation measures to contain the outbreak has varied notably between countries. Many implementations were put in place by countries of the EMR mainly triaging to identify priorities as an adopted strategy followed by the use of novel supply chains and/or dispensing approaches for NCD medicines. However, the use of DHIs stands out as the way to go to support the continuity of NCD services and other essential services during both crises and stability. More guidance and support for systems resilience, preparedness, and response to crises are certainly needed.

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Competing interests: None declared.

L'impact de la pandémie de COVID-19 sur la prestation de service pour les maladies non transmissibles dans la Région de la Méditerranée orientale

Résumé

Contexte : La pandémie de COVID-19 a eu des répercussions négatives sur la prestation de service pour les maladies non transmissibles dans le monde entier, car les systèmes de santé ont été débordés par la riposte à la pandémie.

Objectifs : Le Bureau régional de l'OMS pour la Méditerranée orientale a évalué l'impact de la COVID-19 sur les services, les programmes et le financement liés aux maladies non transmissibles, ainsi que la prise en compte de ces maladies dans la riposte à la COVID-19.

Méthodes : Des données ont été recueillies dans les pays de la Région de la Méditerranée orientale à la mi-2020 à l'aide d'un questionnaire en ligne sur les infrastructures, les politiques, les plans, la dotation en personnel, le financement, les perturbations des services et leurs causes, les stratégies d'atténuation des perturbations, la collecte de données sur les comorbidités et la surveillance, ainsi que les suggestions pour l'orientation technique de l'OMS. Les données ont été exportées dans Microsoft Excel et synthétisées. Les pays ont été regroupés en fonction de leur niveau socio-économique.

Résultats : Dix-neuf des 22 pays de la Région de la Méditerranée orientale ont répondu : 95 % des membres du personnel en charge des maladies non transmissibles ont été réaffectés pour soutenir la riposte à la COVID-19. Les pays à faible revenu étaient moins susceptibles d'inclure les maladies non transmissibles dans leurs plans de riposte à la pandémie et plus enclins à signaler une interruption des services. Les services les plus fréquemment interrompus correspondaient à la prise en charge de l'hypertension (10 pays, soit 53 %), aux soins dentaires (10 pays, soit 53 %), à la réadaptation (9 pays, soit 47 %), aux soins palliatifs (9 pays, soit 47 %) et à la prise en charge de l'asthme (9 pays, soit 47 %).

Conclusion : La pandémie de COVID-19 a perturbé la fourniture de services liés aux maladies non transmissibles dans les pays de la Région de la Méditerranée orientale et la capacité à atténuer les perturbations des services était variable d'un pays à l'autre. Les mesures d'atténuation comprenaient le triage des patients, les chaînes d'approvisionnement en médicaments nouveaux pour les maladies non transmissibles, les interventions de distribution et le recours à la santé numérique et à la télémédecine. Il est recommandé de fournir des orientations et un appui pour assurer la résilience des systèmes, la préparation et la réponse aux crises.

أثر جائحة كوفيد-19 على تقديم خدمات الأمراض غير السارية في إقليم شرق المتوسط

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الخلاصة

الخلفية: لقد أثرت جائحة كوفيد-19 تأثيرًا سلبيًّا على تقديم خدمات الأمراض غير السارية على مستوى العالم، حيث أصبحت النُّظُم الصحية مُثقلة بالاستجابة للجائحة.

الأهداف: أجرى المكتب الإقليمي لمنظمة الصحة العالمية لشرق المتوسط تقييمًا لتأثير جائحة كوفيد-19 فيما يتعلق بالأمراض غير السارية من خدمات وبرامج وتمويل، ولاعتبارات الأمراض غير السارية في الاستجابة لجائحة كوفيد-19.

طرق البحث: جُمعت البيانات من بلدان إقليم منظمة الصحة العالمية لشرق المتوسط في منتصف عام 2020 باستخدام استبيان على شبكة الإنترنت بشأن ما يتعلق بخدمات الأمراض غير السارية من البنية التحتية، والسياسات، والخطط، والتوظيف، والتمويل، وانقطاعات الخدمات وأسبابها، واستراتيجيات التخفيف من تلك الانقطاعات، وجمع البيانات بشأن الاعتلال المصاحب، والترصُّد، فضلًا عن مقترحات الإرشادات التقنية المقدمة من منظمة الصحة العالمية. وجرى تصدير البيانات إلى برنامج Microsoft Excel وتلخيصها. كما صُنِّفت البلدان تبعًا لمستواها الاجتماعي والاقتصادي.

النتائج: أجاب تسعة عشر بلدًا من بلدان إقليم شرق المتوسط البالغ عددها 22 بلدًا على الاستبيان: 95٪ منها أعادت انتداب العاملين في مجال الأمراض غير السارية لدعم الاستجابة لجائحة كوفيد-19. وكانت البلدان المنخفضة الدخل أقل مَيلًا إلى إدراج الأمراض غير السارية في خططها لمواجهة الجائحة، وأكثر مَيلًا إلى الإبلاغ عن انقطاع الخدمات. وكانت أكثر الخدمات التي تعطلت هي علاج ارتفاع ضغط الدم (53٪ من البلدان)، ورعاية الأسنان (53٪)، وإعادة التأهيل (47٪)، والرعاية الملطفة (47٪)، وعلاج الربو (47٪).

الاستنتاجات: أعاقت جائحة كوفيد-19 تقديم الخدمات المرتبطة بالأمراض غير السارية في بلدان إقليم شرق المتوسط، وتباينت القدرة على تخفيف حدة انقطاعات الخدمات من بلد لآخر. وتضمنت تدابير التخفيف فرز المرضى، وسلاسل توريد أدوية جديدة للأمراض غير السارية، وتدخلات صرف الأدوية، واستخدام الصحة الرقمية والتطبيب عن بُعد. ويُوصى بتوجيه ودعم قدرة النظم على الصمود والتأهب والاستجابة للأزمات.

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Epidemiological status of type 2 diabetes mellitus in the Middle East and North Africa, 1990–2019

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Abstract

Background: Type 2 diabetes mellitus (T2D) is associated with various complications and imposes significant economic pressures.

Aims: The aim of this study was to determine the epidemiological status and the burden of T2D in the Middle East and North Africa (MENA) countries during 1990–2019; to inform targeting of prevention strategies.

Methods: The study population included 21 countries, covering a population of about 400 million. The global burden of disease 2019 database was used. Disability-adjusted life years (DALYs) were computed by summing up the years of life lost and the years lived with disability. Prevalence, incidence, death rates and DALY rates per 100 000 people for all locations by age-standardized rates were calculated.

Results: In 2019, Qatar had the highest prevalence [16312.4; 95% unit interval (UI): 15050.0–17723.2] and incidence rates (818.0; 95% UI: 773.9–868.7) of T2D Bahrain had the highest death (127.0; 95% UI: 102.5–154.6) and DALYs (3232.5; 95% UI: 2622.4–3929.3) rates In the MENA area, average DALY rates increased by nearly 31% (808.3 to 1060.8) and average death rates increased by 0.2% (24.8 to 25.2) during 1990–2019. The highest increase for T2D-related DALYs (516.5 to 958.1; 85%) and the highest increase for T2D-related deaths (12.5 to 22.0; 76%) was in the Islamic Republic of Iran.

Conclusion: Prevalence, incidence, deaths and DALYs rates for T2D have continued to increase in most of the MENA countries. Health care systems must make efforts to control modifiable risk factors.

Keywords: diabetes mellitus, epidemiology, MENA, DALYs, type 2 diabetes

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Introduction

The diabetes mellitus epidemic, as a serious global health threat, is associated with various adverse outcomes and an increased risk of premature death and disability. Diabetes imposes considerable economic pressure on individuals, families, health care systems and societies. It causes premature death, disability, job losses, and disruption to education, which all have negative economic effects on countries. These indirect costs contribute to approximately one-third of total costs, an estimated US$ 1.31 trillion (1).

There are 3 main types of diabetes mellitus: type 1 diabetes mellitus, type 2 diabetes mellitus (T2D) and gestational diabetes mellitus, with T2D responsible for about 90% of all diabetes (2). In 2019, the International Diabetes Federation estimated that 463 million people worldwide aged 20–79 years were living with diabetes, representing 9.3% of the global adult population. These estimates are forecast to increase to 578 million (10.2%) in 2030 and 700 million (10.9%) in 2045, and the greatest increase will be in the low- and middle-income countries (3). The increasing trend for diabetes may be due to an ageing population, urbanization, unhealthy diet, the obesity epidemic, sedentary lifestyles, etc. The International Diabetes Federation estimated that 4 million people died from diabetes and its complications in 2019, and nearly half of these deaths occurred in the working-age group (3).

Despite the variation in certain health and disease indices, countries of the Middle East and North Africa (MENA) region have similar cultural, economic and medical status. Global burden of disease (GBD) studies are unique in that they estimate incidence, prevalence, deaths and disability-adjusted life years (DALYs) of diseases for all regions. The GBD studies longitudinally report disease burden and create an opportunity to compare countries and explain the pattern of diseases. These studies set priorities, present health experiences of other countries, help with allocation of resources and assist in tailoring effective health interventions.

The aim of this study was to describe the epidemiological status and the burden of T2D in the MENA countries from 1990 to 2019. Our findings may help in targeting T2D prevention strategies across the region.

Methods

Location and population

The MENA region, with a population of more than 600 million, comprises 21 countries: Afghanistan, Algeria, Bahrain, Egypt, Islamic Republic of Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Palestine, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, Turkey, United Arab Emirates and Yemen (*4*), which were compared in terms of age, sex and risk factors for T2D.

Data collection and quality control

We used the latest data from the GBD (2019 update) in the current study. The GBD dataset reported the prevalence, incidence, death and DALY of T2D in all regions and countries annually from 1990 to 2019. These data estimate the incidence, prevalence, mortality and DALYs of 369 diseases and injuries, and 84 risk factors in terms of location, age and sex in 204 countries and regions (https://vizhub.healthdata.org/).

The methodological details of GBD 2019 have been documented elsewhere (*5–7*). Data used in the report comprise vital registration systems, sample registration systems, household surveys, censuses and demographic surveillance sites. Validation and data quality have been reported previously (*6,8,9*). In the GBD dataset, designing for all countries was based on the quality and accessibility of data. To ensure reliable and accurate comparisons between various countries and times, the same method was applied for each location and year in the MENA region.

Because to the public availability of GBD, ethics approval and informed consent were not required for this study.

Definition of type 2 diabetes mellitus

In the GBD 2019, diabetes includes all encoded diagnoses, E10 to E14, according to the 10th edition of the International Classification of Diseases (ICD-10) (*6*). Type 2 diabetes is defined as insulin secretory defects due to pancreatic β-cell dysfunction and insulin resistance in target organs, as shown by a fasting plasma glucose ≥ 7.0 mmol/L (126 mg/dL) or 2-h plasma glucose ≥ 11.1 mmol/L (200 mg/dL) and/or history of medication for diabetes treatment (insulin and/or oral hypoglycaemic agents (*6*).

The GBD study evaluated the various risk factors attributable to T2D-related DALYs, including metabolic risk factors such as high body mass index (BMI), environmental risk factors such as air pollution and non-optimal temperature, and behavioural risk factors such as tobacco (smoking, second hand smoke), low physical activity and dietary risks (diet low in fruits, fibre nuts and whole grains; diet high in red meat; diet high in processed foods) (*10*). Further information is available at http://vizhub.healthdata.org/gbd-compare/.

DALY calculation

From the GBD dataset, we analysed data on the incidence, prevalence, mortality, DALYs and attributable risk factors for T2D. The DALYs are computed by summing up years of life lost and years lived with disability (*11,12*). Years of life lost are computed as the estimated number of deaths multiplied by a standard life expectancy at the age at which death occurs. Years lived with disability are counted as the prevalence of individual sequelae of the disease multiplied by their corresponding disability weights, without age weighting. The age-standardized rate (ASR), age-standardized incidence rate, age-standardized prevalence, age-standardized death rate and age-standardized DALY rate are reported to universalize the population size and age structure, i.e. rates per 100 000 people for all locations (*13,14*).

To carry out this study, all data were extracted from the GBD (https://vizhub.healthdata.org/). We then analysed the data based on the study objectives, age group, risk factor, sex, etc. All estimates were reported with 95% uncertainty interval. All analyses were performed using *Microsoft Excel*, 2016.

Ethical approval

The ethics committee of the Kermanshah University of Medical Sciences approved this study.

Results

In 1990, the highest prevalence of T2D via ASR were in Qatar [16312.4; 95% UI: 15050.0–17723.2] and Bahrain (7546.0; 95% UI: 682.4–8259.7) (Table 1). Bahrain (14 234.9; 95% UI: 13 261.9–15 287.2) continued to have the highest prevalence rate in 2019. In 1990, Egypt had the lowest prevalence rate (2392.2; 95% UI: 2172.6–2629.7) of T2D. But in 2019, Yemen had the lowest prevalence rate (4686.9; 95% UI: 4150.6–5245.5). In 2019, in all countries of the MENA region except for Yemen (4686.9; 95% UI: 4150.6–5245.5) and Turkey (5082.0; 95% UI: 4584.6–5564.4), the prevalence of T2D was higher than the average global rate (5282.9; 95% UI: 4853.6–5752.1).

The highest incidence rates in 1990 were in Qatar (493.1, 95% UI: 453.7–534.1) followed by Bahrain (442.5; 95% UI: 409.2–476.7) (Table 1). Egypt (140.8; 95% UI: 130.4–151.7) had the lowest incidence of T2D. In 2019, Qatar (818.0; 95% UI: 773.9–868.7) and Bahrain (757.6; 95% UI: 721.3–795.9) continued to have the highest incidence rates; the lowest rate was in Yemen (241.7; 95% UI: 217.4–268.6). Except for Yemen (241.7; 95% UI: 217.4–268.6), in 2019, the incidence of T2D was greater than the average global rate (259.9; 95% UI: 240.4–281.4).

In 1990, the highest ASRs for deaths attributed to T2D were in Qatar (111.2; 95% UI: 94.4–130.9) and Bahrain (77.8; 95% UI: 66.2–91.0) (Table 1). Tunisia (10.9, 95% UI: 8.7–15.0) had the lowest death rate in 1990. Bahrain (127.0; 95% UI: 102.5–154.6) and Qatar (122.1; 95% UI: 98.9–151.5) continued to have the highest death rates in 2019, but Yemen had the lowest death rate (14.2; 95% UI: 10.2–19.8). In 2019, the death rate for T2D in the MENA region (25.2;

Table 1 Comparing the burden of type 2 diabetes mellitus in the world with the Middle East and North Africa region by age-standardized rate per 100 000 population, 1990–2019

Country	Year	Rate (95% UI)			
		Prevalence	Incidence	Deaths	DALYs
Global	1990	3546.5 (3243.8–3862.7)	184.6 (170.9–199.7)	16.7 (15.7–17.6)	628.3 (537.2–730.9)
	2019	5282.9 (4853.6–5752.1)	259.9 (240.4–281.4)	18.5 (17.2–19.7)	801.6 (670.6–954.4)
MENA	1990	3640.4 (3313.8–3996.0)	196.6 (180.7–213.7)	24.8 (22.5–27.7)	808.3 (696.9–944.3)
	2019	6753.3 (6170.3–7394.2)	353.2 (326.1–383.4)	25.2 (22.4–28.2)	1060.8 (872.1–1279.1)
Afghanistan	1990	4458.7 (4001.2–4972.7)	226.9 (204.8–251.8)	27.8 (18.5–40.5)	997.1 (713.4–1373.5)
	2019	8537.4 (7658.3–9562.5)	412.0 (371.7–458.7)	39.9 (23.4–58.0)	1567.9 (1136.3–2073.0)
Algeria	1990	4048.0 (3641.3–4517.6)	211.9 (191.4–234.1)	17.0 (12.6–23.5)	641.4 (485.4–828.7)
	2019	7675.1 (6860.5–8599.1)	386.4 (350.3–428.8)	18.2 (13.9–23.4)	951.0 (727.9–1234.6)
Bahrain	1990	7546.0 (6822.4–8259.7)	442.5 (409.2–476.7)	77.8 (66.2–91.0)	2067.6 (1751.7–2415.8)
	2019	14234.9 (13261.9–15287.2)	757.6 (721.3–795.9)	127.0 (102.5–154.6)	3232.5 (2622.4–3929.3)
Egypt	1990	2392.2 (2172.6–2629.7)	140.8 (130.4–151.7)	23.3 (21.4–25.4)	718.2 (637.2–811.6)
	2019	5657.6 (5105.8–6302.3)	295.2 (268.3–325.2)	33.8 (26.0–43.8)	1224.7 (973.0–1492.8)
Iran (Islamic Republic of)	1990	3285.6 (2940.8–3652.4)	170.5 (155.0–188.4)	12.5 (10.7–14.4)	516.5 (420.7–628.2)
	2019	6312.9 (5690.2–6959.5)	323.3 (295.7–354.5)	22.0 (18.4–23.8)	958.1 (776.6–1170.2)
Iraq	1990	5595.5 (5041.5–6185.8)	286.9 (262.8–312.7)	49.2 (39.5–58.6)	1544.0 (1292.5–1824.7)
	2019	8564.6 (7852.9–9298.9)	424.9 (392.4–460.2)	45.8 (37.1–54.4)	1625.0 (1314.8–1979.3)
Jordan	1990	5243.6 (4824.3–5714.5)	300.4 (277.9–323.3)	63.9 (53.8–74.9)	1624.7 (1380.1–1899.1)
	2019	7628.8 (6944.1–83187.0)	395.6 (363.4–428.4)	40.2 (34.1–47.5)	1292.9 (1069.4–1569.3)
Kuwait	1990	6685.3 (6107.3–7339.9)	346.9 (317.7–378.9)	28.8 (25.4–32.3)	1072.4 (877.3–1311.0)
	2019	10250.2 (9240.2–11339.5)	495.5 (451.9–542.7)	18.5 (15.3–22.2)	1136.3 (841.6–1480.0)
Lebanon	1990	4447.1 (4035.0–4924.8)	231.3 (211.8–255.2)	20.4 (17.5–24.4)	801.8 (649.5–990.4)
	2019	7653.3 (6871.0–8524.3)	383.5 (347.7–424.1)	15.9 (11.4–20.4)	991.2 (737.8–1295.0)
Libya	1990	4770.4 (4282.1–5283.8)	244.8 (221.3–271.1)	14.2 (10.5–18.0)	686.8 (531.8–866.7)
	2019	9292.0 (8328.3–10384.7)	454.8 (409.7–506.5)	18.3 (13.4–24.1)	1138.8 (859.7–1475.2)
Morocco	1990	3419.6 (3062.0–3803.5)	178.7 (161.4–198.1)	13.1 (10.4–18.6)	546.8 (436.7–695.7)
	2019	6918.0 (6211.8–7684.1)	345.1 (311.5–378.7)	22.4 (17.2–28.3)	1008.6 (786.9–1261.8)
Oman	1990	4248.8 (3825.3–4693.4)	242.0 (222.1–264.4)	44.7 (34.3–57.2)	1248.3 (992.0–1505.9)
	2019	7423.3 (6666.4–8199.8)	410.3 (374.4–447.8)	58.3 (50.4–66.5)	1618.5 (1363.6–1912.1)
Palestine	1990	4569.7 (4130.8–5053.0)	258.2 (237.5–281.7)	53.9 (43.0–66.4)	1398.9 (1131.1–1700.6)
	2019	8319.6 (7549.9–9013.0)	452.7 (414.6–485.4)	68.8 (59.5–78.7)	1907.9 (1642.6–2233.1)
Qatar	1990	8552.6 (7728.5–9442.2)	493.1 (453.7–534.1)	111.2 (94.4–130.9)	2528.1 (2147.5–2948.9)
	2019	16312.4 (15050.0–17723.2)	818.0 (773.9–868.7)	122.1 (98.9–151.2)	2975.3 (2401.2–3673.1)
Saudi Arabia	1990	5380.7 (4914.3–5869.4)	282.7 (260.4–306.4)	25.2 (19.2–33.1)	902.3 (710.1–1117.0)
	2019	9453.1 (8563.1–10498.6)	462.1 (420.8–506.9)	19.1 (16.2–23.7)	1064.5 (829.7–1348.1)
Sudan	1990	3621.7 (3234.1–4040.3)	186.6 (168.2–206.2)	11.1 (8.4–16.4)	510.3 (386.5–656.2)
	2019	7272.0 (6509.9–8134.3)	359.6 (323.4–399.6)	15.7 (10.6–21.7)	855.6 (643.6–1090.2)
Syrian Arab Republic	1990	4341.8 (3942.2–4797.3)	224.5 (204.8–246.0)	18.7 (14.4–23.2)	740.1 (594.8–903.0)
	2019	6832.6 (6133.8–7554.8)	345.7 (312.5–378.2)	15.9 (12.3–20.8)	853.2 (646.5–1103.2)
Tunisia	1990	4352.6 (3907.5–4816.6)	226.1 (205.3–249.7)	10.9 (8.7–15.0)	564.0 (434.2–720.3)
	2019	8162.2 (7324.6–9059.8)	408.6 (369.9–451.9)	14.8 (10.7–19.9)	943.8 (713.8–1233.8)
Turkey	1990	3582.8 (3284.4–3912.6)	202.5 (188.6–219.4)	40.4 (34.6–47.0)	1141.6 (976.1–1333.6)
	2019	5082.0 (4584.6–5564.4)	273.8 (248.8–298.6)	22.7 (18.3–27.6)	869.9 (702.3–1073.5)
United Arab Emirates	1990	6855.8 (6171.6–7585.2)	397.2 (364.7–431.8)	75.3 (58.3–92.8)	1884.2 (1558.7–2246.7)
	2019	11098.2 (10089.0–12249.4)	589.9 (546.0–641.8)	55.2 (41.4–70.7)	1865.2 (1468.0–2332.4)
Yemen	1990	2720.2 (2418.6–3042.1)	145.9 (131.5–161.8)	11.7 (8.1–17.9)	467.3 (354.5–626.4)
	2019	4686.9 (4150.6–5245.5)	241.7 (217.4–268.6)	14.2 (10.2–19.8)	676.5 (512.3–878.8)

DALYs = disability-adjusted life years.

95% UI: 22.4–28.2) was higher than the global average (18.5 95% UI: 17.2–19.7).

The highest DALYs rates for T2D in 1990 were in Qatar (2528.1; 95% UI: 2147.5–2948.9) and Bahrain (2067.6; 95% UI: 1751.7–2415.8); Yemen (467.3; 95% UI: 354.5–626.4) had the lowest rate (Table 1). In 2019, the highest rates were again in the same 2 countries, with Bahrain (3232.5; 95% UI: 2622.4–3929.3) and Qatar (2975.3; 95% UI: 2401.2–3673.1), while Yemen (676.5; 95% UI: 512.3–878.8) continued to have the lowest DALYs rate. In 2019, except for Yemen, the DALYs rate for T2D, calculated using the ASR, was reported to be higher than the average global rate (801.6; 95% UI: 670.6–954.4).

The global DALYs rate for T2D in men (856.2; 95% UI: 721.2–1030.7) was higher than in women (743.7; 95% UI: 621.8–889.0). In the MENA countries, the DALYs rate for T2D in women (1096.2; 95% UI: 902.4–1324.9) was higher than that in men (1025.5; 95% UI: 840.8–1243.2). In terms of the ASR, Qatari women (3628.6; 95% UI: 2952.6–4381.6) had the highest DALYs rate of T2D in the region. In Bahrain, men (3200.8; 95% UI: 2597.6–3885.6) had the highest DALYs rates in the region (Figure 1).

In the MENA region, the incidence of T2D in men (354.4; 95% UI: 326.3–385.0) was greater than that of women (351.5; 95% UI: 325.3–381.9) (Figure 1). Likewise, the prevalence of T2D in men (6794.8; 95% UI: 6201.7–7431.4) was greater than that in women (6706.2; 95% UI: 6129.1–7328.4).

In the MENA region, the average DALYs rates (calculated using ASR) increased by nearly 31% between 1990 and 2019, (808.3; 95% UI: 696.9–944.3 in 1990 and 1060.8; 95% UI: 872.1–1279.1 in 2019) (Table 1). During this period, the greatest decrease in the T2D-related DALYs (24%) was in Turkey (1141.6 to 870.0). The greatest increase in the T2D-related DALYs, with an 85% rise, was in the Islamic Republic of Iran (516.5 to 958.1) Figure 2. There was no significant peak between 1990 and 2019 among the countries of the Region.

Global death rates (calculated using ASR) increased by nearly 11% between 1990 and 2019 (16.7 to 18.5). In the MENA region, the average death rate increased by nearly 0.2% between 1990 and 2019 (24.8 to 25.2). Between 1990 and 2019, the greatest reduction in the T2D-related death, a 44% was in Turkey (40.4 to 22.7), while the greatest increase in the T2D-related death, 76%, was in the Islamic Republic of Iran (12.5 to 22.0) (Figure 3).

The prevalence of T2D increased from 1990 to 2019 in all countries of the MENA region. Average prevalence rates (calculated using ASR) increased by nearly 86.0% from 1990 to 2019 (3640.4 to 6753.3). Moreover, the

Figure 1 Disability-adjusted life years rate for males and females per 100 000 population for type 2 diabetes mellitus according to age-standardized rate in the countries of the Middle East and North Africa, 2019

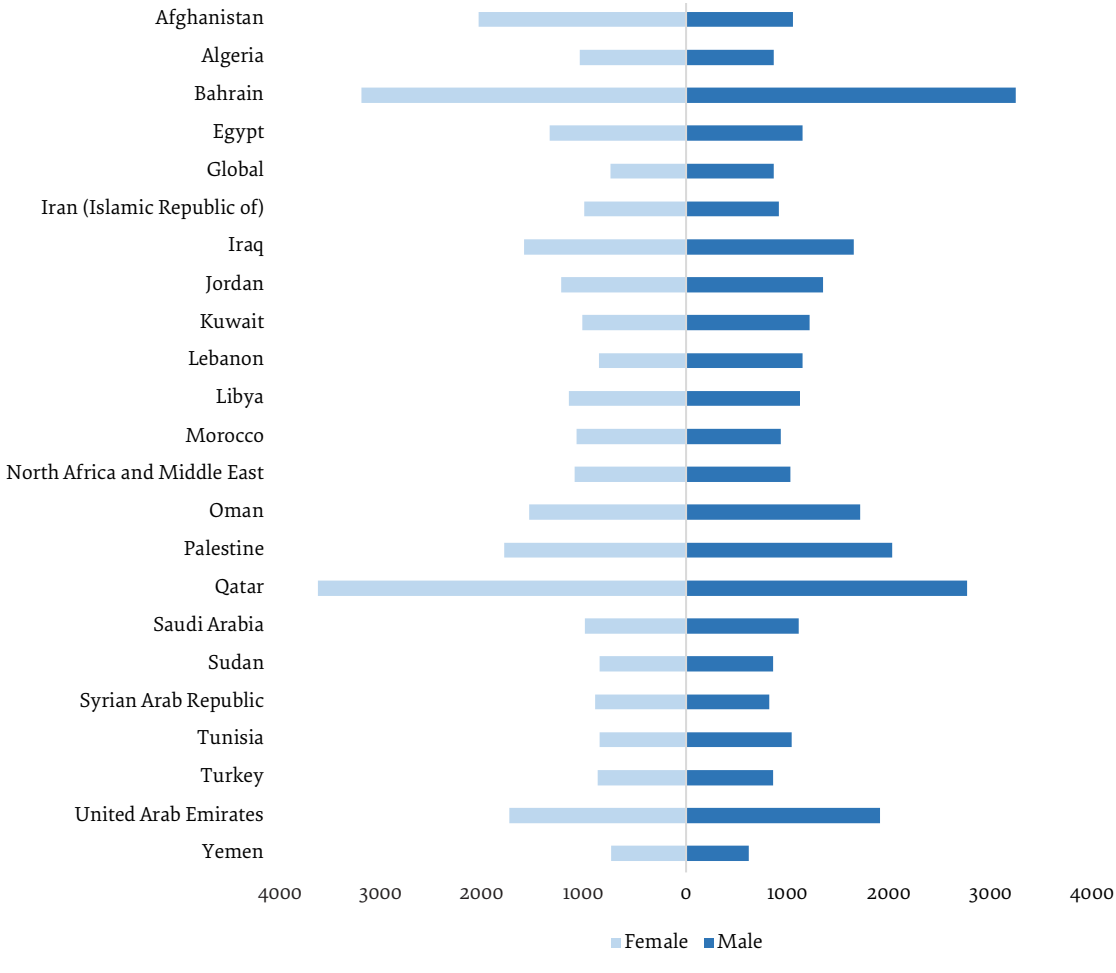
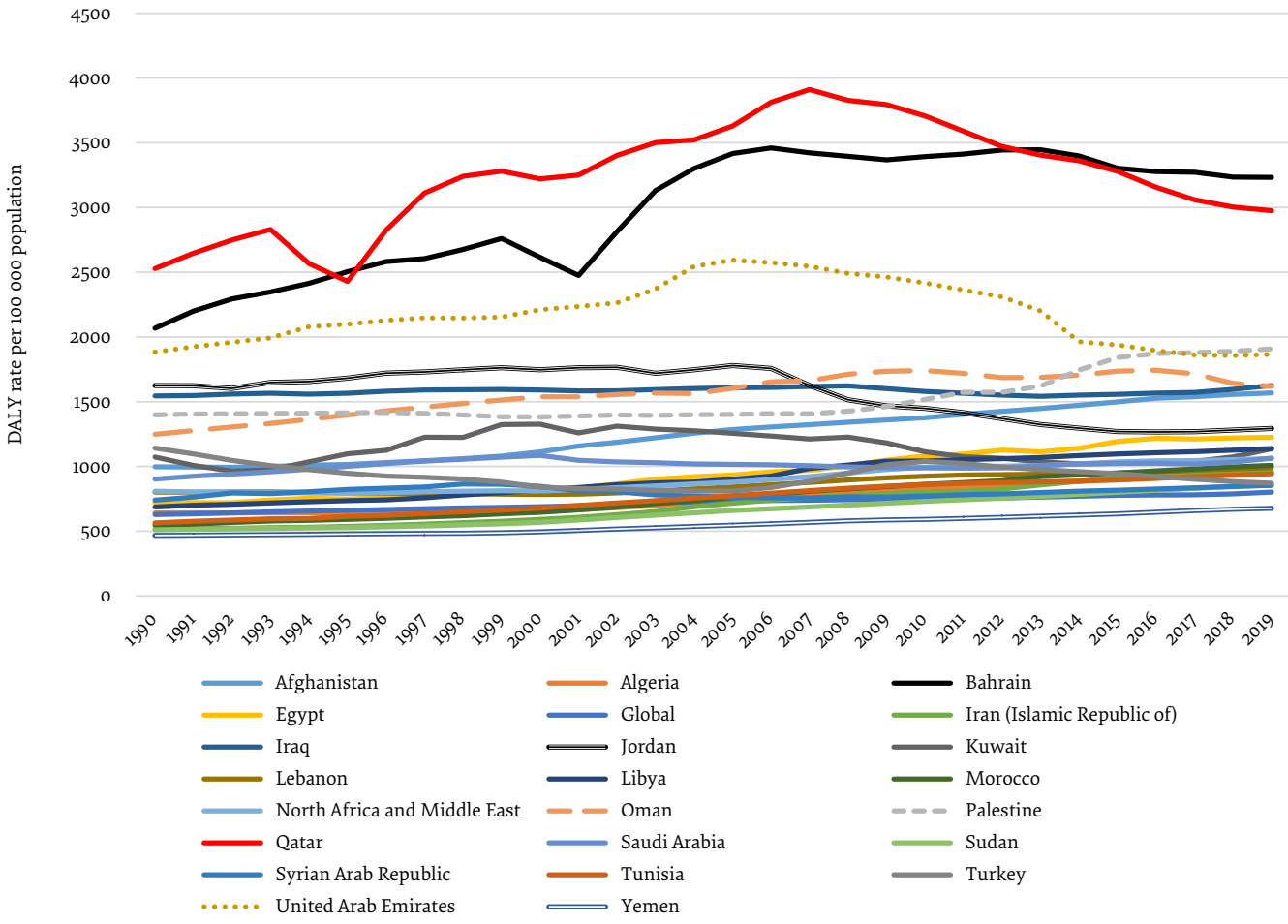


Figure 2 Age-standardized disability-adjusted life years rate for type 2 diabetes mellitus in the Middle East and North Africa and globally, 1990–2019



incidence rate of T2D increased from 1990 to 2019 in all countries of the MENA region. In MENA, average incidence rates by ASR increased by nearly 80.0% from 1990 to 2019 (196.6 to 353.2). Egypt, Morocco and Sudan had the highest increase in both prevalence and incidence between 1990 and 2019 (Figure 3).

In 2019, the T2D-related DALYs increased with age. Most DALYs showed an increase for age 45–49 years and above. In Qatar and Bahrain, the T2D-related DALYs increased at a much faster rate and the final values were extremely high compared with the other (Figure 4).

High BMI, air pollution and smoking had the greatest effect on the DALYs in all the MENA countries (Figure 5). The highest T2D-related DALYs rate was documented for women in Saudi Arabia (87.4%) and Kuwait (86.7%), and was attributed to high BMI. The highest DALYs rate attributed to air pollution was documented in women (26%) and men (25%) in Afghanistan, followed by women and men in Qatar (both 24%). The highest DALYs rate due to smoking was documented in Lebanese men (23%).

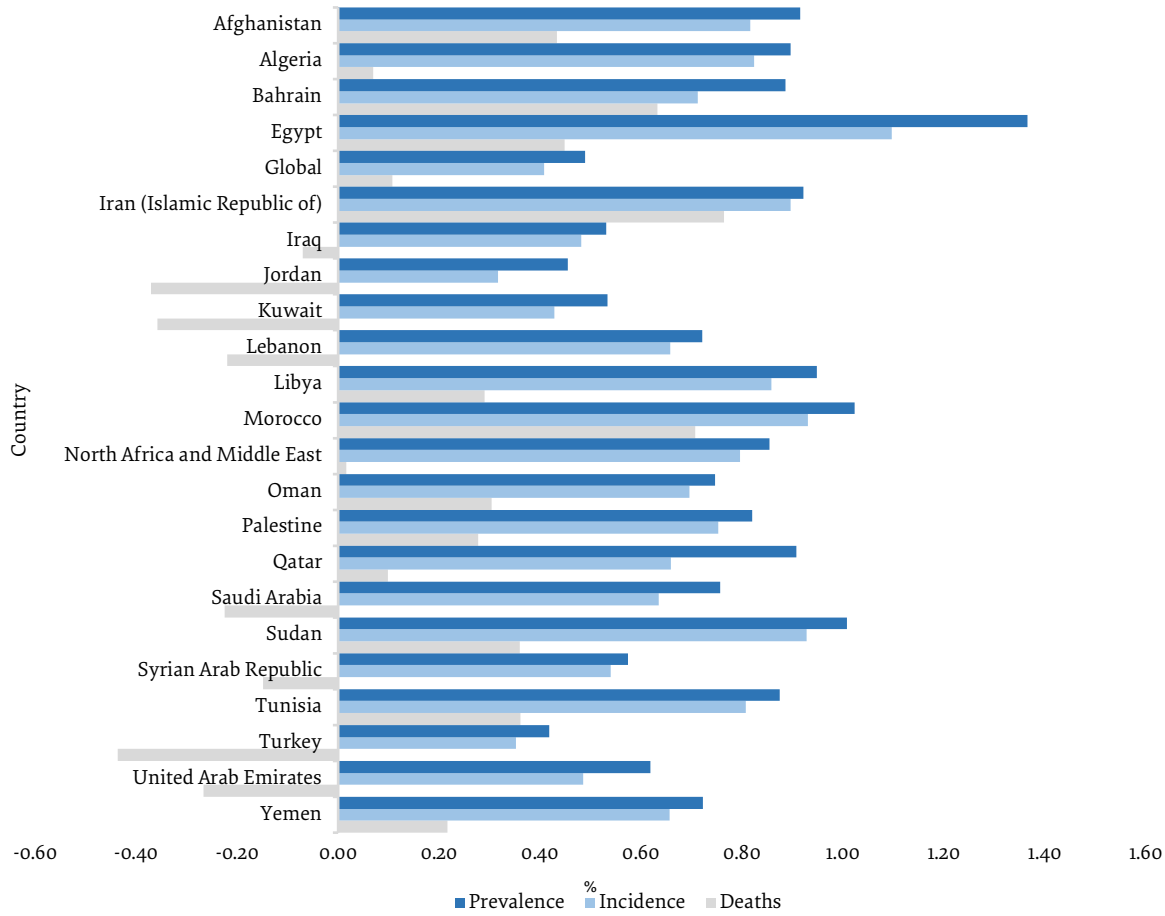
Discussion

Diabetes is recognized as a critical health problem, which imposes an adverse impact on human life, the health system and socioeconomic development. People with diabetes have a 2–3-fold greater risk of all-cause death. Diabetes has the second highest negative total effect on decreasing global health-adjusted life expectancy across the world (*15–17*).

In the MENA region the prevalence and incidence rates of T2D increased from 1990 to 2019 in all countries. Average prevalence increased by nearly 86.0% and average incidence by nearly 80.0%. To the best of our knowledge, population aging, urbanization, obesity, unhealthy diets, and low physical activity may be strong reasons for these increases in 2019.

Alarmingly high prevalence, incidence, death and DALYs rates of T2D were reported in Qatar and Bahrain, driven by the high prevalence of obesity (*18*). For patients with T2D in Qatar and Bahrain, weight loss through the use of intensive lifestyle interventions are indicated to reverse diabetes (*19,20*).

Figure 3 Changes in the age-standardized prevalence, incidence and disability-adjusted life years rates per 100 000 population for type 2 diabetes mellitus in both sexes in the Middle East and North Africa, 1990 to 2019

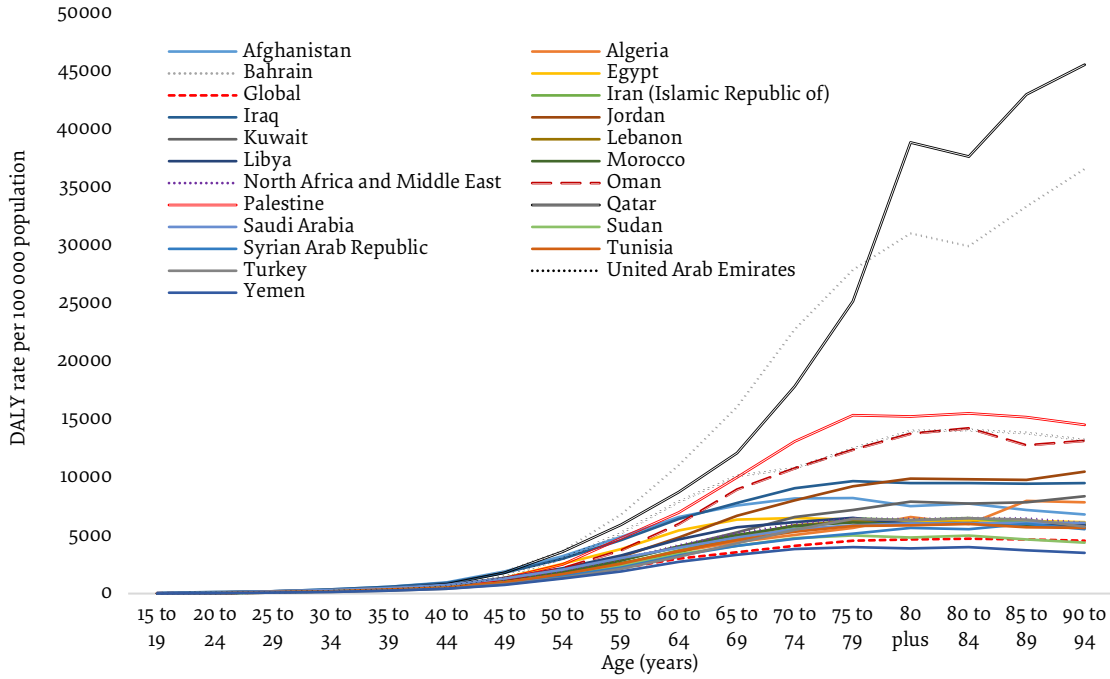


The estimated global prevalence of T2D has increased almost 1.5-fold since 1990. However, we found that prevalence in the MENA region was greater than the global average, although in Yemen and Turkey it was lower. The incidence of T2D in the MENA region was greater than the global average, but in Yemen, it was lower. This may be due to higher consumption of carbohydrate, fat and sugar and lower consumption of protein and vegetables in most developing countries than the global rates (*21*).

In low- and middle-income countries, infrastructure is inadequate to support healthy lifestyles, health care systems are not capable of diagnosing T2D early, and are not able to provide timely access to treatment. Also westernized diet is expanding in these countries, so the people may be more vulnerable to developing T2D. Low prevalence and incidence of T2D in Yemen could be attributed to malnutrition due to armed conflict, less industrialization, poor economy and the more traditional lifestyle in a country whose economy depends on animal husbandry and agriculture. Likewise, between 2003 and 2013, Turkey applied very successful health reforms such as the family medicine model, organizing a universal health coverage plan, developing primary health care and applying integrated care (*22*). Other countries could use similar health reforms to reduce the burden of T2D.

Despite considerable investment and improvement in clinical care and pharmaceutical research, there was an increasing trend between 1990 to 2019 in the DALYs (increasing about 31.0%) and death rate (increasing about 0.2%) caused by T2D in the MENA region. Therefore, we hypothesized that the current approach for managing T2D, which focuses on expensive medications and cross-sectional reduction of blood glucose levels, is not efficient in reducing DALYs and all-cause mortality among people with diabetes. These may be caused by non-modifiable risk factors like population aging and positive family history (*23*), although other risk factors like high calorie diet and sedentary lifestyle may also be involved. The DALYs counts for T2D increased from 1990 to 2019 in all countries in the region, but in Jordan, Turkey and the United Arab Emirates they decreased. These countries are known as the destinations for medical tourism in the MENA region (*22,24,25*). The T2D-related DALYs and deaths in the countries of MENA region except for Yemen was higher than the global average. In fact, the prevalence and incidence in Yemen were low, consequently, T2D-related DALYs were low.

Figure 4 Age trend of the disability-adjusted life years rates for type 2 diabetes mellitus in both sexes in the Middle East and North Africa and globally, 2019



High BMI, air pollution and smoking had the greatest effect on the T2D-related DALYs in all countries. As already reported, high BMI is mostly responsible for T2D and has been continuously increasing (*26*). In 2019, women in Saudi Arabia and Kuwait had the highest DALYs in the region due to high BMI. Research has shown that persons with BMI under 25.0 kg/m^2 usually have the lowest rates of T2D (*17,27*). With increasing BMI, the risk of T2D is increased too. Nearly half of adults suffering from T2D are obese (*28*). Emerging hypermarkets increase accessibility to processed, high-fat, energy-dense, sugar-loaded, low-nutrient and salt-laden foods at relatively low prices, and are implicated for the decrease in the consumption of whole grains, fruits and vegetables. High BMI is mostly caused by unhealthy diet and sedentary lifestyle. We suggest the health systems should encourage greater motivation and desire for exercise and consuming whole grains, fruits, vegetables, etc., and restrict the availability of unhealthy products.

Air pollution is a critical risk factor worldwide. Outdoor and indoor air pollution may alter lung function. Vascular homeostasis and insulin sensitivity, lead to disorders in glucose homeostasis (*29*). Efficient air pollution management is critically required for a healthy lifestyle. The highest proportion of total DALYs attributed to air pollution was in both women and men in Afghanistan and Qatar. The highest proportion of total DALYs attributed to smoking was among Lebanese men.

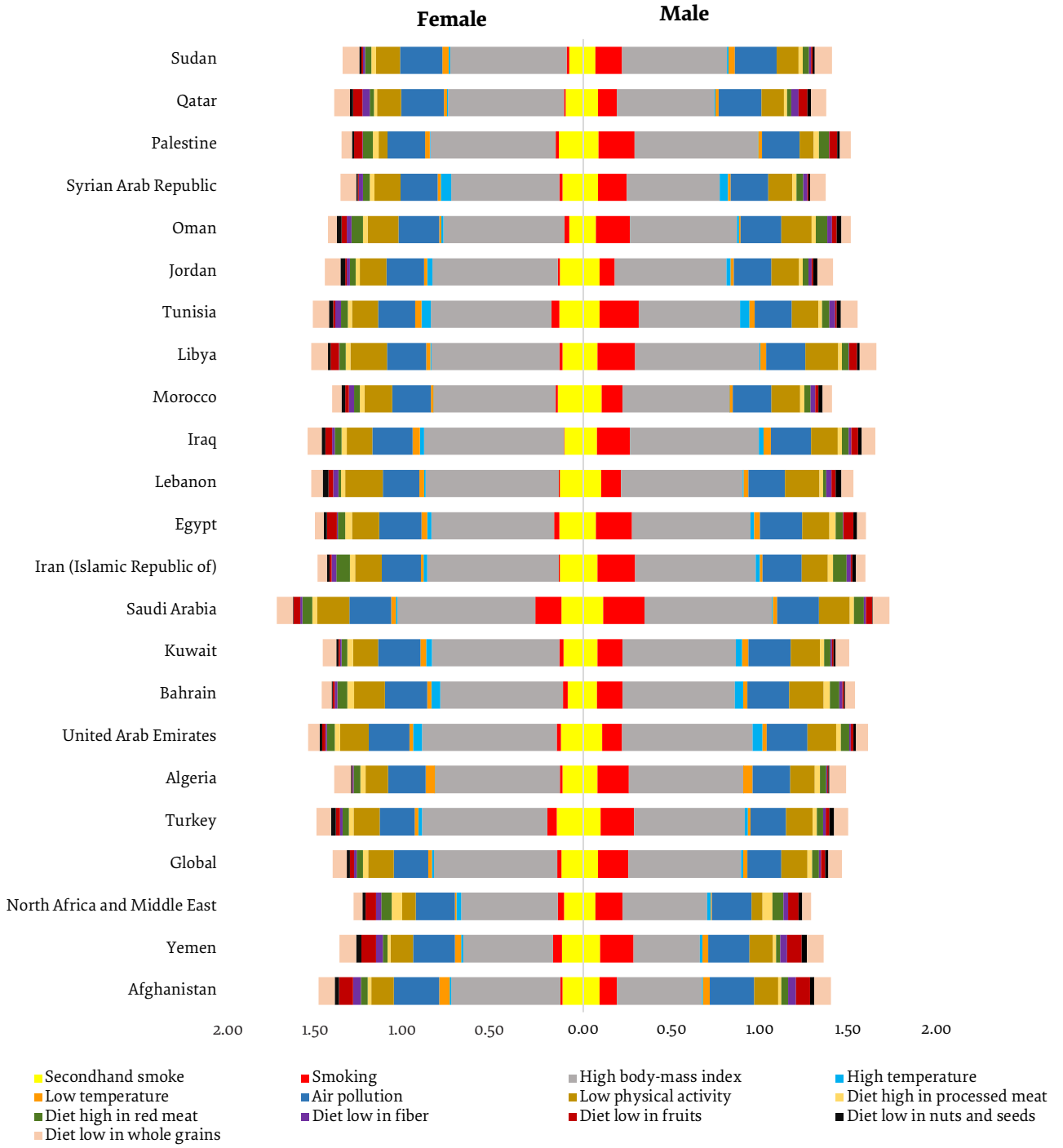
The global DALYs rate of T2D in men was higher than in women. However, in MENA, the DALYs rate for T2D in women was higher than in men. We infer that less employment opportunities outside the home, meaning physical activity is restricted to housework, may be responsible for the higher frequencies of obesity and sedentary lifestyles and consequently diabetes among women in the region. On the other hand, in women, obesity, diabetes and hypertension are prevalent after childbirth (*30,31*). Qatari women and Bahraini men had the highest DALYs rates according to ASR. This difference may be ascribed to the distribution of risk factors between men and women across populations.

From 1990 to 2019, Turkey had the highest decrease in T2D-related DALYs (from 8th to 18th rank) and deaths (from 8th to 10th rank). This decrease was a result of Turkey improving its health care system in recent decades (*22*). The Islamic Republic of Iran had the highest increase in T2D-related DALYs (from 18th to 16th rank in 2019) and death (from 18th to 10th rank in 2019). This increase may be attributed to the consequences of armed conflict and sanctions, dispersion, destabilization of health care systems, poor access to prevention, care and treatment, and poor education.

The T2D-related DALYs increased sharply with age. We found that the highest rate of T2D was reported in ages 45–49 years and higher. In fact, increasing life expectancy will result in a greater burden of T2D in the elderly.

The strengths of the present study include comparing the data of countries that have similar information registration systems and sociodemographic indices. Other strengths were the comprehensive estimations of the T2D burden reported as prevalence, incidence, death and DALYs among different countries from 1990 to 2019, hence, it can detect the strengths and weaknesses of the health care systems in these countries. All limitations of

Figure 5 Distribution of total disability-adjusted life years related to type 2 diabetes mellitus by age-standardized rate in both sexes attributed to various risk factors in the Middle East and North Africa, 2019



the GBD study are detailed elsewhere (7) and our study was wholly subject to those limitations.

We did not cover type 1 diabetes mellitus and gestational diabetes mellitus, these will be the subject of separate studies. In July 2011, South Sudan gained independence and separated from Sudan but in this study, the data for Sudan and South Sudan are reported as one country. Deaths reported in the GBD are the deaths directly caused by T2D, which may underestimate the mortality attributable to T2D. Certainly, T2D is associated with the increased risk of death, cardiovascular disease, cancer and infectious diseases which result in a higher indirect death rate. The estimates in the GBD are updated annually, therefore these limitations should be addressed.

Conclusion

T2D has continued to increase in prevalence, incidence, deaths and DALYs rates in most countries of the MENA region. This increasing trend may be attributed to ageing population, social and economic transformation, urbanization, the obesity epidemic, and unhealthy diets

such as processed and high-fat diet, sedentary lifestyles and inability of health care systems to diagnose T2D early or provide access to treatment. Given that most of the T2D burden is advanced by modifiable risk factors, health care systems are crucially needed to set policies, allocate resources, tailor educational interventions to modify unhealthy lifestyles, efficiently address overweight and obesity, smoking and exposure to air pollution.

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Situation épidémiologique du diabète sucré de type 2 dans la Région Moyen-Orient et Afrique du Nord, 1990-2019

Résumé

Introduction : Le diabète sucré de type 2 est associé à diverses complications et impose des contraintes économiques importantes.

Objectifs : La présente étude visait à déterminer le statut épidémiologique et la charge du diabète sucré de type 2 dans les pays du Moyen-Orient et d'Afrique du Nord au cours de la période 1990-2019 afin de mieux cibler les stratégies de prévention.

Méthodes : La population d'étude était composée de 21 pays, couvrant près de 400 millions de personnes. La base de données de 2019 sur la charge mondiale de morbidité a été utilisée. Les années de vie ajustées sur l'incapacité (DALY) sont calculées en additionnant les années de vie perdues et les années vécues avec une incapacité. Les taux de prévalence, d'incidence, de mortalité et de DALY pour 100 000 personnes ont été calculés pour tous les lieux en utilisant des taux standardisés selon l'âge.

Résultats : En 2019, le Qatar présentait les taux de prévalence [16 312,4 ; 95 % intervalle unitaire (UI) : 15 050,0-17 723,2] et d'incidence (818,0 ; 95 % UI : 773,9-868,7) les plus élevés. Bahreïn présentait les taux de mortalité (127,0 ; UI à 95 % : 102,5-154,6) et de DALY (3232,5 ; UI à 95 % : 2622,4-3929,3) les plus élevés. Dans la Région Moyen-Orient et Afrique du Nord, les taux moyens de DALY ont augmenté de près de 31 % (808,3 à 1060,8) et les taux moyens de mortalité ont enregistré une hausse de 0,4 % (24,8 % à 25,2 %) au cours de la période 1990-2019. La plus forte augmentation des DALY liées au diabète sucré de type 2 (516,5 à 958,1 ; 85 %) et la hausse la plus importante des décès liés au diabète sucré de type 2 (12,5 à 22,0 ; 76 %) ont été enregistrées en République islamique d'Iran.

Conclusion : Les taux de prévalence, d'incidence, de décès et de DALY liés au diabète sucré de type 2 ont continué à augmenter dans la plupart des pays de la Région Moyen-Orient et Afrique du Nord. Les systèmes de santé doivent s'efforcer de maîtriser les facteurs de risque modifiables.

الوضع الوبائي للسكري من النمط 2 في الشرق الأوسط وشمال أفريقيا، 1990–2019

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الخلاصة

الخلفية: يرتبط السكري من النمط 2 بمضاعفات مختلفة، ويتسبب في ضغوط اقتصادية كبيرة.

الأهداف: هدفت هذه الدراسة إلى تحديد الوضع الوبائي للسكري من النمط 2 وعبء هذا المرض في بلدان الشرق الأوسط وشمال أفريقيا خلال المدة 1990–2019، مما قد يساعد في استهداف استراتيجيات الوقاية.

طرق البحث: استخدمت الدراسة قاعدة البيانات العالمية لعبء الأمراض لعام 2019، وشملت 400 مليون شخص في 21 بلدًا. وحُسبت سنوات العمر المُصححة باحتساب مدد الإعاقة (DALYs)، من خلال جمع سنوات العمر المفقودة وسنوات العيش مع الإصابة بالإعاقة. وحُسِبت معدلات الانتشار والإصابة والوفيات ومعدلات سنوات العمر المصححة باحتساب مدة الإعاقة لكل 100 ألف شخص في جميع المواقع باستخدام المعدلات المُوحَّدة حسب السن.

النتائج: في عام 2019، كانت قطر بها أعلى معدل انتشار بواقع 16312.4 (95٪ UI: 15050.0–17723.2) ومعدلات إصابة 818.0 (95٪ UI: 773.9–868.7). وكانت البحرين بها أعلى معدل وفيات (127.0؛ 95٪ UI: 102.5–154.6) ومعدلات سنوات العمر المصححة

باحتساب مدد الإعاقة (3232.5؛ 95٪ UI: 2622.4–3929.3). وفي منطقة الشرق الأوسط وشمال أفريقيا، ارتفع متوسط معدلات سنوات العمر المصححة باحتساب مدد الإعاقة بنسبة 31٪ تقريبًا (808.3 إلى 1060.8) وارتفع متوسط معدلات الوفاة بنسبة 0.2٪ (24.8 إلى 25.2) خلال الفترة 1990–2019. وسُجلت أعلى زيادة في سنوات العمر المصححة باحتساب مدد الإعاقة المرتبطة بالسكري من النمط 2 (516.5 إلى 958.1؛ 85٪)، وأعلى زيادة في الوفيات المرتبطة بالسكري من النمط 2 (12.5 إلى 22.0؛ 76٪) في جمهورية إيران الإسلامية.

الاستنتاجات: استمرت معدلات الانتشار والإصابة والوفيات ومعدلات سنوات العمر المصححة باحتساب مدد الإعاقة للسكري من النمط 2 في الارتفاع في معظم بلدان الشرق الأوسط وشمال أفريقيا. وينبغي لنُظُم الرعاية الصحية أن تبذل جهودًا للسيطرة على عوامل الخطر القابلة للتعديل.

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Household catastrophic total cost due to tuberculosis in Egypt: incidence, cost drivers and policy implication

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Abstract

Background: Tuberculosis (TB) is a disease that disproportionately affects the poor. The World Health Organization lists economic factors as one of main barriers to tuberculosis management.

Aims: This study aimed to estimate the household total catastrophic cost of TB and its determinants among newly diagnosed Egyptian tuberculous patients.

Methods: This was a cohort prospective study covering 257 TB patients registered in 2019. The patients were followed up bi-monthly until the end of the treatment regimen (4 visits). A standardized questionnaire published by the poverty sub-working group of the Stop TB Partnership was used after minor modification. The following costs were measured: pre-diagnosis, direct and indirect, guardian and coping, as well as annual household income. Catastrophic cost (direct plus indirect) was considered if the total cost of TB treatment exceeded 20% of the household's annual income. Sensitivity analyses were conducted using different thresholds.

Results: The incidence of household total catastrophic cost was 24.1%. The mean total cost of TB treatment was US$ 198. Over 50% of the total direct cost was incurred during the pre-diagnosis period. After adjustment for other determinant variables using multivariable logistic regression, we found that age < 30 years, living in a house with crowding index > 2, poverty and coping were more likely to cause higher total catastrophic cost.

Conclusions: Catastrophic cost was experienced by 1 out of every 4 new TB patients. As the main cost drivers were poverty and coping, the Ministry of Health and Population should be collaborated with Ministry of Finance and NGOs to put a plan of social protection system for poor families with TB patients.

Key words: catastrophic cost, tuberculosis, economic burden, cohort study, Egypt

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Introduction

Tuberculosis (TB) is a disease that disproportionately affects the poor. Therefore, TB programmes need to ensure that economically and socially disadvantaged patients do not face barriers that keep them from seeking treatment. By addressing barriers and the reasons for delay to timely diagnosis and treatment in the National TB Programme (NTP), costs to TB patients, particularly among the poor, can be effectively reduced (*1*).

Poor people have longer pathways to care, and costs of accessing care are generally higher before than after diagnosis; on average, costs incurred before treatment represented at least 50% of the total cost of the TB episode (*2*). Out-of-pocket costs for public and private health care services may lie at the beginning of a spiral into poverty for many families and exacerbate poverty among the already-poor. Universal access to care and reducing the socioeconomic burden associated with TB are key objectives of the current WHO Stop-TB strategy. The WHO lists economic factors as one of 4 barriers to TB care (*3*).

Loss of income and direct expenses trigger a downward spiral whereby the patient is less able to complete treatment, more likely to have repeat episodes, and more likely to develop drug resistance resulting in more expensive and laborious treatment (*4,5*).

Many studies have been conducted in Africa and Asia to assess the catastrophic cost of TB for patients and households. The incidence of total catastrophic cost of TB in Uganda was 53.1% (*6*) and in Zimbabwe 80% (*7*). In Asia, the reported catastrophic incidence in Indonesia was 36% (*8*), while in China catastrophic health care expenditure (CHE) was 66.8% (*9*) and the household catastrophic total cost was 33.6% (*10*). There is a difference between catastrophic total cost of TB and CHE. According to the WHO definition, catastrophic total costs (direct and indirect combined) incurred during illness and treatment exceed a given threshold (e.g. 20%) of the household's annual income, while CHE is defined as out-of-pocket payments for health care (for all conditions) exceeding a given fraction of a household's total consumption (non-food). The CHE for TB is defined as out-of-pocket medical expenses for TB care exceeding a specific proportion of household income or capacity to pay (*11*).

Egypt is ranked among the mid-level incidence countries. According to a WHO estimation of the TB burden in 2019, the incidence of TB was 12 per 100 000 inhabitants. The estimated proportion of TB cases with multidrug resistance/rifampicin resistance was 1.4% among new cases and 23.0% among previously treated patients (12). In Egypt, there have been no published studies estimating the catastrophic total costs or CHE for TB at the national level. Accordingly, conducting such a study could be of value in assessing the impact of economic constraints and impoverishment among TB patients and their households.

The main objectives of this study were to measure the incidence of total household catastrophic cost of TB and identify the risk factors associated with it.

Methods

Study design

We used a cohort prospective study to achieve the study objectives. The study cohort included a sample of newly diagnosed TB patients who had been on treatment for at least 2 weeks since starting the intensive phase. All patients were registered in the National TB Programme during the first quarter of 2019. Study patients were followed up bi-monthly (4 interviews for each patient) until the end of the treatment regimen.

Study setting

According to the General Organization of Physical Planning, Egypt is divided into 7 regions (27 governorates): Greater Cairo, Alexandria Region, Delta Region, Suez Canal Region, North Upper, Central Upper and Southern Upper. For simplicity of selection, we combined the regions into 3 sectors: Greater Cairo (3 governorates), North (Alexandria and Delta = 12 governorates) and South (all 3 Upper regions = 10 governorates). We excluded North and South Sinai for security reasons. From the North and South sectors, 4 governorates were randomly selected. From the Middle sector, Cairo was randomly selected. Out of 44 TB management units (TBMUs) in the selected governorates, 24 were randomly selected. A weighted proportional allocated sample from each governorate was calculated depending on the registered number of TB patients in 2018.

Some patients were considered ineligible: those who refused to sign the informed consent, children under 15 years without their guardian's consent or for whom the guardian refused to give consent, and re-treated patients. Multidrug resistant patients were excluded because they need a longer time for follow-up and in some selected centres the number of these patients was very low.

Sampling method and sample size

This was a cluster sample considering the TBMU as a cluster. As there are 24 clusters in the 5 selected governorates, we retrieved around 10–20 patients per cluster. Consecutive consenting eligible patients were interviewed at each study site until the required sample size was reached. The sample size calculated for this study was 276 TB patients using *EpiInfo*, version 7. The assumptions used for calculation were: estimated household catastrophic cost rate 30% (22–38%), 95% confidence level, design effect of 2.0, and dropout rate of 10%. The assumption of catastrophic cost rate was based on preliminary results of unpublished work done recently in 2 TBMUs in Cairo.

Data collection

A standardized questionnaire from the poverty sub-working group of the Stop TB Partnership, the "Tool to estimate (TB) patient's costs", was used (13). The questionnaire was translated into Arabic and rechecked for proper translation by a public health expert. Then both face and content validity of the questionnaire were evaluated as a routine step in the process of evaluation of the protocol by the Institutional Review Board of the Faculty of Medicine, Ain Shams University. After approval of the protocol, the questionnaire was piloted on 20 TB patients from some TBMUs not included in the study; no changes were made to the questionnaire. Interviews were carried out by trained health care workers with previous experience in interviewing TB patients. The questionnaire covered socioeconomic and demographic variables such as age, sex, marital status, education, employment, household monthly income, place of residence, family size and number of rooms. Other variables were included in the questionnaire such as type of TB and diagnostic delay.

Operational definitions: according to WHO tuberculosis patient cost surveys (11,13)

- Catastrophic total costs due to TB comprised total costs of TB (direct and indirect combined) incurred by household during illness and treatment that exceeded 20% of the pre-disease annual household's income.
- Direct costs were out-of-pocket costs linked to seeking diagnosis and treatment, including medical expenses, fees, transport, accommodation, food expenditures and other costs, net of any reimbursement.
- Indirect costs were self-reported household income loss (net effect of income change before as compared to during TB episode).
- Guardian cost was the costs incurred by family members looking after the patient during care. For each guardian, both direct and indirect costs were considered.
- Costs incurred by patients who attempted to cope with the costs of TB care included borrowing money or selling their assets to finance care.
- Annual income was estimated from the average monthly income reported by the patient. This was calculated from the monthly income before TB symptoms, after diagnosis and at the end of treatment. To assess and value patient's time cost, we used the output-based approach.

- Poor status was considered if the household earnings were below 1000 Egyptian pounds per month (those in the first quintile of the monthly income).

Regarding monthly income and all costs incurred by the patients, we collected the data in Egyptian pounds then converted to US$ (US$ 1 = 16.5 Egyptian pounds).

Data analysis

We used *SPSS*, version 21, for statistical analysis. Descriptive statistics included mean, standard deviation, median, interquartile range, frequency, percentage and 95% CI. Analytical statistics was performed in 2 steps. First, bivariate analysis using the chi-squared test was applied to identify variables associated with catastrophic cost. Crude odds ratios (cORs) with 95% confidence interval were calculated. In the second step, multivariable logistic regression models were constructed and adjusted odds ratios (adj. ORs) were calculated. All variables in the bivariate analyses that expressed *P*-value < 0.25 and were of clinical importance (*8*) were entered into the models. *P*-value < 0.05 was considered significant.

Ethical approval

This study was approved by the Research Ethics Committee of the Ministry of Health and Population (FWA00016183).

Results

Out of the 276 new TB patients interviewed, only 257 had complete records. The characteristics of the study cohort are shown in Table 1. The mean age was 38.3 [standard deviation (SD) 14.8] years and around one quarter of patients were ≥ 50 years old. This cohort included more males (61.9%) than females; 58.8% of participants were married and 22.6% were illiterate. One quarter of the study sample was affiliated to government organizations with a regular monthly income, 55.3% were freelancers or working in the private sector and around one fifth were unemployed.

The majority of the participants lived in urban governorates, 66.5% had pulmonary TB and the crowding index for 78.6% of the patients was 1–2 persons/room (Table 1). Around 25% of the participants were poor and 11.3% adopted coping strategies by borrowing money or selling their assets.

The mean value of the total cost during the TB episode was US$ 198 (median US$ 122) (Table 2). The mean value (US$ 109) of the total indirect costs amounted to 55% of the total costs (direct and indirect). The proportion of direct to indirect cost was 89/109 = 0.82. However, the median value of the total direct costs was similar to the total indirect costs (US$ 61). The mean value of the pre-diagnosis direct cost (US$ 56) was 2.5 times greater than that of the indirect costs (US$ 21). In comparison, in the intensive and continuation phases the indirect costs were much higher than the direct costs.

Household total catastrophic cost (ICC) rate was considered at different cut-off points (Figure 1). At 20% threshold, the incidence of the total ICC among the study sample was 20.1%. At a threshold exceeding 10%, the incidence of ICC increased to 59.9%; at a threshold exceeding 30% of the annual household income it was only 6.6%.

The ICC was analysed across study variables using a threshold exceeding 20% (Table 3). The younger age

Table 1 Characteristics of study participants (*n* = 257), tuberculosis patients in Egypt, 2019

Characteristic	No.	%
Age (years)		
< 30	83	32.3
30–49	109	42.4
≥ 50	65	25.3
Sex		
Male	159	61.9
Female	98	38.1
Current marital status		
Single	89	34.6
Married	151	58.8
Divorced/Widow	17	6.6
Education level		
Illiterate	58	22.6
Primary-Secondary	158	61.5
University	41	16.0
Employment		
Governmental	63	24.5
Freelance/private	142	55.3
Jobless	52	20.2
Crowding index		
1–2 persons/room	202	78.6
> 2 persons/room	55	21.4
Place of residence		
Urban governorate	212	82.5
Urban/rural governorate	45	17.5
Income (poverty status)		
Poor ($US < 61/month)	63	24.5
Non-poor	194	75.5
Breadwinner		
Patient	215	83.7
Other family member	42	16.3
Type of TB		
Pulmonary	171	66.5
Extrapulmonary	86	33.5
Diagnostic delay (weeks)		
≤ 4	74	18.3
> 4	183	81.7
Coping		
No	228	88.7
Yes	29	11.3

$US = 16.5 Egyptian pounds (2019 average).

Table 2 Total household/patients' costs incurred by tuberculosis patients during the pre-diagnosis, intensive and continuation phases, Egypt, 2019

Period/type of cost	Cost ($US)		IQR (US$)	
	Mean	Median	25th	75th
Pre-diagnostic period				
Direct costs	56	34	12	72
Indirect costs	21	0	0	30
Intensive phase period				
Direct costs	14	3	2	8
Indirect costs	27	13	0	36
Continuation phase				
Direct costs	19	13	6	22
Indirect costs	61	36	0	85
Total direct costs to HH (pre-diagnosis, post diagnosis)	89	61	29	106
Total indirect costs to HH (pre- plus post-diagnosis)	109	61	0	148
Total cost to HH (direct + indirect)	198	122	67	239

IQR = interquartile range.

groups, < 30 years, showed a higher significant ICC than those aged ≥ 50 years (cOR 2.37, 95%CI: 1.05–5.39). There were insignificant differences between males and females and between current marital status, education level, place of residence, diagnostic delay and type of TB.

Compared with the ICC among patients affiliated to governmental organizations with a stable monthly income, patients working as freelancers experienced higher ICC (cOR 2.72, 95% CI: 1.03–5.04). Crowding index was significantly associated with ICC as patients living in houses with crowding index > 2 persons/room showed an ICC of 36.4% compared with 20.8% for those with a crowding index of 1–2 persons/room.

Poor patients experienced a higher ICC (33.3%) than non-poor patients (21.1%). Where the main breadwinner was a patient, the incidence of ICC (26.5%) was significantly higher than that reported when family members were the main breadwinner (11.9%).

The highest ICC was reported among patients who adopted coping strategies (55.2%) compared with those who did not (20.2%) (Table 3).

To identify the determinant variables associated with higher ICC, we used a multivariable logistic regression model (Table 4). Variables retained in the final step of the model that significantly predicted high ICC were: younger age < 30 years (adj. OR 2.69, 95% CI: 1.10–6.61), those living with crowding index of > 2 persons/room (adj. OR 2.32, 95% CI: 1.18–4.58), poor patients (adj. OR 2.06, 95% CI: 1.06–3.98) and TB patients who adopted coping strategies (adj. OR 5.13, 95% CI: 2.26–11.68).

Sensitivity analyses using different thresholds for catastrophic cost were analysed (Table 5). For each threshold level, both bivariate and multivariable analyses were evaluated in a similar way to that used with the > 20% threshold. In the multivariable logistic regression, coping strategy was a common determinant (predictor) for ICC for all 4 catastrophic thresholds, while being poor was retained as a predictor in 3 threshold levels (10%, 25% and 30%). Crowding index was retained in the models that used 25% and 30% thresholds. Age groups and place of residence were retained in 1 scenario only (10%).

Discussion

This is the first study conducted in Egypt to assess the economic burden of TB diagnosis and treatment. The incidence of catastrophic cost in this study was 24.1% although services (diagnosis, laboratory investigations and drugs) provided by the Ministry of Health and Population

Figure 1 Thresholds of catastrophic total cost of tuberculosis, Egypt, 2019

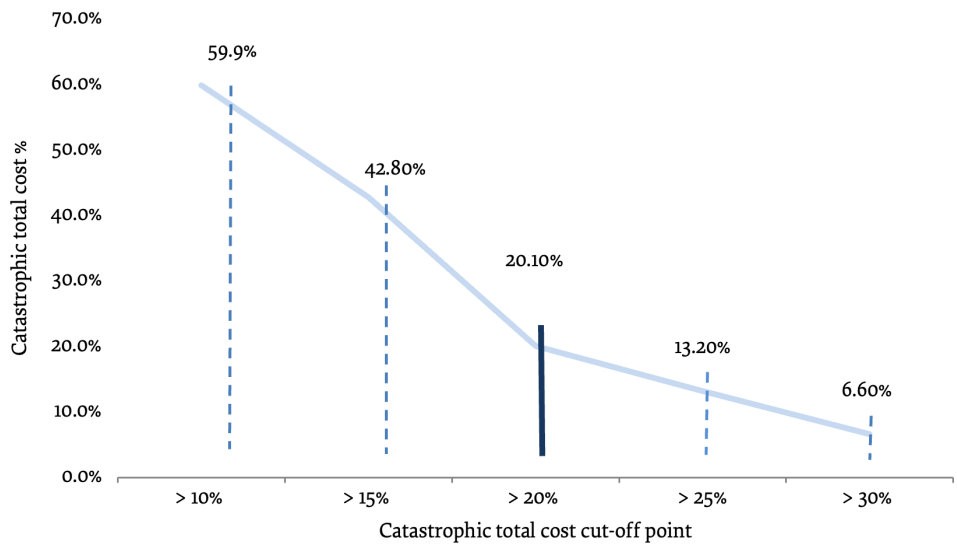

Table 3 Distribution of total catastrophic household costs among tuberculosis patients, Egypt, 2019

Category	Total catastrophic HH cost		P-value	cOR	95% CI
	Yes	%			
Age (years)					
< 30 (*n* = 83)	25	30.1	0.039	2.37	1.05–5.39
30–49 (n109)	27	24.8	0.147	1.81	0.81–4.04
≥ 50 (*n* = 65)	10	15.4	–	–	–
Sex					
Male (*n* = 159)	43	27.0	0.163	0.65	0.35–1.20
Female (*n* = 98)	19	19.4			
Current marital status					
Single (*n* = 89)	23	25.8	0.642	1.16	0.63–2.12
Married (*n* = 151)	35	23.2	–	–	–
Divorced/widow (*n* = 17)	4	23.5	0.974	1.02	0.31–1.33
Education level					
Illiterate (*n* = 58)	14	24.1	0.800	1.13	0.44–2.94
Primary/secondary (*n* = 158)	39	24.7	0.716	1.17	0.51–2.65
University (*n* = 41)	9	22.0	–	–	–
Employment					
Governmental (*n* = 63)	9	14.3	–	–	–
Freelance/private (*n* = 142)	39	27.5	0.043	2.72	1.03–5.04
Jobless (*n* = 52)	14	26.9	0.096	2.21	0.87–5.63
Crowding index					
1–2 persons/room (*n* = 202)	42	20.8			
> 2 persons/room (*n* = 55)	20	36.4	0.017	2.18	1.14–4.15
Residence					
Urban governorate (*n* = 212)	48	22.6			
Urban/rural governorate (*n* = 45)	14	31.1	0.228	1.54	0.76–3.13
Type of TB					
Pulmonary (*n* = 171)	41	24.0			
Extrapulmonary (*n* = 86)	21	24.4	0.936	1.02	0.56–1.88
Breadwinner					
Patient (*n* = 215)	57	26.5			
Other family member (*n* = 42)	5	11.9	0.043	2.67	1.00–7.13
Diagnostic delay					
≤ 4 weeks®	17	23.0			
> 4 weeks	45	24.6	0.784	1.09	0.58–2.07
Income (poverty status)					
Non-poor (*n* = 194) ®	41	21.1			
Poor (*n* = 63) (US$ < 61/month)	21	33.3	0.049	1.87	1.00–3.49
Coping					
No (*n* = 228)	46	20.2			
Yes (*n* = 29)	16	55.2	< 0.001	4.87	3.19–10.84

cOR = crude odds ratio

was free. Comparing with studies that used similar methodology, a similar incidence (27–28%) of catastrophic cost was reported in Kenya (*14*) and South Africa (*15*) while a higher ICC (41%) was reported in Brazil (*16*). However, our finding was much lower than the corresponding figures reported in some African countries, e.g. Uganda (53.1%) and Zimbabwe (80%) (*6,7*), as well as in some Asian countries, e.g. China (33.6%) and Myanmar (60%) (*10,17*). In all these studies, including ours, the total catastrophic costs are considered high and pose a high economic burden on TB patients and their families as most TB patients in developing countries are poor.

Table 4 Predictor factors associated with high catastrophic total household costs among tuberculosis patients using multivariable logistic regression (final model)

Category	Multivariable logistic regression analysis		
	P-value	Adjusted OR	95% CI
Age			
< 30 years	0.030	2.96	1.10–6.61
30–49 years	0.369	1.49	0.62–3.58
≥ 50 years	–	–	–
Crowding index			
1–2 persons/room			
> 2 persons/room	0.015	2.32	1.18–4.58
Income (poverty status)			
Non-poor			
Poor (US$ < 61/month)	0.032	2.06	1.06–3.98
Coping strategy			
No			
Yes	< 0.001	5.13	2.26–11.68

Variables entered at the beginning of the model were age group, sex, employment, place of residence, crowding index, breadwinner, poverty status and coping.
OR = odds ratio; CI = confidence interval.

In this study, ≥ 50% of the total direct cost was incurred during the period between onset of symptoms and time of diagnosis. This is in agreement with the findings of other studies in Africa and Asia (*9*, *18–21*). The longer the pre-diagnosis period, the higher the cost incurred by TB patients before treatment. Lack of public awareness about the symptoms is one of the reasons for the long delay before diagnosis and increased household impoverishment. In our study, direct cost was much higher than indirect cost incurred for TB in the pre-diagnosis period, while the reverse was true during the intensive and continuation phases. In contrast, higher indirect cost, in either the pre-diagnosis period or the post-diagnosis, was reported in Nigeria (*18*). Low percentage of indirect cost was reported in Delhi, India, which may be accounted for by the availability of TBMUs near the workplace or residence of the patients (*22*). The presence of DOTS (directly observed treatment, short course) centres near the homes and workplaces of TB patients has a positive impact on travel by decreasing both time and non-medical costs (*22*). There were marked variations between different studies regarding the ratio of direct to indirect costs. These differences may be attributed to the method used to calculate the indirect costs, financial and welfare policies in regard to TB management and the role of nongovernmental organizations in supporting poor patients.

Table 5 Sensitivity analyses to identify determinants of catastrophic total cost using different thresholds of the household income

Catastrophic threshold (%)	Significant variables (bivariate analysis)	Significant determinant variables (multivariable logistic regression analysis)
10	Age group Coping Place of residence	Age group Poor status Coping Place of residence
15	Coping Employment	Coping
25	Crowding index Poor status Coping	Crowding index Poor status Coping
30	Crowding index Poor status Coping	Crowding index Poor status Coping

Analysing the determinants of high catastrophic cost showed that patients aged < 30 years incurred more than double catastrophic total cost than the older group. A similar result was found in Nigeria (*18*) and India (*20*), while studies in China, Benin and Nigeria reported a greater cost among elderly people (*9,23,24*). Other studies, however, have reported no association between age and catastrophic cost (*6–8,14,15,22*). Younger TB patients are more likely to be affected financially and economically due to the long duration of the TB episode, which results in reducing the income of patients, particularly those working in the private sector or as freelancers with low monthly income.

In this study, males experienced greater catastrophic costs but after adjustment for other factors this association disappeared. A number of studies have reported nonsignificant high cost among males (*6–9,14,15,23*) while others have reported significant high catastrophic cost incurred among males (*17,18,22,24*).

Consistent with previous reports, our findings revealed no association between education level and catastrophic cost (*6–8,10,14,16*). There was no consensus in the studies that analysed the association between education level and catastrophic cost, as some studies reported higher costs among educated patients (*18,22–24*) while others reported the opposite (*9,10*).

Employment status was not found to be a determinant for catastrophic cost in our study, which is in agreement with studies conducted in Indonesia and India (*8,22*), however, other studies have reported significant higher catastrophic cost among the unemployed (*9,10,15,16*).

Patients living in houses with a crowding index > 2 were more likely to incur greater household total catastrophic cost. Poor families with TB patients are characterized by having large family sizes, which adds a further economic burden and most likely exposes them to high catastrophic cost. However, studies in China and rural areas of South Africa and India have reported that large families were less likely to be exposed to high catastrophic cost, which may result from the family having more earners (*9,15,22*).

Our findings emphasize the importance of coping as a determinant factor behind high catastrophic cost. Those using coping strategies were 5 times more likely

to experience catastrophic cost. Coping strategies are associated with poverty, which is considered one of the main deterministic factors associated with catastrophic cost. Similar findings have been reported in almost all studies.

This study has some limitations. It included only new TB patients and excluded re-treated, multidrug resistant patients and children. Recall bias is one of the characteristics of studies concerned with income and cost of treatment. However, we tried to minimize this by conducting a prospective cohort study and interviewed TB patients at short intervals.

Egypt started implementing the universal health care in 2019 in a few governorates. The determinants identified in this study should be considered by the Ministry of Health and Population when implementing universal health care coverage by engaging the various ministries concerned, e.g. social and finance, to mitigate the economic and financial burden of families affected by TB.

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Coût total des dépenses catastrophiques des ménages liées à la tuberculose en Égypte : incidence, facteurs de coût et implications politiques

Résumé

Contexte : La tuberculose est une maladie qui touche les pauvres de manière disproportionnée. En effet, l'Organisation mondiale de la Santé a classé les facteurs économiques parmi les principaux obstacles à la prise en charge de la tuberculose.

Objectifs : La présente étude estime le coût total des dépenses catastrophiques des ménages liées à la tuberculose et ses déterminants parmi les patients tuberculeux égyptiens nouvellement diagnostiqués.

Méthodes : Il s'agissait d'une étude de cohorte prospective couvrant 257 patients atteints de tuberculose enregistrés en 2019. Les patients ont été suivis deux fois par mois jusqu'à la fin de leur protocole thérapeutique (quatre visites). Un questionnaire standardisé publié par le sous-groupe de travail sur la pauvreté du Partenariat Halte à la tuberculose a été utilisé après quelques modifications mineures. Les coûts suivants ont été mesurés : coûts avant le diagnostic, coûts directs et indirects, coûts pour les personnes qui s'occupent des malades et coûts de l'adaptation à la situation financière ainsi que le revenu annuel du ménage. Les coûts (directs et indirects) étaient considérés comme étant catastrophiques si le coût total du traitement de la tuberculose dépassait 20 % du revenu annuel du ménage. Des analyses de sensibilité ont été effectuées en utilisant différents seuils.

Résultats : L'incidence du coût total des dépenses catastrophiques pour les ménages était de 24,1 %. Le coût total moyen du traitement de la tuberculose était de 198 dollars des États-Unis. Plus de 50 % du coût direct total a été engagé pendant la phase précédant le diagnostic. Après ajustement pour d'autres variables déterminantes à l'aide d'une régression logistique multivariable, nous avons constaté que le fait d'être âgé de moins de 30 ans, de vivre dans une maison dont l'indice de surpeuplement est supérieur à deux, la pauvreté et l'adaptation à la situation financière étaient plus susceptibles de causer un coût catastrophique total plus élevé.

Conclusions : Un nouveau patient tuberculeux sur quatre a subi un coût catastrophique. Les principaux facteurs de coût étant la pauvreté et l'adaptation à la situation financière, le ministère de la Santé et de la Population devrait collaborer avec le ministère des Finances et les organisations non gouvernementales (ONG) pour mettre en place un système de protection sociale destiné aux familles pauvres comptant des patients tuberculeux.

التكلفة الإجمالية الباهظة للأسر بسبب السل في مصر: معدل التكلفة الباهظة، ومسببات التكلفة، والآثار المترتبة على السياسات

محسن جاد الله، وجدي أمين، ميرفت راضي

الخلاصة

الخلفية: السل مرض يؤثر على الفقراء بدرجة متفاوتة. وترى منظمة الصحة العالمية أن العوامل الاقتصادية أحد العوائق الرئيسية أمام معالجة السل.

الأهداف: هدفت هذه الدراسة إلى تقدير التكلفة الإجمالية الباهظة للسل التي تتكبدها الأسرة، والعوامل المحددة لها بين المرضى المصريين المصابين بالسل الذين شخِّصت حالاتهم حديثًا.

طرق البحث: كانت هذه دراسة استباقية أترابية شملت 257 مريضًا بالسل مُسجَّلًا في عام 2019. وجرت متابعة المرضى كل شهرين حتى نهاية نظام المعالجة (4 زيارات). واستُخدم استبيان موحد نشره الفريق العامل الفرعي المعني بالفقر التابع لشراكة دحر السل، بعد تعديل طفيف. وقد قِيسَت التكاليف التالية: تكاليف ما قبل التشخيص، والتكاليف المباشرة وغير المباشرة، وتكاليف الوصي والتكيف، فضلًا عن الدخل السنوي لِلأسرة المعيشية. وتُعد التكلفة (المباشرة وغير المباشرة) باهظة إذا تجاوزت التكلفة الإجمالية لعلاج السل 20٪ من الدخل السنوي للأسرة. وقد أُجريت تحليلات الحساسية باستخدام عتبات مختلفة.

النتائج: بلغت نسبة تحمل الأسرة لتكلفة باهظة 24.1٪. وبلغ متوسط التكلفة الإجمالية لعلاج السل 198 دولارًا أمريكيًّا. ويُدفَع أكثر من 50٪ من إجمالي التكاليف المباشرة خلال فترة ما قبل التشخيص. وبعد تعديل المتغيرات المحددة الأخرى باستخدام الانحدار اللوجستي المتعدد المتغيرات، وجدنا أن العمر أقل من 30 عامًا، والعيش في منزل ذي مؤشر ازدحام أكثر من 2، والفقر والتكيف كان أكثر عرضة لتحمل تكلفة باهظة أعلى.

الاستنتاجات : عانى مريض واحد من كل 4 مرضى جدد من مرض السل من تكلفة باهظة. نظرًا لأن العوامل الرئيسية للتكلفة كانت الفقر والتكيف ، يجب أن تتعاون وزارة الصحة والسكان مع وزارة المالية والمنظمات غير الحكومية لوضع خطة لنظام الحماية الاجتماعية للأسر الفقيرة مع مرضى السل.

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Understanding the reasons for refusal of polio vaccine by families in Quetta Block, Pakistan

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Abstract

Background: Global polio eradication is a goal yet to be achieved in countries like Pakistan. In recent years, the Polio Eradication Initiative has been making steady progress with good campaign coverage and low numbers of polio cases. However, in 2019 Pakistan reported 146 cases compared to 12 in 2018. A major factor cited for this regression was a surge in vaccine refusals by parents and caretakers.

Aims: To assess the reasons for the refusal of polio vaccination in Quetta Block, Balochistan.

Methods: The study was conducted using data acquired from 2 polio vaccination campaigns over 3 months in 2019. The data were collected in Quetta Block, a highly endemic zone having continuous transmission of the polio virus over several years. The data were analysed using the statistical software, *SPSS*, version 20. We used descriptive statistics to demonstrate the characteristics of the study population. Categorical variables were measured as frequencies and percentages.

Results: Refusal rates were almost 8.6% for the polio campaign of April and 8.1% for June 2019. Misconceptions about vaccines made up 56.4% of reasons for refusals, followed by religion 16%.

Conclusion: Misconceptions about the vaccine are the main driving force behind vaccine refusals in the study setting. Efficient strategies are required to address misconceptions in this red zone of poliovirus transmission in Balochistan.

Keywords: vaccine refusal, polio eradication, Pakistan

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Introduction

Global eradication of polio is a necessary goal that is yet to be achieved in countries like Pakistan, where one of the most significant surges in number of polio cases was reported in 2019 (*1*). Currently, Pakistan is the only country, besides Afghanistan, with wild poliovirus 1 (WPV1) serotype-endemic reservoirs (*2*). In recent years, the Polio Eradication Initiative has been seen to be making steady progress with good campaign coverage and low numbers of cases. However, 2019 proved to be a year of regression with Pakistan reporting 146 cases compared with only 12 in 2018 (*3*).

A major reason given for this regression was a surge in vaccine refusals by parents and caretakers. In 2012, the World Health Organization (WHO) initiated the SAGE Working Group on Vaccine Hesitancy to better understand the community's polio vaccine refusal. The working group highlighted factors influencing the decision by parents or caretakers to accept vaccines. It coined the term "vaccine hesitancy", which represents the delay in acceptance or refusal of vaccines despite the availability of vaccination services (*4*).

Confidence in vaccines is pivotal to maintaining the demand for and use of vaccines. It has been observed that providing vaccines becomes exceptionally challenging when targeting groups that refuse or delay acceptance (*5*).

Regardless of the challenges, in collaboration with WHO, Pakistan initiated enhanced measures, including community mobilization, community-based immunization and supplementary immunization activities (*6*). Generous funding from the Bill and Melinda Gates Foundation and other organizations have played a pivotal role in these efforts (*6*).

In this study, we attempt to explain why Pakistan has been experiencing high caseloads despite achieving record success in vaccine coverage and political and community engagement. Our goal is to understand the reasons for the great surge in vaccine refusals.

Methods

Study design and duration

The study was conducted using data acquired from the 2 polio vaccination campaigns spread over 3 months in 2019.

Setting

This study was conducted in the Quetta Block in Baluchistan province, Pakistan. This particular block is considered a highly endemic zone because of the continuous transmission of poliovirus in the last few years. Quetta Block has 3 major cities: Killa Abdullah, Pishin and Quetta. The cities are further subdivided into *tehsils* and union councils.

The data for Quetta city were acquired from the municipal offices of Chiltan and Zarghoon towns. Similarly, for Pishin the data were acquired from the offices of the *tehsils* of Barshore, Karezat and Pishin. For Killa Abdullah the data were acquired from the *tehsils* of Chaman, Gulistan and Killah Abdullah.

Sample

The study sample was acquired from the database of the Emergency Operation Centre for Polio Eradication Initiative, Balochistan at Quetta. The emergency operation centre is managed through a public–private partnership between the Government of Balochistan and WHO, UNICEF, the Bill and Melinda Gates Foundation, Rotary International and the Centers for Disease Control and Prevention in the United States of America.

Immunization activities in Pakistan include the routine immunization coverage by WHO and supplementary immunization activities, which include the use of bivalent oral polio vaccine (bOPV) (poliovirus types 1 and 3). There are community-based vaccination and permanent transit points, which employ community health workers in the districts that have continuous wild poliovirus reservoirs (7).

As part of the official protocol, data for all children receiving the polio vaccine are collected to measure the success of the campaign and identify challenges experienced during vaccination outreaches. The data are de-identified and shared with the relevant authorities or stakeholders for research, reports and record-keeping.

The total sample we received for our study was 754 945 children aged 0–5 years residing in Quetta Block, covering 2 campaigns: the campaign for April [national immunization days (NID)] and the campaign of June [sub-national immunization days (SNID)] of the Quetta Block. NID is mass immunization campaign conducted across the country to provide polio vaccine to every child under the age of 5 years. It is done house-to-house, and children are vaccinated and a record maintained. In comparison, SNID is an extra scheduled mass immunization campaign that is conducted only in those areas with high numbers of positive cases to ensure proper immunization.

According to a study conducted in Khyber Pakhtunkhwa, Pakistan, respondents misconceived the vaccine to be capable of causing harm to the immune system (93%), triggering adverse reactions 97.5%, to be against their social and moral values (95%), and to be not as good as traditional methods for treating children 98.5% (8). In our study sample we aimed to identify the reasons for refusal of the polio vaccine

Data analysis

The data acquired were entered and analysed using *SPSS*, version 20. We used descriptive statistics to demonstrate the characteristics of the study population. Categorical variables were measured as frequencies and percentages.

Ethical review

Ethical review was carried out by the Institutional Review Board of Bolan Medical College, Quetta. The data were analysed with the permission of the emergency operation centre at Quetta.

Table 1 Characteristics of the polio vaccination campaign in Quetta Block, April and June 2019

Element of vaccination campaign	April			June		
	Age (months)		Total	Age (months)		Total
	0–11 No. (%)	12–59 No. (%)	No. (%)	0–11 No. (%)	12–59 No. (%)	No. (%)
Total coverage			672 311 (91.4)			694 075 (91.9)
Location						
At home	108 350 (14.7)	475 967 (64.7)	584 317 (79.5)	110 378 (14.62)	487 870 (64.62)	598 248 (79.2)
Other than home			87 994 (12.0)			95 737 (12.7)
Outside the home home	1 200 (0.2)	13 415 (1.8)	14 615 (2.0)	1 475 (0.2)	14 414 (1.91)	15 889 (2.1)
At fixed points	2 218 (0.3)	5 683 (0.8)	7 901 (1.1)	2 701 (0.36)	5 735 (0.7)	8 436 (1.1)
At transit point	3 258 (0.4)	14 421 (2.0)	17 679 (2.4)	4 069 (0.5)	14 390 (1.9)	18 459 (2.5)
At school			27 193 (3.7)			24 555 (3.3)
Vaccination of guests[a]			20 606 (2.8)			28 398 (3.8)
Refusals			63 149 (8.6)			60 870 (8.1)
Total			735 460			754 945

[a]*Children offered vaccination while visiting houses of their relatives, friends or acquaintances.*

Table 2 Characterization of polio vaccine refusals by parents and caretakers in the Quetta Block and its three cities during the polio vaccination campaigns of April and June 2019 (note: there were no direct refusals)

Location	Month	Reason for refusal						
		Religion	Misconception	Demand for compensation	Repeated vaccinations	Child sick	Child sleeping	Other
Quetta Block	April	9449	36855	1469	3254	4214	7765	143
Quetta Block	June	10771	33031	1551	3094	4672	7703	48
Quetta city	April	2927	23278	364	1207	3190	5981	106
Quetta city	June	3296	19834	398	1164	3589	6266	33
Pshin city	April	1464	3396	285	326	441	987	20
Pshin city	June	1678	2868	363	547	462	793	9
Killa Abdullah	April	5058	10181	820	1721	583	797	17
Killa Abdullah	June	5797	10329	790	1383	621	644	6

Results

The description of the vaccination campaigns is shown in Table 1, which shows the frequencies of the children vaccinated and refusals during the 2 campaigns. The vaccinated children were categorized into 2, vaccinated at home and vaccinated outside the home. Vaccinated outside the home had 5 sub-categories: vaccination outside the home, at fixed points, at transit points, guest vaccination and vaccination at school.

During the April campaign, a total of 735 460 children were approached for vaccination. These children were divided into 2 age groups for convenience, 0–11 months and 12–59 months. Overall, the total number of children successfully vaccinated was 672 311 (91.4%), 63 149 (8.6%) refused the vaccination. The total number of children vaccinated at home was 584 317 (79.5%), with 108 350 (14.7%) in the 0–11 months age group and 475 967 (64.7%) in the 12–59 months group. The total number of children vaccinated outside the home was 87 994 (12.0%).

During the June campaign, the total number of children approached for vaccination was 754 945. The total number successfully vaccinated was 694 075 (91.9%). The number of refusals was 60 870 (8.1%). The total number of children vaccinated at home was 598 248 (79.2%). The total vaccinated outside the home was 95 737 (12.7%).

The health care workers recorded the reasons for refusals during the campaigns using a standardized tool (tally sheet) designed by WHO. The tally sheet documents details such as total number of children, children under the age of 6 months and children under 5 years. It has a section to record families that refuse vaccination with a column to specify the reason.

Many reasons were recorded, including: religion, misconception about the vaccine, demand for compensation (groceries, cash, materials for construction, or electricity), campaign fatigue (families tired of repeated vaccination campaigns), unavailability of children because they were not well or sleeping and refusal without reason. The unknown reasons were recorded under "other".

Our study focused only on the reasons for refusals. The families that refused vaccines were revisited in the catch-up phase of the vaccination campaign. Since our study focused on the reasons for refusal, we documented earlier statistics to better understand the refusals.

The characteristics of vaccine refusal in each campaign (April 2019 and June 2019) for Quetta Block and its associated cities, Quetta city, Pishin city and Killa Abdullah city are shown in Table 2. To better understand refusal, we took the average of each refusal reason from both campaigns. Overall, the total number of refusals was 62 009. The distribution of reasons in Quetta Block is shown in Table 2. The most prevalent reason was misconception, reported by 34 943 (56.4%) individuals. Other factors were religion 10 110 (16.3%), children sleeping 7734 (12.5%), child was sick 4443 (7.2%), repeated campaigns 3174 (5.1%), demand for compensation 1510 (2.4%) and other reasons 96 (0.2%). There were no direct refusals.

The characterization of refusals for Quetta city was assessed individually. The total number of refusals was 35 816. Misconception remained the most reported factor at 60.2%, followed by refusal due to the children sleeping at the time of the vaccination 17.1%. The third leading cause, at 9.5%, was refusal because the child was sick. The fourth leading cause, at 8.7%, was religion, however, this was the second most reported reason in Quetta Block. Demand for compensation were the least reported, at 1.1% (Figure 1).

The total number of refusals in Pishin city was 6819. The trend in reasons for refusal was the same as in Quetta Block, however, the value for misconception was lower, 45.9% (Figure 2). Religion was the second most reported at 23.0%, which was comparatively higher than Quetta Block and Quetta city.

The total number of refusals reported in Killa Abdullah city was 19 373. The trends were similar to Pishin. Misconception (52.9%) was the most reported reason, and religion (28.0%) the second most commonly reported (Figure 3).

Figure 1 Characterization of polio vaccine refusals by parents and caretakers in Quetta city, Pakistan, April and June 2019

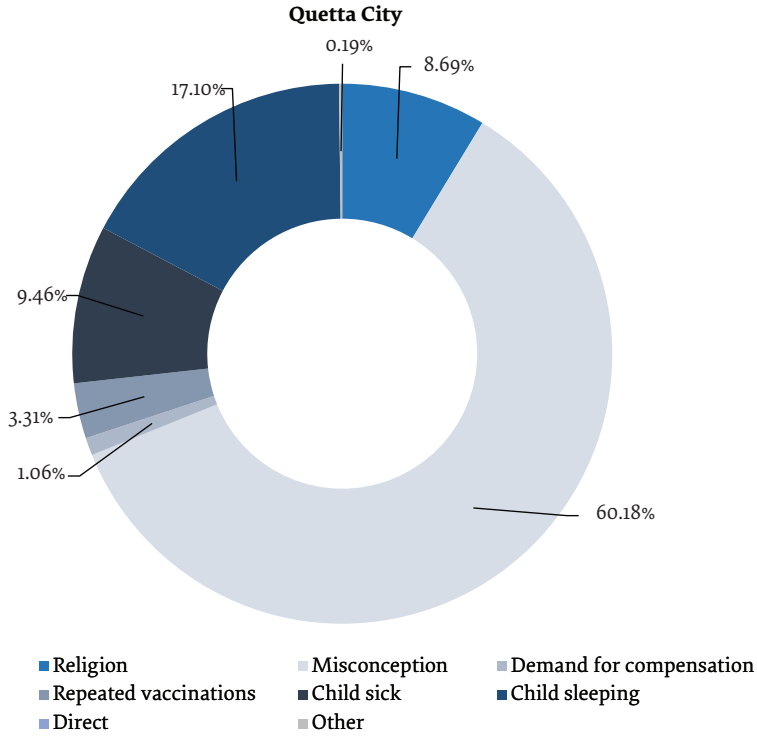
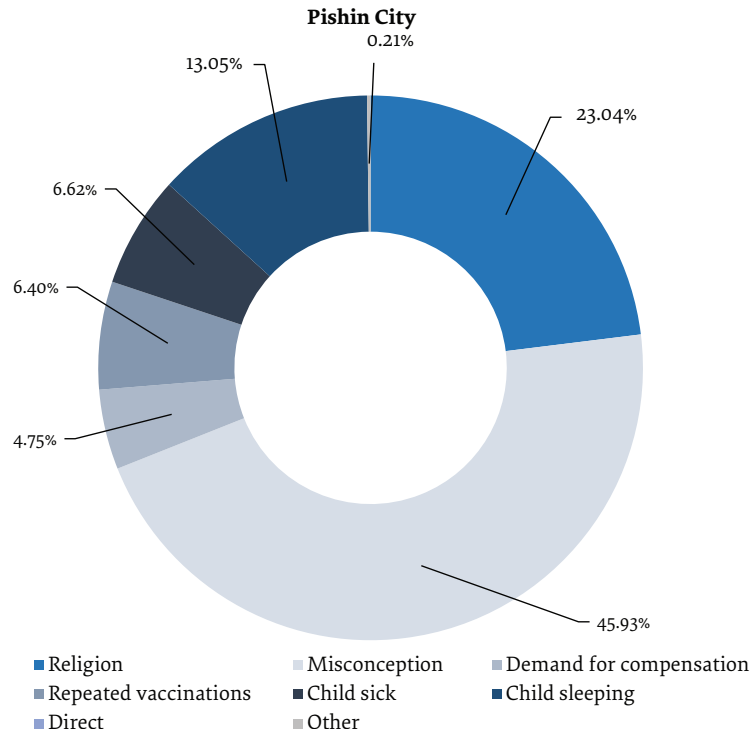


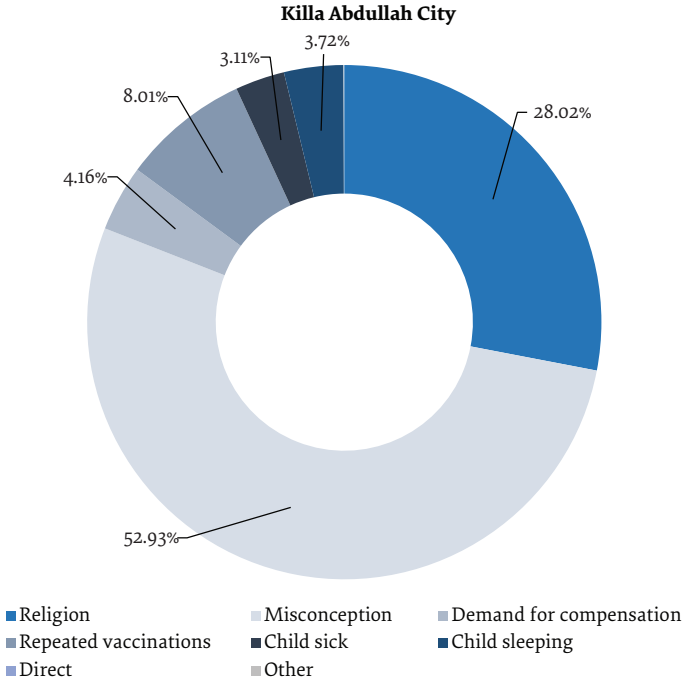
Figure 2 Characterization of polio vaccine refusals by parents and caretakers in Pishin city, Pakistan, April and June 2019



Discussion

Our study showed that misconceptions (distinct from religion) about vaccines contributed the most to vaccine hesitancy or refusal. Although poliovirus has been eliminated in most parts of the world, Pakistan and Afghanistan remain the only 2 countries with endemic poliovirus infections. After successfully keeping the number of polio cases as low as 8 in 2018, the spike to 146 cases in 2019 is concerning for the Polio Eradication Initiative in Pakistan (9). Of these 146 cases, there were 12 cases of wild poliovirus from Baluchistan, where 6 were

Figure 3 Characterization of polio vaccine refusals by parents and caretakers in Killa Abdullah city, Pakistan, April and June 2019 (other = 0.1%)



from Quetta block. Of the total cases in Quetta Block, 5 were reported in Killa Abdullah district (*10*).

Research has shown multiple reasons for under-vaccination in developing countries, with vaccine hesitancy/refusal being the main one (*11,12*). Vaccine refusal is complicated and must be understood in its social, cultural, religious and epidemiological contexts (*12*).

Our study articulates the reasons for the surge in vaccine refusals as a triad of religion, misconception and political factors. Misconception and low vaccine literacy collectively accounted for 59% and 46% respectively of the reasons for refusals in a study conducted in Nigeria (*14*). Religions reasons contRepeated vaccinations 52% of the total refusals in the same study. In another study conducted in Quetta and Peshawar, a negative perception of vaccines (84.8%) along with religious beliefs (39.06%) were the main reasons for vaccine refusal (*15*). In northern Nigeria, some prominent religious figures spread the rumour that polio vaccination was a conspiracy of the Western intelligence agencies to spread HIV or cause infertility among Muslim children (*16*).

Previous analysis of political factors indicates fears due to suspicion of health workers as agents of foreign governments. This fear was linked to the discovery of Osama bin Laden's residence in Pakistan. It alleged that one of the doctors administering the polio vaccination door-to-door used it as camouflage to access bin Laden's residence . This rumour has impacted polio vaccination severely (*17*) and health workers are viewed with suspicion and not allowed to conduct door-to-door campaigns (*18*). Some areas have been affected more by this incident than others (*6*). However, the exact impact of these reasons have still not been extensively studied.

Younger maternal age, older child (age group 5 and 6 years), uneducated parents and delaying the vaccination of sick children are other reasons that play a role in vaccine refusal (*19*). Poor awareness programmes, low literacy rates and vaccine hesitancy (*13*) are also significantly associated with high rates of refusal.

Reasons for vaccine refusal are distinct for different countries (*11*) and may vary in different regions of the same country. These reasons should be investigated within each context to understand the dynamics and address them appropriately.

In our study of 2 polio vaccination campaigns, we observed that 9% of 735 460 children in April 2019 and 8% of 754 945 children in June were not vaccinated due to refusal. Overall, the most common reason for refusals in Quetta Block was misconception, religion, children unavailable because they were sleeping or because they were sick. A minor, but new, reason for refusal was the community demanding compensation such as cash, food items or materials related to electricity and construction in exchange for getting their children vaccinated.

In November 2015, the government of Pakistan established the Islamic Advisory Group on Polio Eradication (IAG), enlisting the help of clerics to help raise community awareness about the benefits of polio vaccine and affirm that vaccination does not conflict

with the teachings of Islam (*20*). The IAG held multiple sessions with health care providers to discuss every aspect of polio vaccination and campaigns. The group developed literature on polio vaccination based on the Quran and Hadith and promoted it via electronic and print media to help counter negative religious beliefs about polio vaccine. The efforts of the IAG had a positive impact on the polio campaigns and helped decrease the rate of refusals. However, efforts need to continue as vaccine refusals still comprise a significant reason for the continuing endemicity of vaccine-preventable diseases like polio. The IAG is positioned to strengthen polio vaccination and contribute to the eradication of polio polio from Pakistan (*15*). It is noteworthy that refusal based on religious beliefs significantly declined when approached in a context-appropriate manner, indicating that sustained efforts by the IAG can result in significant decline of vaccine refusals due to religious beliefs.

This study is significant compared with previous studies because instead of relying on qualitative or descriptive methods of data collection by female health workers, health workers or community members/mothers (*21,22*), it used targeted data of the exact number of community refusals from the emergency operation centre in Balochistan. This means that each count of refusal is verified, adding to the validity of the data.

Our study is also unique because it was an analysis and comparison of 2 campaigns. Compared with smaller studies in north-west Pakistan analysing responses from 200 female health workers and 210 mothers for their perspective/perception of vaccine and vaccine refusals (*21*), our study recorded 754 945 individual responses from community data in 2 vaccination campaigns conducted in the Quetta Block in 2019. This data is significant in terms of sample size and validity. No previous study from Pakistan on polio vaccine refusal has reported such a large volume of data or presented community data from Balochistan (*21,22*). The data presented here are based on 2 different campaigns in the same region over 3 months. This emphasizes the ability of our data to represent refusal status over an extended period. Previous research did not shed light on anything more than a single-period data; 2 studies by Khan et al. presented KAP analysis of residents and religious scholars towards the polio vaccination in Quetta and Peshawar blocks (*15,23*). Our analysis captured a more diverse array of reasons for vaccine hesitancy/refusal in Balochistan (*21,22*). Hence our study makes a significant contribution to the scientific literature about polio vaccine refusals in Balochistan, specifically the Quetta Block.

Our study provides detailed evidence behind refusals and identifies misconceptions about polio vaccine as the most significant factor in the community's refusal of polio vaccination.

This study has limitations. Pakistan and Afghanistan share a porous border without immigration control; Quetta Block has a significant number of residents who are not necessarily accounted for, making it hard to assess the coverage of polio vaccination campaigns. Quetta Block is multi-ethnic and multicultural, the blending of its local community with the Afghan immigrants/refugees can be viewed in 2 ways. First, being of 2 different nationalities may influence their refusal of a vaccine. Second, the closeness of the community, with similar social, ethnic and religious backgrounds may influence the reasons for refusing the vaccine. However, this effect cannot be ascertained unless the 2 communities are studied and compared separately.

However, reflecting on recent efforts to boost COVID-19 vaccine acceptance rates, Pakistan found itself in a unique situation to generate demand for a new vaccine in a country that was still rife with vaccine hesitancy due to a history of misinformation and myths. As a significant step towards promoting vaccines and mitigating misinformation around vaccines, the Government of Pakistan collaborated with UNICEF to track vaccine uptake trends through social media analysis and research surveys. This action allowed the government to design content (flyers, social media posts, mainstream media news, advertisements) that address the rumours and underlying fear among the public. The Ministry of Health expanded the polio vaccination helpline in the country to include COVID-19 and allow easy public access to vaccines and information about them (*25*).

Addressing vaccine hesitancy and understanding the reasons behind them is a crucial step, and examples like the ones shared in this paper hold a promising prospect for achieving the goals for vaccine coverage.

Conclusion

Contrary to popular belief that religion contributes most most to vaccine hesitancy, our study confirms that misconceptions are of far greater significance. Targeted efforts to address existing and emerging reasons for refusal must be made to improve the community's acceptance and perception of the polio vaccine. We want to reiterate that the Quetta Block represents a high-risk area and can compromise national eradication efforts if not addressed immediately.

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Comprendre les raisons pour lesquelles les familles rejettent le vaccin antipoliomyélitique dans le bloc de Quetta (Pakistan)

Résumé

Contexte : L'éradication mondiale de la poliomyélite est un objectif qui n'a pas encore été atteint dans des pays comme le Pakistan. Ces dernières années, l'Initiative pour l'éradication de la poliomyélite a réalisé des progrès constants caractérisés par une bonne couverture de la campagne et un faible nombre de cas de poliomyélite. Cependant, en 2019, le Pakistan a notifié 146 cas, contre 12 en 2018. Une raison majeure citée pour expliquer cette régression est l'augmentation du nombre de parents et d'aidants qui rejettent la vaccination.

Objectifs : Évaluer les raisons du rejet de la vaccination antipoliomyélitique dans le bloc de Quetta, au Baloutchistan.

Méthodes : L'étude a été réalisée à partir des données acquises lors de deux campagnes de vaccination antipoliomyélitique menées pendant trois mois en 2019. Les données ont été recueillies dans le bloc de Quetta, une zone fortement endémique où la transmission du poliovirus est continue depuis plusieurs années. Les données ont été analysées à l'aide d'une plateforme logicielle d'analyse statistique. Nous avons utilisé des statistiques descriptives pour mettre en évidence les caractéristiques de la population d'étude. Les variables catégorielles ont été mesurées sous forme de fréquences et de pourcentages.

Résultats : Les taux de rejet étaient de près de 8,6 % et 8,1 % pour les campagnes antipoliomyélitiques d'avril et de juin 2019, respectivement. Les idées fausses au sujet des vaccins représentaient 56,4 % des raisons justifiant le rejet du vaccin, suivies par la religion pour 16 %.

Conclusion : Les idées fausses concernant les vaccins sont les principales causes de rejet de la vaccination. Des stratégies efficaces sont nécessaires pour lutter contre ces idées fausses dans la zone rouge de circulation du poliovirus au Baloutchistan.

فهم الأسباب الكامنة وراء رفض الأسر للقاح شلل الأطفال في مقاطعة كويتا، باكستان

محمد سمسور زراق، حمايال سانا، زارا أرشاد، أنوم سليم، مزهجان شاه، هلماند طارين، سامي الله، سابا بالوش، صالحة كاكار، كلسوم كاكار

الخلاصة

الخلفية: إن استئصال شلل الأطفال هدف عالمي لم يتحقق بعدُ في بلدان مثل باكستان. وعلى مدى السنوات الأخيرة، أحرزت "مبادرة استئصال شلل الأطفال" تقدمًا مطردًا بفضل التغطية الجيدة بالحملات وانخفاض عدد حالات الإصابة بشلل الأطفال. ومع ذلك، أبلغت باكستان عن 146 حالة في عام 2019 في مقابل 12 حالة في عام 2018. ومن العوامل الرئيسية التي أشير إليها في هذا التراجع الزيادة الكبيرة في حالات رفض الوالدين ومقدمي الرعاية للقاحات.

الأهداف: هدفت هذه الدراسة الى تقييم الأسباب وراء رفض التطعيم ضد شلل الأطفال في مقاطعة كويتا بلوك، في بلوشستان .

طرق البحث: أجريت الدراسة على بيانات جرى الحصول عليها من حملتين للتطعيم ضد شلل الأطفال على مدى 3 أشهر في عام 2019. وجُمعت البيانات في منطقة كويتا بلوك، وهي منطقة شديدة التوطن تعاني من استمرار انتقال فيروس شلل الأطفال على مدى السنوات العديدة الماضية. وجرى تحليل البيانات على منصة برمجيات إحصائية. واستخدمنا الإحصاءات الوصفية لتوضيح خصائص مجموعة الدراسة. وقيست المتغيرات الفئوية مثل التواتر والنسبة المئوية.

النتائج: بلغت معدلات الرفض 8.6٪ تقريبًا لحملة شلل الأطفال في أبريل / نيسان و8.1٪ في يونيو / حزيران 2019. وشكلت المفاهيم الخاطئة عن اللقاحات 56.4٪ من إجمالي حالات الرفض، تلتها 16٪ من حالات الرفض لأسباب دينية.

الاستنتاجات: تُعَدُّ المفاهيم الخاطئة عن اللقاح القوة الدافعة الرئيسية وراء رفض أخذ اللقاح. ولا بد من وضع استراتيجيات فعالة للتصدي لهذه المفاهيم الخاطئة لإزالة التحفظات على اللقاحات في المنطقة الحمراء لانتقال فيروس شلل الأطفال في بلوشستان .

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Impact of COVID-19 on health professionals' education in Eastern Mediterranean Region

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Abstract

Background: The education sector is one of the major sectors adversely affected by the COVID-19 pandemic globally, and education of health professionals is no exception. Thousands of health professional institutions in the Eastern Mediterranean Region were closed abruptly to ensure the safety of students and staff.

Aims: This study aims to describe the situation of health professionals' education in the EMR during COVID-19 and review strategies adopted by institutions to ensure continuity of education.

Methods: A qualitative, exploratory, key informant-based survey involving 50 institutions was conducted in 13 Member States of the EMR. The survey included medicine (n=23), dentistry (n=9), nursing (n=13), and pharmacy (n=5) colleges. The questionnaire included 40 open-ended questions about the challenges facing health professionals' education during the COVID-19 lockdown and strategies adopted for the continuation of education. Data were analysed and summarized to reach meaningful conclusions.

Results: Almost all institutions in the EMR were closed during February and March 2020 as the number of cases increased. Most institutions, with few exceptions, in resource-constrained countries switched to online learning through emergency remote teaching mechanisms. COVID-19 caused delays in the completion of academic sessions and modifications to the curricula to cover courses within a short time.

Conclusion: COVID-19 may continue to impact health professionals' education. However, countries with better IT infrastructure and support will likely continue to develop their online educational capacities to reap the benefits of e-learning in the future.

Keywords: Health, education, Mediterranean, EMR, pandemic, COVID-19

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Background

The COVID-19 pandemic has had detrimental effects on global healthcare systems with a ripple effect on every aspect of human life *(1)*, including the education sector *(2)*. Health professionals' education has also been impacted by the pandemic *(3,4)*. To ensure the safety of students and staff, health professional institutions were closed, learning was suspended and examination schedules were disrupted, forcing students to continue their studies remotely *(5,6)*.

In the WHO Eastern Mediterranean Region (EMR), the pandemic caused unplanned, abrupt closure of almost all institutions, and as the pandemic continued, most institutions progressively moved to online learning. A plethora of challenges was associated with this unanticipated transition to online learning. There is limited information about how education was managed in most institutions in EMR during the pandemic lockdown. Very few studies have been conducted to explore the distressing impact it had on health professionals' education. A study conducted in Jordan identified poor internet coverage, lack of suitable digital devices, and variation in educational digital platforms as major challenges facing the promotion of online learning *(7)*. Another study conducted in Pakistan identified the shortage of IT staff and infrastructure, lack of teacher and student training on the use of digital technologies, inability to maintain online learner engagement, difficulty in marking online attendance, and inability to maintain work-life balance while working from home as the major challenges *(8)*. Research conducted in Egypt identified poor staff development, lack of continuity of clinical training, poor security and reliability of online assessment, cheating during online examinations, and a high number of student enrolment as major challenges *(9)*.

This qualitative exploratory study was initiated to understand the situation of health professionals' education in the EMR during the COVID-19 lockdown, identify challenges with the continuity of education, and recognize the impact of the pandemic on health professionals' education. The study explores strategies to deliver education in a more efficient and effective manner while ensuring the safety and security of students and staff as the pandemic continues.

Methods

A qualitative, key informant-based, exploratory study was conducted, involving institutions from 13 Member States of the WHO EMR. This was an institutions-based survey from selected countries, as it was difficult to approach all countries in the Region due to time and resource constraints. As the intent of the study was to explore the response of the institutions to continue education disrupted by the COVID-19 pandemic and the challenges faced by them in adopting digital technologies, a non-probability based purposive sample of 70 institutions was taken from 4 major disciplines, including medicine, dentistry, nursing, and pharmacy. Institutions were selected from the database of institutions available at the health workforce unit of WHO/EMRO and in consultation with WHO country offices. Fifty institutions accepted the invitation and responded. The primary criteria for the selection of a respondent were that they should be well-informed and actively involved in online learning in the institution and should be willing to participate in the study. Respondents were sent the questionnaire through an online link.

The questionnaire, mainly consisting of qualitative questions, was prepared and content validated through consultations with expert teachers and administrators involved in learning during the COVID-19 pandemic lockdown. The questions focused on the closure of institutions due to COVID-19 lockdown, use of digital technologies to resume learning activities, challenges faced by institutions in continuing learning, and strategies adopted to adjust curricula, teaching, learning, and assessment to the changing scenario. The online questionnaire was shared through SurveyMonkey during August and September 2020. All respondents provided written responses. In case of insufficient answers, additional information was requested through individual queries. Respondents were encouraged to consult other local information sources if they did not have sufficient information.

Qualitative content data analysis was performed by two independent researchers and data were summarized to reach meaningful conclusions. Researchers developed a data validation and analysis strategy to improve data credibility and make meaningful conclusions. Member checking and triangulation were done by inviting respondents to review their responses and by collecting additional information about institutions. Accuracy and rigour of the findings were ensured by using Lincoln and Guba's evaluation criteria for establishing the trustworthiness of qualitative research. 'Trustworthiness' involves establishing: 'credibility' (confidence in the 'truth' of the findings), 'transferability' (applicability of findings in other contexts), 'dependability' (consistency and repeatability of findings), and 'confirmability' (a degree of neutrality or the extent to which the findings of a study are shaped by the respondents and not researcher bias). Lincoln and Guba mentioned several techniques to establish the trustworthiness of qualitative research *(10)*.

Results

Fifty institutions from 13 EMR countries responded to the survey and completed the questionnaire. The health professional institutions included schools of medicine (23), dentistry (9), nursing (13), and pharmacy (5). Table 1 presents a list of participating countries and the number of institutions.

Health professional institutions in EMR experienced several challenges in managing the continuity of learning

Table 1 Distribution of EMR Member States and institutions participating in the survey

Country	Medical schools	Dental schools	Nursing schools	Pharmacy schools	Total (%)
Afghanistan	–	–	1	–	1 (2)
Bahrain	1	–	–	–	1 (2)
Egypt	3	–	6	2	11 (22)
Jordan	–	–	1	–	1 (2)
Lebanon	–	–	–	1	1 (2)
Iran	2	–	–	–	2 (4)
Iraq	5	–	–	–	5 (10)
Oman	1	–	–	–	1 (2)
Pakistan	8	7	1	–	16 (32)
Saudi Arabia	–	–	1	1	2 (4)
Sudan	1	–	2	–	3 (6)
United Arab Emirates	1	2	–	1	4 (8)
Yemen	1	–	1	–	2 (4)
Total (%)	23 (46)	9 (18)	13 (26)	5 (10)	50

as the pandemic continued. EMR comprises a diverse range of Member States, including those facing protracted crises (e.g. Afghanistan, Iraq, Libya Somalia, Sudan, Syria, Yemen) and the high-income Gulf Cooperation Council countries. Several challenges were cross-cutting among the institutions and countries. These challenges are briefly described in the following sections.

The abrupt closure of institutions and their transition to online learning

As the virus spread quickly, institutions in Iran, Iraq, and Bahrain were among the first to close (in February 2020). Closure of institutions in most countries was a national-level decision, beyond the control of the institutions. Most institutions remained physically closed, at least for some weeks between March and May 2020. Revival and continuity of learning emerged as daunting tasks. Transitioning to online learning was the only option, however, switching to online learning in the shortest possible time, especially for resource-constrained institutions, was full of challenges. These challenges included general constraints due to poor IT infrastructure, unavailability of appropriate bandwidth and speed, and the cost of the internet connection to support learning.

Five institutions (in Sudan, Yemen, and Afghanistan) could not start online learning primarily due to weak IT support. Few countries commonly reported general challenges during this transitional phase, including untrained faculty (Bahrain, Egypt, Pakistan, United Arab Emirates), internet-related problems (Egypt, Iraq, Afghanistan), financial constraints, limited electricity supply, harsh weather, unavailability of software packages, internet and electronic devices (Sudan), lack of access to online servers and student overload (Jordan), financial and human resources issues (Saudi Arabia), and the lack of digital technical support (Egypt).

Timely completion of the academic 2019-2020 year and on-time admissions for the following year (2020-2021) were major administrative challenges, especially in countries that had hundreds of institutions (Pakistan, Sudan, Egypt, and Iraq). Delays ranging from 3–4 months were reported in these countries for the completion of the academic year and for new admissions.

Clinical or practical training

Although the theoretical part of the curriculum was somehow covered through online learning, there were delays in clinical or practical training. Institutions needed to be at least partially open for skills training, making them to adopt unique opening strategies. An institution in Egypt was opened for examinations only, few others in Egypt, Iran, and Pakistan opened partially for clinical training. Students in Bahrain managed to complete the academic year by July 2020, while institutions in Iran extended the semester to compensate for the lost periods.

The completion of practical or clinical training remained a major challenge to institutions, especially those with large enrolments. Few institutions, especially in the public sector, had large class sizes, up to 350 students per class (for example, Pakistan, Sudan, Egypt) and resuming practical or clinical activities was a big challenge for them. Those institutions took several steps to continue learning. Students were divided into smaller groups and their practical or clinical activities were rescheduled with additional safety measures. Strategies such as the use of videos, skills laboratories, and simulations to resume practical or clinical activities were promoted. Institutions reported using roleplays, virtual cases, and videotaped clinical procedures to minimize the need for mandatory clinical or laboratory exposure (Egypt, Sudan, UAE, Iran, Pakistan). Yet few other institutions postponed clinical training to the later part of the year (Iraq, Egypt).

Introduction of new teaching and learning tools

A significant number of institutions, especially in countries with high-quality internet and IT infrastructure (hardware, software, and support staff) started minimal online activities within 1-2 months after the closure of institutions, and expanded the activities progressively. Most institutions reported initiating online classes, progressively expanding to small group discussions, interactive lectures, online assignments, and later the use of IT for student assessment. At the early stage of online classes, communication software packages (mainly video conferencing packages) became very useful. Commonly reported packages included Zoom (Pakistan, Egypt, UAE, Jordan, Oman), Google Drive (Pakistan), Microsoft Teams (Egypt, UAE, Jordan, Saudi Arabia, Lebanon), Yammer (Egypt), Cisco Webex (Egypt, Saudi Arabia, Oman), WhatsApp (Egypt), Sky room (Iran), Webinar Jam (Pakistan), Adobe Connect (Iran), Skype (Iran), Go To Meeting (Oman), Go To Webinar (Oman), and Google Meet (Pakistan).

Later, learning management systems (LMS) gained popularity for managing a wider range of educational activities. Commonly reported LMS included Moodle (Pakistan, Egypt, UAE, Iraq), Blackboard Ultra (UAE, Saudi Arabia, Egypt), National LMS (Iraq), Google Classroom (Pakistan), and WIZ IQ (Sudan). In the initial phase, most institutions relied on free software packages to manage online education. Only 16 (32%) institutions reported having their own custom-built software programmes for educational management. As institutions became more acquainted with online learning, the use of LMS increased.

Adjustments to curricula due to online learning

Online learning required the adjustment of curricula to the new model of education. Almost 64% (32/50) of institutions reported that they had to adjust their curricula (including reductions in content) because of delays in sessions and align them with online teaching methodologies. These curricular modifications also involved minimizing redundant materials, encouraging interactive discussions (Iraq), revising the curriculum

to prioritize materials that could be taught easily online, rescheduling of practical and clinical content (Pakistan, Iran, Egypt), the introduction of virtual laboratories, simulator-based clinical teaching, use of videos (Saudi Arabia, Oman), use of recorded lectures, and online assignments (Egypt).

Online assessment

Conducting online assessment was a relatively novel area due to limitations in digital technologies, weak institutional and staff capacity, and lack of regulatory support. However, few institutions (Jordan, Pakistan, and Bahrain) immediately started developing online assessment capacity. Forty institutions out of 45 (90%) managed to conduct some form of online assessment, mostly within 2–3 months after their closure. Commonly reported online assessment methods included online tests, quizzes, assignments (Pakistan), I-Cloud form quizzes (Egypt), online examinations, student presentations, case studies, open-book exams (Jordan), use of custom-built national software such as 'Faradid' (Iran), online viva voce (Iraq), poster presentations, problem-solving skills, self-learning, student presentations and assignments (Egypt).

Assessment of practical or clinical skills using online technologies was a major challenge. Few institutions used online interviews (oral), slides, and photos (like passive stations in Objective Structured Clinical Examination) as well. Few institutions mentioned conducting online Objective Structured Clinical Examination/Objective Structured Practical Examination (OSCE/OSPE) (Bahrain), virtual ward rounds, using live, virtual, and simulated patients, although their use was limited, as it required a lot of logistics, preparation, and staff training. Several institutions postponed the assessment of clinical or practical skills until they were able to open because of the logistic and regulatory challenges.

Faculty development and training

Capacity development of faculty in the use of online digital technologies was another major challenge for most institutions. Few institutions in Sudan, Pakistan, Afghanistan, and Yemen, did not conduct any training; both teachers and students mostly learned through trial and error. Few others conducted only minimal training (Egypt, Pakistan), while some countries (Oman, Bahrain, Saudi Arabia, Sudan) reported conducting specialized workshops for teachers with well-structured training programmes.

Institutions used several strategies to provide training to teachers and students on the use of online learning management systems. These strategies included preparing short videos on how to use software packages (Bahrain, Egypt), developing orientation programmes on the use of IT for teachers and students (Pakistan, Egypt, Sudan), and effective use of social media for education (Egypt). Iran, Egypt, and UAE reported using emails, sharing documents and questions, and arranging facilities for 'on-the-job' online sessions where nurses could not leave duty stations. Training in online assessment included how to conduct mock examinations (Bahrain, Iraq, Saudi Arabia, Oman), teacher orientation

Table 2 Major challenges faced by different institutions in the EMR due to the disruption of education and transition to online learning during the COVID-19 lockdown

a. Digital infrastructure in the country
- Weak digital infrastructure (unavailability of internet service, bandwidth issues, and high cost of internet) in several EMR countries with protracted crises, especially in remote areas
- Lack of institutional capacities to introduce online learning, especially for specialties other than medicine and dentistry
- Frequent disruption of electric power supply
- Cost implications for institutions, faculty, and students to access online learning
- Lack of IT technical support for customization of software to institutional needs
- Initial cost of establishing IT departments, hiring IT staff, cost of software customization, especially in institutions with limited resources

b. Clinical or practical training
- Delays in the completion of clinical or practical training due to closure of institutions.
- Increased clinical workload on faculty in response to COVID-19 clinical care, resulting in reduced educational activities
- Prioritization and rescheduling of clinical or practical training to compensate for the delays
- Management of clinical or practical training sessions for large groups

c. Adjustments to curricula for online learning
- Challenges with the reduction in content due to delays
- Revision of curricula to align with online teaching methods
- Challenges with improving student engagement in online teaching and learning methods

d. Online assessment
- Limitation of digital technologies in online assessment
- Regulatory issues for the acceptance of online assessment
- Institutional readiness for online assessment
- Student and staff training on online assessment methods
- Validity and reliability of online assessment methods

e. Faculty readiness and capacity
- Hesitancy and reluctance among some faculty to accept online learning
- Limited skills and experience of faculty in online learning
- Increased workload on faculty in contributing to the development of the online learning systems

sessions on online assessment (Pakistan, Jordan, Egypt, Saudi Arabia), preparing weekly quizzes (Egypt), training through virtual sessions (Egypt), orientation videos, written instructions, and the use of online discussion groups for assessment (Egypt, Pakistan, UAE).

Discussion

The abrupt closure of the institutions in most EMR countries disrupted learning and threatened timely completion of the 2019/2020 academic year. Online learning technologies emerged as the only option to urgently resume learning. The term 'Emergency Remote Teaching' (ERT) connotes a sudden interim transition of instructional delivery to online model because of an imminent catastrophe (such as COVID-19), irrespective of the online courses that had been originally planned and designed to be delivered virtually *(11)*. Unlike a purpose-built online learning management system, ERT comprises the use of available remote teaching tools for delivering curricula that would otherwise be delivered physically. As soon as the emergency abates, instructional delivery may revert to its original format. Thus, due to urgency, providing reliable, temporary, fast, and durable access to educational instruction during a crisis would be more efficient than reconstructing a sophisticated educational system *(12)*.

Appropriate use of digital technologies in health professionals' education is not free from challenges that should be considered for the realization of its desired impact. In different institutions, a wide range of challenges were reported, including technical issues such as inadequate technical infrastructure, unreliable internet connectivity, absence of institutional strategies to facilitate online teaching, increased financial costs, pedagogical insecurity, insufficient preparedness of faculty for effective use of online teaching tools, time constraints, lack of appropriate tools for clinical teaching, and lack of direct contact between teachers and learners *(13)*. Many organizational barriers to technology integration arise from competing tensions between institutional policy and practice and faculty beliefs or abilities. University administrators may view technology as a tool to attract and retain students, whereas faculty may struggle to create harmony between digital technologies and traditional pedagogy *(14)*. The unavailability of essential infrastructure and inefficient institutional strategies represent major challenges for integrating online learning in education *(15)*.

In the EMR, COVID-19 provided an opportunity for educational institutions to explore the potential of digital technologies and assess their capacities to integrate these technologies into routine teaching and learning. The term '*e*-learning or online education has a broad meaning. Several institutions in the EMR simply provide the instructional material to students on their institution's website which they can access through the internet *(16)*. Others view online learning as means to deliver lectures through some video conferencing software. While a sizeable part of face-to-face education is inevitable for ensuring the development of psychomotor skills of students, rational use of online education, especially for delivering theoretical components of the curriculum, can improve student-centeredness and save time and cost of education *(17,18)*. A study conducted in a medical school in Bahrain suggests that up to 30% of the curriculum could be delivered online post-COVID-19 because it saves a lot of time and effort *(19)*. For health professionals' training, Muthuprasad et al. propose a hybrid or blended curricular approach with an appropriate mix of face-to-face and online learning methods to achieve cognitive and practical skills *(20)*.

The range of online learning activities may include taking online classes, conducting small group discussions, sharing learning experiences with students through videos, virtual patients, case-based or team-based learning, and conducting online formative and summative assessments.

During the early stage of the pandemic, many institutions in the EMR were resilient enough to quickly resume, at least basic education, through online systems. As the pandemic continues in the Region, the use of online digital technologies is progressively being integrated with traditional pedagogy. The pace of integration is however variable from one institution to another, depending on the availability of resources and local educational regulations. During the post-COVID-19 era, it is expected that most institutions will require major curricular revisions and redesign as they progressively move to blended learning models.

A particularly challenging aspect of education during the pandemic was the substantial restriction of clinical or practical learning experiences for students *(21,22)*. Resumption of clinical and laboratory-based activities proved to be a major challenge for most institutions. The pedagogical principles of competency-based, time-variable education were quickly operationalized to enable schools to shorten traditional time-bound block training without lowering performance standards *(23)*. A nursing school in Hong Kong used flipped classroom, demonstration of nursing change-of-shift handover in a simulated clinical environment, and developed simulated training ward to enhance nursing students' ability to provide care to patients competently and safely *(24,25)*.

Increased use of educational technologies exclusively for assessment purposes has been observed during COVID-19, the term named 'Technology Enhanced Assessment' (TEA) *(26)*. Online assessment can support knowledge-based assessment (e.g. multiple-choice or extended matching items), performance-based assessment (e.g. OSCE stations or virtual patient cases), practice-based assessment (e.g. portfolios or logbooks), or behaviour or attitude-based assessment (contributions to discussion boards or peer assessment of project work) and these can all be modified into formative or summative assessments to document student learning based on the purpose and needs of the educational experience *(27)*.

The assessment of clinical competencies, however, remains a difficult area that needs innovative solutions and adaptations *(28)*. Synchronous methods of assessment (online, real-time assessment) can be done through Multiple Choice Questions (MCQs) (and other items), open-book exams *(29)*, and the use of online OSCE/OSPE. Due to the specific nature of conducting OSCE, it becomes a difficult form of examination to conduct, in terms of investment of time, efforts and resources. Since physical distancing became the norm during COVID-19, OSCEs have posed an even bigger challenge, requiring further investment in designing stations, selecting suitable software, and training staff. Researchers at Arabian Gulf University (Bahrain) have developed a toolbox that provides step-by-step guidance on effectively planning and conducting an online OSCE *(30)*.

Large-scale student assessment of MCQs (well-timed) is done through Google Forms *(31)*. Moodle can be used for advanced assessment settings for different question types, such as shuffling the items and their options, using sequential or free navigation *(32)*. Relatively advanced technologies such as simulated patients, simulated operation theatres, and Mini-Clinical Evaluation Exercises (Mini-CEX) have been used to guide and assess clinical performance *(33)*. Student assignments and assessment portfolios can be used effectively as asynchronous methods of assessment in an online setup *(34)*.

Online examinations face several challenges in the form of resource intensity, academic integrity, student and teacher training, examination validity, and their acceptance by the regulatory institutions. Students and teachers must be well-trained for online assessment and must be well-informed about cheating, impersonation, and plagiarism issues to assure the integrity of the whole examination system. Online proctoring systems are becoming common. Educational institutions in the EMR face challenges of developing online assessment systems and building capacities of teachers and students on the effective use of these systems.

Online teaching and learning require not only the availability of online educational resources but also the training of both teachers and students to effectively use the resources, at times, complex technologies. Some faculty may be hesitant to use them due to the lack of technical knowledge and/or scepticism about the efficacy of technology to improve student learning outcomes *(35)*. Creating the conditions that foster student engagement *(36)*, success, and retention remains a perennial issue within the higher education sector *(37)*. Teachers must be well-trained to use online interactive tools for enhancing student engagement *(38,39)*. Few commonly used tools for online student engagement include Padlet, Socrative, DialedIn, Quizlet, Clicker, etc. Gamification packages such as Kahoot, Gimkit, Book Widgets, and Classcraft have the potential to enhance student interest and keep them engaged in the learning process. Similarly, quiz developing apps such as Quizlet, Quizziz, and Socrative can be used effectively to develop quizzes to ensure that learning takes place as desired. Online poll apps such as Easypolls and Poll Everywhere can be used effectively to engage students in the learning process even while delivering lectures online.

It is the responsibility of the institutions to develop robust capacity-building and professional development programmes for both teachers and students to train them on the effective use of online educational technologies. Departments of medical education in the institutions can play a significant role in conducting such training.

This study is limited to a snapshot of health professionals' education during the COVID-19 pandemic in 13 Member States of the EMR. We could only include information from 50 institutions, majority of which were medical and dental colleges. The sample may not be representative of other health professionals and for all countries. It is highly recommended that each EMR country perform detailed analysis of the situation of its educational institutions and develop strategies to bring transformative changes in education during the post-COVID-19 era.

Conclusion

EMR consists of a diverse range of countries, almost half of them suffering from protracted crises. Countries face diverse challenges in managing education during the COVID-19 pandemic and blend online education with traditional pedagogy. Few challenges are cross-cutting (for example, revisions and adaptation of curricula, faculty development, and student engagement) while others are specific to the socio-economic situation of the country (for example, the availability of IT infrastructure, education policies, and the availability of resources to institutions). It is encouraging to see that despite having limited resources, weak technical capacities, and constrained IT infrastructure, most EMR countries managed to take advantage of digital technologies and resumed educational activities within a short period. Initially, institutions that used digital technologies for relatively simple educational activities progressed to more complex functions as additional resources and expertise were gained. The direction of change is towards adopting blended learning strategies, the pace of change, however, may vary, depending on the local digital infrastructure and the availability of resources. The new norms set by the pandemic for the use of digital technologies are likely to continue in the future and have a significant impact on the future of health professionals' education. To bring transformative and sustainable changes, EMR countries must ensure that the educational technologies are contextualized to the socio-economic and political situation of their countries, and adequately supported by the prevailing IT infrastructure and appropriate regulations.

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Impact de la COVID-19 sur la formation des professionnels de santé dans la Région de la Méditerranée orientale

Résumé

Contexte : Le secteur de l'éducation est l'un des principaux secteurs touchés par la pandémie de COVID-19 dans le monde, et la formation des professionnels de la santé ne fait pas exception. Des milliers d'établissements pour la formation des professionnels de la santé dans la Région de la Méditerranée orientale ont été fermés brusquement pour assurer la sécurité des étudiants et des personnels.

Objectifs : La présente étude vise à décrire la situation concernant la formation des professionnels de la santé dans la Région de la Méditerranée orientale pendant la pandémie de COVID-19 et à examiner les stratégies adoptées par les institutions pour assurer la continuité de leur formation.

Méthodes : Une enquête qualitative, exploratoire, basée sur des informateurs clés et impliquant 50 institutions, a été menée dans 13 États Membres de la Région de la Méditerranée orientale. L'enquête incluait des facultés de médecine (n = 23), de médecine dentaire (n = 9), de soins infirmiers (n = 13) et de pharmacie (n = 5). Le questionnaire comprenait 40 questions ouvertes sur les défis liés à la formation des professionnels de la santé pendant le confinement dû à la COVID-19 et sur les stratégies adoptées pour la poursuite de l'éducation. Les données ont été analysées et synthétisées pour parvenir à des conclusions significatives.

Résultats : Presque tous les établissements de la Région de la Méditerranée orientale ont été fermés en février et mars 2020 du fait de l'augmentation du nombre de cas. La plupart des institutions, à quelques exceptions près, dans les pays aux ressources limitées, sont passées à l'apprentissage en ligne par le biais de mécanismes d'enseignement à distance d'urgence. La COVID-19 a entraîné des retards dans l'achèvement du calendrier académique et la modification des programmes d'enseignement pour assurer les cours sur une courte période.

Conclusion : La COVID-19 pourrait continuer d'avoir un impact sur la formation des professionnels de la santé. Cependant, les pays disposant d'une meilleure infrastructure et d'un meilleur soutien en matière de technologies de l'information continueront probablement à renforcer leurs capacités d'enseignement en ligne afin de profiter des avantages liés à ce mode d'enseignement à l'avenir.

تأثير جائحة كوفيد-19 على تعليم المهنيين الصحيين في إقليم شرق المتوسط

جوهر واجد، جولين جيديك

الخلاصة

الخلفية: قطاع التعليم من القطاعات الرئيسية التي تضررت من جائحة كوفيد-19 على الصعيد العالمي، ولا يُستثنَى من ذلك تعليم المهنيين الصحيين. كما أغلقت فجأة آلاف المؤسسات المهنية الصحية في إقليم شرق المتوسط، حرصًا على سلامة الطلاب والعاملين.

الأهداف: هدفت هذه الدراسة إلى وصف وضع تعليم المهنيين الصحيين في إقليم شرق المتوسط خلال جائحة كوفيد-19، واستعراض الاستراتيجيات التي اعتمدتها المؤسسات لضمان استمرارية العملية التعليمية.

طرق البحث: أُجري مسح نوعي استكشافي قائم على مصادر المعلومات الرئيسية، وشاركت فيه 50 مؤسسة في 13 دولة عضوًا في إقليم شرق المتوسط. وشمل المسح بعض كليات الطب (العدد=23)، وطب الأسنان (العدد=9)، والتمريض (العدد=13)، والصيدلة (العدد=5). وتضمن الاستبيان 40 سؤالًا مفتوحًا بشأن التحدِّيات التي واجهت تعليم المهنيين الصحيين خلال فترة الإغلاق بسبب كوفيد-19، والاستراتيجيات المعتمدة لمواصلة التعليم. وحُلِّلت ولُخِّصَت البيانات للوصول إلى استنتاجات مفيدة.

النتائج: لقد أُغلقت جميع المؤسسات تقريبًا في إقليم شرق المتوسط خلال شهرَيْ فبراير/ شباط و مارس / آذار 2020 نظرًا لزيادة عدد الحالات. وتحوَّلت معظم المؤسسات، ما عدا بضعة استثناءات، في البلدان ذات الموارد المحدودة إلى التعلُّم عبر الإنترنت من خلال آليات التدريس عن بُعد في حالات الطوارئ. وتسببت جائحة كوفيد-19 في تأخُّر إكمال الدورات الأكاديمية، وإدخال تعديلات على المناهج الدراسية لتغطية المقررات الدراسية في وقت قصير.

الاستنتاجات: قد يستمر تأثير جائحة كوفيد-19 على تعليم المهنيين الصحيين. ولكن البلدان التي لديها بِنْية تحتية تكنولوجية ودعم تكنولوجي أفضل من المرجح أن تواصل تنمية قدراتها في مجال التعليم عبر الإنترنت لجني فوائد التعلُّم الإلكتروني في المَستقبل.

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Emerging challenges to realizing global polio eradication and their solutions

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Abstract

Background: The Global Polio Eradication Initiative (GPEI) promised to eradicate polio by 2000, yet the disease remains endemic in 2 countries. The current threat of resurgence in countries with low vaccine coverage and circulating vaccine-derived poliovirus (cVDPV) outbreaks due to oral polio vaccine warrants a strategy review.

Aims: To review the performance of the GPEI from a context based in Pakistan, identifying threats to success and suggesting strategy modifications to help achieve eradication.

Methods: This was a desk review of the effectiveness of GPEI that was launched in 1988 to eradicate polio by 2000. Subsequent failure to eradicate led to multiple iterations in strategy and planning documents. These documents were reviewed alongside relevant literature to explore the reasons for failure and emergence of cVDPV.

Results: GPEI has been effective in reducing the global polio disease burden by > 99%, but it remains endemic in Pakistan and Afghanistan. cVDPV has caused multiple outbreaks since 2000, and caused 7 times more cases than wild poliovirus (WPV) globally in 2020. The Polio Eradication and Endgame Strategic Plan 2013–2018 aimed to eradicate WPV and cVDPV simultaneously. In 2019, Pakistan saw an upsurge in WPV amid an outbreak of cVDPV infection that continued throughout 2020. Wild polio eradication was not realized and the country was unable to transition to inactivated polio vaccine as predicted in the strategic plan.

Conclusion: Over 20 countries now report cVDPV outbreaks and many others are at risk. A country-specific modified strategy is required to eradicate WPV and cVDPV simultaneously, more so in endemic countries.

Keywords: poliomyelitis, Pakistan, disease eradication, inactivated poliovirus vaccine, health policy

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Introduction

Poliomyelitis is caused by poliovirus serotypes 1–3. Most infections remain asymptomatic or cause mild nonspecific symptoms. However, a small proportion of infections (1:200 – varies with serotype) causes paralytic poliomyelitis and permanent disabilities. Involvement of respiratory muscles may result in death in 5–10% of cases.

Humans are the only host; no animal reservoir or vector is involved. Children aged < 5 years are affected more frequently. The most active modes of transmission in low- and middle-income countries with high population density and active transmission are the faecal–oral route and person to person transmission, while saliva and respiratory droplets transmit the disease in high-income countries (1). Understanding these epidemiological factors is critical when planning to break the chain of transmission and ultimately eradicate the disease.

Two effective trivalent vaccines, inactivated polio vaccine (IPV; 1955) and attenuated oral polio vaccine (OPV; 1961), have been used to immunize children for many years. OPV was chosen for inclusion in national programmes of routine immunization and was again preferred for the Global Polio Eradication Initiative (GPEI) in 1988 to eradicate the disease by 2000. The goal was to immunize every child until there was no virus left to transmit to others. Acute flaccid paralysis surveillance and subsequent environmental sampling were integral components of surveillance and response monitoring (2). Polio vaccination through national programmes of immunization and subsequently through GPEI was effective in reducing the disease burden significantly. In 1988, there were 350 000 cases in 125 endemic countries. By 2012, the Americas, Western Pacific and European regions were certified as polio free and the global disease burden was 650 cases – more than 99% reduction in global cases (2). The last reported case caused by poliovirus serotype 2 was in 1999 and it could not be declared eradicated until 16 years later in 2015; at which time, trivalent OPV (tOPV) was replaced by bivalent (bOPV). Serotype 3 infection was last reported in 2012 and was declared to have been eradicated in 2019. All current cases of wild polio across the globe are caused by serotype 1.

Since the launch of GPEI, the targets set to achieve eradication have been revised on multiple occasions. In 2013, the Polio Eradication and Endgame Strategic Plan introduced a major shift in policy – wild polio

virus (WPV) and circulating vaccine-derived poliovirus (cVDPV) were to be eradicated simultaneously. A shift from tOPV to bOPV and administering at least one dose of IPV was mandated, among other measures. WP eradication was forecast for 2018, at which stage bOPV would be completely replaced with IPV in national programmes (*3*).

OPV was included in Pakistan's Expanded Program on Immunization (EPI) in 1978. GPEI has been in place with the highest level of commitment at government level since 1994. In spite of reporting 20 000 cases in 1990, the impetus provided by GPEI led to a 99% reduction in cases, which was a major achievement. Yet, the disease remains endemic in Pakistan. There was a sharp rise of wild polio cases to 147 in 2019 compared to 12 in 2018, 8 in 2017, 20 in 2016, 54 in 2015 and 306 in 2014. Although type 2 vaccine was withdrawn in 2016, an outbreak (22 cases) of cVDPV2 was reported in 2019. One hundred and thirty-five such cases were reported in 2020 in addition to 84 wild polio cases, adding to the challenges of eradication. During this period, environmental samples tested positive for wild polio type 1 and cVDPV from across the country (*4*, *5*). There was a reduction in outbreaks and cases of WPV and cVDPV in 2021. A single case of infection with WPV and 8 with cVDPV had been reported at the time of writing, presenting a window of opportunity to redouble efforts and eradicate the disease from Pakistan.

Given the failure to eradicate polio and a spike in case numbers, a desk review of the literature related to the eradication initiative, changing epidemiology, emerging scientific knowledge and subsequent reorientation of the strategy was relevant. Google Scholar, PubMed, World Health Organization (WHO) publications and the United States Centers for Disease Control website were browsed using search terms poliomyelitis, WHO Global Polio Eradication Initiative, oral polio vaccine, inactivated polio vaccine and circulating vaccine derived polio virus from 1990 to June 2021 where access to free full text was available. Publications related to the objectives of this review were extracted while others were excluded.

Critical review of polio eradication efforts

Smallpox is the only successful model of global eradication of an infectious disease. A comprehensive strategy of surveillance, isolation, containment and immunization with a heat-stable effective vaccine was adopted in 1967 to eradicate the disease in 10 years' time. The last smallpox case was reported in 1977. The disease was certified to have been eradicated within the stipulated timeframe in 1980. Following success against smallpox, polio was selected for eradication. The disease had several dissimilarities to smallpox, which had only one genetically stable serotype, had obvious clinical diagnosis, no subclinical infection and there was safe, effective and heat-stable vaccine (*6*). Polio was hardly a fit for the smallpox eradication model. Polio spreads through the faecal–oral route and from person to person. The strategy adopted for its eradication relied heavily on strong immunization and surveillance but ignored a few critical interventions to break the chain of transmission, such as access to clean drinking water, sanitation and hand hygiene (WASH) (*7*, *8*). WASH, one of the components of a comprehensive strategy, would contribute to disease eradication efforts by lowering risk of person-to-person and faecal–oral transmission.

There were multiple extensions to the initial target to eradicate polio by 2000 but the strategy remained largely unchanged, until the launch of the Polio Eradication and Endgame Strategic Plan 2013–2018 in 2013, which introduced a major shift in policy to eradicate both WPV and cVDPV simultaneously. The plan had 4 objectives. Objective 2 dealt with strengthening immunization systems and withdrawal of OPV over a timeline containing key milestones. These included the introduction of at least 1 dose of IPV in national programmes by 2015 and a switch to bOPV by 2016. However, global certification of wild polio eradication in 2018 was not achieved, nor was bOPV stopped to move to an IPV-only schedule by 2019 (*3*). Hence, the plan was revised again and WHO released the Polio Endgame Strategy 2019–2023. This document focused on reorienting the programme, integrating with other health services and reiterating its goals to interrupt WPV transmission and stop all cVDPV outbreaks (*8*).

Time and again the deadline for eradication has slipped. Delays in achieving our target within timelines may imply failure to eradicate polio and perhaps a lost opportunity. The latest iteration in play is the Polio Eradication Strategy 2022–2026, Delivering on a Promise. The strategy has the same 2 goals as the earlier documents. Its objectives are to introduce steps to improve governance and efficiency of the programme through integration, accountability and addressing the obstacles to eradication. Many of these recommendations are already in practice and it remains to be seen how they improve programme outcomes. Capacity building for programmes in the 2 endemic countries remains in scope, as do countries at risk of cVDPV outbreaks to hasten outbreak detection and response.

Alongside the above measures, WHO has recommended the introduction of a novel monovalent oral polio vaccine 2 (nOPV2) to interrupt cVDPV2 outbreaks and address low immunity to serotype 2 following the switch to bOPV in 2016 (*9*). This new vaccine is considered to be more stable genetically. However, it has only undergone phase 1 and phase 2 trials, leading to authorization for emergency use. Since its safety and efficacy have yet to be tested in large randomized clinical trials, we are not sure if the vaccine can live up to its promise. In Pakistan, WPV and cVDPV are in circulation due to factors such as low efficacy of OPV, low vaccine coverage through routine immunization, and growing resistance to all OPVs. Supplementary immunization activities (SIAs) with IPV instead of nOPV2 could provide an opportunity to build immunity against all serotypes, interrupting both WPV and cVDPV transmission simultaneously.

A calculated risk was taken when OPV was chosen for GPEI. OPV may cause vaccine-associated polio – paralysis in 1 out of 2.7 million first doses of vaccine or 2–4 cases per birth cohort of 1 000 000. The choice was made considering the other benefits of OPV over IPV (*10*), not suspecting the emergence of cVDPV, first reported incidentally in 1999–2000, the target year to have achieved eradication. cVDPV is a genetically divergent vaccine virus strain that can emerge through the use of any of the three Sabin viruses 1–3, causing outbreaks in populations with immunity gaps. Its emergence demands combating WPV transmission and unanticipated cVDPV outbreaks.

Since 2000, 1085 cases of paralysis were caused by cVDPV, of which 932 (~86%) were caused by cVDPV2. A recent study reported that the number of cVDPV outbreaks tripled from 9 to 29 in 15 countries from January 2018 to June 2019. Twenty-five (86%) outbreaks were caused by cVDPV2 outside the monovalent OPV2 response area, mostly in African nonendemic countries around 3 years after the shift from tOPV to bOPV. These made up 124 (77%) of 161 cVDPV cases (*11*). Burki reported that 2018 also saw 101 cases of cVDPV, which was the second successive year in which cases of cVDPV exceeded those of WPV (*12*). cVDPV cases were almost double the WPV cases (325 vs 174) in 2019 and about 7 times (992 vs 140) in 2020. Alarmingly, nonendemic countries reported 325 of the 365 global cases of cVDPV in 2019 (*2*).

OPV has also been found to be less effective in South Asia/India when compared with other regions. A review of studies from India has reported significantly lower tOPV vaccine efficacy. Plotkin has summarized the results of studies on seroconversion after 3 doses of tOPV. Seroconversion was near 100% for all 3 serotypes in the United States of America. Developing countries saw lower seroconversion rates; however, the lowest rates (40–86%; median 63%) were reported in 9 studies from India (*13*). Efficacy of IPV in India remains comparable with other parts of the world (*14*,*15*). Analysis of reported polio cases in Pakistan from 2017 to 2019 suggests low vaccine efficacy (Shafique M, National Institute of Health, Islamabad, unpublished data, 2019). Up to 30% of reported cases had received > 3 doses of vaccine through routine immunization programmes. Accounting for both routine immunization and SIA, > 55% received > 7 doses of OPV, 62% > 4 and 70% > 3.

Not least among concerns has been a growing resistance to OPV that is now more widespread than localized, often resulting in polio health workers being viewed with suspicion and targeted with violence during SIAs (*16*,*17*). Combination of cultural, political, religious and other social factors, reluctant parents and weak programme governance contribute to the growing sentiment. However, IPV is nowhere near being hindered, as shown in a study in the conflict zone of Northwest Pakistan (*18*). Despite insecurity and OPV hesitancy during SIAs, provision of both OPV and IPV through community engagement as a component of other maternal and childhood services significantly improved immunization coverage of both polio and other vaccines, compared to home delivery of OPV alone during SIAs. This was the first large-scale administration of IPV in the country. Coverage increased to 80% in the study population with no reported refusals.

Polio vaccine coverage in Pakistan varies among provinces but the overall coverage has remained lower than desired for several years (*19*).

GPEI saw a phased implementation globally in the early 1990s following the adoption of a resolution by the World Health Assembly in 1988. Although GPEI has been effective in reducing the disease burden significantly, its effectiveness has varied across regions. The Americas (1994), Western Pacific (2000) and Europe (2002) saw eradication earlier than Africa, South East Asia and Eastern Mediterranean. In Southeast Asia, India reported its last case of wild polio in 2011 and the region was declared polio free in March 2014 (*20*). More recently, Africa was certified to be free of wild polio in 2020. However, Pakistan and Afghanistan continue to remain endemic, begging the question: why was a strategy effective in eradication globally less so in the Pakistan–Afghanistan epidemiological unit?

The health system in Pakistan has worked to its capacity and has improved its competence over the years, driven by the high level of commitment to GPEI by successive governments, at times at the expense of other child health programmes. Yet, we have recently noticed an upsurge in wild polio cases alongside a major outbreak of cVDPV, making it pertinent to address both of them simultaneously, as provided in the Polio Eradication and Endgame Strategic Plan 2013–2018. It is time to reconsider the polio eradication strategy for Pakistan and implement these guidelines irrespective of achieving wild polio eradication.

High-income countries initially used OPV to eliminate wild polio and subsequently shifted to IPV to address the issue of vaccine-associated polio (*21*). However, North European countries have achieved both these phases simultaneously using an IPV only schedule (*1*, *22*).

Stopping circulation of WPV has been a major component of GPEI strategy from the beginning; hence, OPV, which provides mucosal immunity, was preferred to IPV. This objective has yet to be met with the present OPV, which has complicated the eradication process through emergence of cVDPV. Eradication could not be achieved in Pakistan over the last 30 years. Achievement of wild polio virus eradication is a daunting task that cannot be verified reliably. A move towards elimination through introduction of a more effective and safe vaccine, that is, IPV, until we can develop an improved OPV may be the paradigm shift (to eradicate disease instead of the virus) that is needed. Limited transmission may occur for some time but strong population immunity through an effective and safe vaccine would ensure that no one develops disease and eventually, the virus disappears. A shift in strategy to a safer and more effective vaccine (i.e. IPV) should be considered to maintain a high rate of population immunity. Vulnerable populations should be

protected from paralysis through sustainable vaccination programmes with the expectation that WPV circulation will eventually stop (*23*).

Some recent literature has been critical of the GPEI, calling for a containment strategy to be considered given an insurmountable "final mile" where there are challenges to eradication (*24*). WHO remains receptive yet concerned. Pivoting from the eradication objective towards a sustained systematic control strategy could lead to polio resurgence– an exponential rise in cases across the next 10 years to as many as 200 000 a year and hundreds of thousands of children living with disability (*25*). Our gains stacked up against the amount of time, money and resources invested on this initiative – at times to the cost of other cost-effective public health interventions and routine immunization coverage in a resource-poor country – translate into an astronomical cost of failure in the form of polio resurgence. The world cannot afford to lose this battle. If anything, our long-standing strategy needs to be supplemented with measures that help it adapt to current challenges and meet its objectives in the final mile.

Conclusions

Considering our experience over 30 years of implementing the current polio eradication strategy, changing epidemiology of the disease, as well as scientific evidence that has emerged since then, the following are suggestions for inclusion in a comprehensive strategy for eradication in countries at risk of WPV and cVDPV outbreaks.

- Launch interventions to break the chain of transmission, including an emphasis on hand hygiene, improved access to clean drinking water and sanitation
- Strengthen routine immunization
- Merge GPEI into EPI; assets, equipment, human resource and legacy
- Coverage could be improved by linking the country's national citizenship directory's birth registration with EPI, creating a database so any babies missed out could be tracked and immunized. During the ongoing COVID-19 pandemic and restricted mobility, SIAs are constrained; therefore, it is imperative to focus on routine immunization for high coverage of all available antigens in the programme, including polio.
- Integrate routine immunization with other maternal and child health services
- Shift to a total IPV immunization schedule in routine immunization programmes and withdraw bOPV unconditionally; that is, without waiting for zero WP cases to be reported. mOPV may be used during SIAs.
- Communities must be engaged to build vaccine trust, enhance demand, create public ownership and increase awareness.

Wild polio may be endemic in 2 countries, but the rest of the world remains on guard, continuing with programmes to ensure high vaccination coverage to protect their populations. Unfortunately, more than 20 countries now report cVDPV outbreaks and many others are at risk of resurgence of wild polio,, particularly those with low vaccination coverage. There is now a need to assess the ramifications for several countries and address WPV and cVDPV eradication simultaneously. Our current predicament is a significant global threat in which cVDPV outbreaks compromise the objectives of the GPEI. WHO and its partners must work closer than ever with national governments and professional healthcare societies to arrive at country-specific policies for endemic countries and others at high risk of cVDPV outbreaks because one size rarely fits all.

Addressing our current predicament in Pakistan (co-circulation of WPV and cVDPV, low vaccine coverage, low OPV efficacy and growing resistance to OPV) requires a strategic shift as opposed to reorientation. Our policy must be equipped to handle our challenges.

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Nouveaux obstacles à l'éradication mondiale de la poliomyélite et solutions pour y remédier

Résumé

Contexte : L'Initiative mondiale pour l'éradication de la poliomyélite (IMEP) s'est engagée à éradiquer la maladie à l'horizon 2000, mais celle-ci reste endémique dans deux pays. La menace actuelle de résurgence dans les pays ayant une faible couverture vaccinale et des flambées épidémiques de poliovirus circulants dérivés d'une souche vaccinale (PVDVc) imputables au vaccin antipoliomyélitique oral justifie un examen de la stratégie.

Objectifs : Examiner les performances de l'IMEP dans le contexte pakistanais, en identifiant les obstacles à la réussite et en suggérant des modifications de la stratégie pour parvenir à l'éradication.

Méthodes : Le présent article constitue un examen documentaire de l'efficacité de l'IMEP, qui a été lancée en 1988 pour éradiquer la poliomyélite à l'horizon 2000. Par la suite, l'échec de l'éradication de la maladie a conduit à plusieurs itérations dans la stratégie et la planification. Ces documents de stratégie et de planification ont été examinés parallèlement à la littérature pertinente afin d'explorer les raisons de l'échec et de l'émergence de PVDVc.

Résultats : L'IMEP a réussi à réduire la charge mondiale de morbidité due à la poliomyélite de plus de 99 %, mais la maladie reste endémique en Afghanistan et au Pakistan. De multiples flambées de PVDVc ont eu lieu depuis 2000 et

le nombre de cas enregistrés de PVDVc dans le monde en 2020 était sept fois supérieur à celui des cas de poliovirus sauvages (PVS). Le Plan stratégique pour l'éradication de la poliomyélite et la phase finale 2013-2018 visait à éradiquer simultanément le PVS et le PVDVc. En 2019, le Pakistan a connu une recrudescence du poliovirus sauvage dans un contexte de flambée de PVDVc qui s'est poursuivie tout au long de 2020. L'éradication du poliovirus sauvage n'a pas été réalisée et le pays n'a pas été en mesure de mener la transition vers le vaccin antipoliomyélitique inactivé comme le prévoyait le Plan stratégique.

Conclusion : Aujourd'hui, plus de 20 pays signalent des flambées épidémiques dues à des PVDVc et de nombreux autres sont à risque. Une stratégie modifiée spécifique au pays est nécessaire pour éradiquer simultanément le PVS et le PVDVc, en particulier dans les pays d'endémie.

التحديات الناشئة أمام تحقيق استئصال شلل الأطفال عالميًّا وحلولها

محمد سلطان

الخلاصة

الخلفية: وعدت «المبادرة العالمية لاستئصال شلل الأطفال» باستئصاله بحلول عام 2000، ومع ذلك ما يزال المرض متوطنًا في بلدين. ويستدعي التهديد الحالي بعودة ظهور الفيروس في البلدان ذات التغطية المنخفضة باللقاحات وفاشيات فيروسات شلل الأطفال الدائرة المشتقة من اللقاحات بسبب اللقاح الفموي لشلل الأطفال استعراضًا للمبادرة.

الأهداف: هدفت هذه الدراسة الى استعراض أداء المبادرة العالمية لاستئصال شلل الأطفال في سياق باكستان، وتحديد التهديدات التي تواجه النجاح، واقتراح تعديلات على الاستراتيجية للمساعدة على تحقيق الاستئصال.

طرق البحث: كان هذا استعراضًا مكتبيًّا لفعالية «المبادرة العالمية لاستئصال شلل الأطفال» التي أُطلقت في عام 1988، لاستئصاله بحلول عام 2000. وقد أدى الفشل اللاحق في القضاء على المرض إلى تكرارات متعددة في وثائق الاستراتيجية والتخطيط. وكذلك روجعت هذه الوثائق إلى جانب المؤلفات ذات الصلة لاستكشاف أسباب الفشل وظهور فيروسات شلل الأطفال الدائرة المشتقة من اللقاحات.

النتائج: كانت «المبادرة العالمية لاستئصال شلل الأطفال» فعالة في خفض العبء العالمي للمرض بنسبة تزيد على 99٪، لكنه ما يزال متوطنًا في باكستان وأفغانستان. وقد تسببت فيروسات شلل الأطفال الدائرة المشتقة من اللقاحات في فاشيات متعددة منذ عام 2000، وتسببت في حالات إصابة أكثر 7 مرات من الحالات بسبب فيروس شلل الأطفال البري على الصعيد العالمي في عام 2020. واستهدفت «الخطة الاستراتيجية لاستئصال شلل الأطفال» والشوط الأخير من استئصاله 2013–2018 استئصال فيروس شلل الأطفال البَرِّي وفيروسات شلل الأطفال الدائرة المشتقة من اللقاحات في الوقت نفسه. وفي عام 2019، شهدت باكستان ارتفاعًا مفاجئًا في فيروس شلل الأطفال البري وسط فاشية لعدوى فيروسات شلل الأطفال الدائرة المشتقة من اللقاحات استمرت طوال عام 2020. ولم يتحقق استئصال شلل الأطفال البري، ولم يتمكن البلد من التحول إلى لقاح شلل الأطفال المعطَّل على النحو المتوقع في الخطة الاستراتيجية.

الاستنتاجات: أبلغ الآن أكثر من 20 بلدًا عن فاشيات فيروسات شلل الأطفال الدائرة المشتقة من اللقاحات، أيضًا هناك بلدان كثيرة أخرى معرضة للخطر. ويلزم وضع استراتيجية مُعدَّلة خاصة بكل بلد لاستئصال فيروس شلل الأطفال البَرِّي وفيروسات شلل الأطفال الدائرة المشتقة من اللقاحات في الوقت نفسه، وينطبق ذلك أكثر على البلدان التي يتوطن بها هذا المرض.

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Gastric cancer in the Arab World: a systematic review

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Abstract

Background: Gastric cancer (GC) is the fourth most common cancer worldwide, characterized by multifactorial pathogenesis and a heterogeneous geographic distribution. The complexity of this malignancy has evolved, with environmental and genetic factors and treatment strategies being more studied.

Aims: We aimed to group and organize the clinicopathological and epidemiological features of GC in the Arab World and compare with data from Western countries.

Methods: To obtain the highest number of topic-related articles, an extensive electronic search was conducted in the PubMed MEDLINE and Cochrane databases up to March 2022 using Boolean operators with a combination of keywords and MeSH terms. A total of 42 articles were retained after screening in accordance with the objectives of the study. The estimated age-standardized incidence rates in the Arab World were collected from the GLOBOCAN 2020 database.

Results: A total of 46 articles were retrieved from 11 countries in the Arab World. Epidemiological elements were collected, especially tumour attributes, risk factors and population characteristics, in addition to some therapeutic strategies. Results were regrouped by theme and then organized in tables and charts, allowing a global and regional approach to the subject.

Conclusion: This review shows that the Arab World is considered a low-rate GC incidence region, presenting almost the same tumour characteristics as the Western countries. The lack of GC data in the Arab World should trigger a rise in research on this type of malignancy to better understand the subject.

Keywords: gastric cancer, review, Arab World, incidence, epidemiology

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Introduction

Gastric cancer (GC) is the fourth most common cancer worldwide (*1,2*). The male to female ratio is 2:1. It ranks fourth in cancer-related mortality, with more than 768 000 deaths in 2020 (*1*). In most cases, this type of malignancy grows from epithelial cells, leading to adenocarcinomas, commonly divided into 2 types according to Lauren's classification: diffuse and intestinal (*3,4*). As with all types of cancer, GC presents at specific metastasis sites, with liver, peritoneal surface and distant lymph nodes being the most frequent (*2,5*).

The pathogenesis is multifactorial with a heterogeneous geographic distribution. The environmental factors are: high consumption of salted food, low socioeconomic status, smoking, low intake of fruits and vegetables, Epstein-Barr virus infection (*6,7*) and, especially, *Helicobacter pylori* infection (*8,9*). The genetic factors are less detailed, although some genetic profiles, such as the E-cadherin, *IL-1B*, mutation, are known to increase the risk of developing this malignancy (*6,10,11*).

The epidemiological features of GC have been widely studied in Western countries, making them well understood (*12,13*). However, there is a lack of unified data when considering the epidemiology of GC in the Middle East and Arab countries (*14,15*).

Arab countries are countries in North Africa and West Asia that have Arabic as their native language. Despite the large differences in the environment and lifestyle of these countries, they still share genetic and cultural similarities and have common scientific societies. Therefore, they can be looked on as a single epidemiological entity.

This review, the first of its kind in the Arab World, aims to regroup all the available information on GC in this region, discuss the clinicopathological and epidemiological factors and compare them with data from Western countries, and propose new public health strategies for GC control. .

Methods

To obtain a maximum number of articles, an extensive electronic search of the literature was conducted in the PubMed MEDLINE and Cochrane Library databases, retrieving all the articles published from December 1971 to March 2022. Using Boolean operators, the MeSH terms "stomach neoplasm" and keywords "gastric" and "cancer" were used in combination with MeSH terms and keywords related to the Arab World: "Lebanon", "Tunisia", "Algeria", "Egypt", "Libya", "Saudi Arabia", "Bahrain", "Kuwait, "Syria", "Somalia", "Djibouti", "Comoros", "Oman", "Emirates", "Palestine", "Jordan", "Qatar", "Morocco", "Iraq,

"Mauritania", "Sudan", "Yemen", "East Mediterranean", "Middle East and North Africa", "Arab".

A total of 177 articles were extracted. Four of the investigators (Aoude, Moussallem, Abdo and Youssef) screened titles and abstracts of the retrieved articles, and then entire texts were analysed. This was to include studies in English or French from the Arab World that contain data on GC. Studies emphasizing *H. pylori*, or other topics not directly related to cancer, or cancer types other than GC, as well as studies from countries other than the Arab World were excluded. The 46 papers that correspond to the objectives were used for this review. The selection process is summarized in the PRISMA diagram (Figure 1).

This review features a collection of the estimated age-standardized incidence rates per 100 000 of GC in 2020, for both sexes and all ages in the Arab World from the GLOBOCAN 2020 database.

Results

Overview

A total of 46 articles contained information about the characteristics of GC in the Arab World. Most of the publications retrieved discussed molecular studies and risk factors, while the others presented descriptive epidemiology and treatment outcomes. Figure 2 shows the contribution of each country: Tunisia was the most active with 12 publications, followed by Oman with 8 and Egypt with 7.

Incidence

We studied the GLOBOCAN 2020 database to extract the estimated age-standardized incidence rate per 100 000 for GC in the Arab World for both sexes and all ages (*40*). The rates were generally in the same range for the northern part of the Arab World (Table 1) . The highest incidence rates were found in Oman (8.0) and Yemen (7.1), while the rates were lowest in Kuwait and Saudi Arabia (both 2.7), Sudan (2.5) and the Comoros (1.3).

Risk factors

Helicobacter pylori infection

Helicobacter pylori infection was one of the main GC risk factors in both sexes (*16*). This bacteria was relatively prevalent in the Arab World in patients with GC; a Moroccan cohort study showed an *H. pylori* infection rate of 57.5% (*9*). However, it is important to note that some countries, such as Tunisia (*15*), witnessed a decrease in *H. pylori* infection in the last decade.

In contrast, a 2009 case–control study in Oman demonstrated an absence of significant interaction between *H. pylori* infection and the development of GC (*17*).

Epstein-Barr and other viral infections

It is controversial whether Epstein-Barr virus is an important etiological factor for GC. Its prevalence in GC

Figure 1 PRISMA flowchart for article selection process

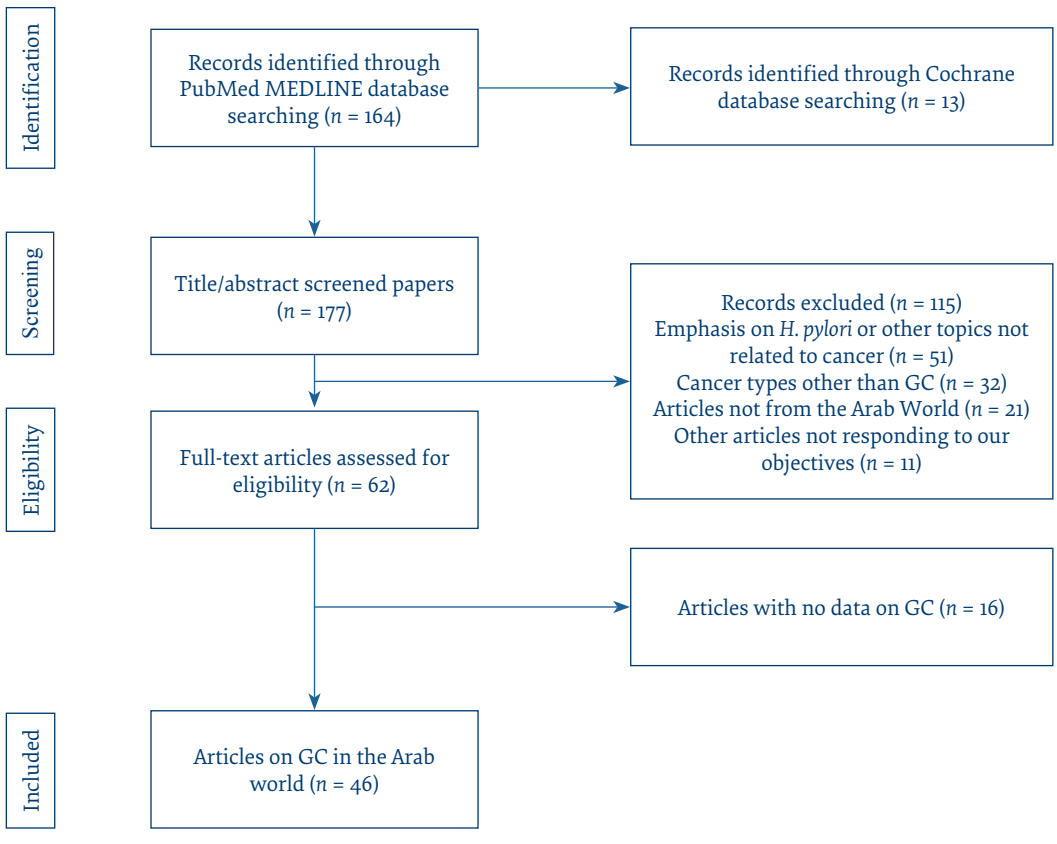
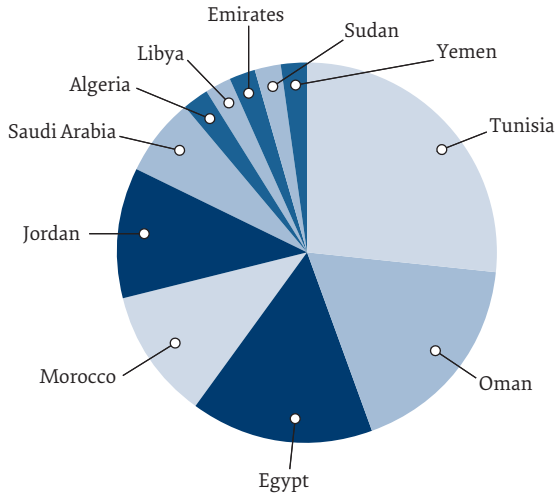


Figure 2 The contribution of different Arab countries in studies on gastric cancer (*n* = 46), 1971 to 2022



patients in the Arab population has been subject to many studies that demonstrated inconsistencies, noticeable even within the same country. This can be corroborated by 3 Tunisian studies showing a prevalence of 14.8% (*18*), 10.1% (*19*) and 4.1% (*7*) for Epstein-Barr virus infection in GC patients.

On another note, a potential emerging risk factor for GC, the John Cunningham (JC) virus, was detected in 26% of stomach cancer cases (*20*), with a significant predominance in the elderly and in a majority of the intestinal histological type.

Lifestyle

Lifestyle plays a major role in the development of all types of cancer, including GC. Several modifiable lifestyle risk factors have been studied in the carcinogenesis of stomach tumours. The most relevant risk factor in the Arab populations was tobacco (*4*), with a prevalence of 30.4% (P = 0.02). Alcohol, tea, high nutrient intake (*21*) and drinking untreated water (*22*) were associated with 3 times greater odds of developing GC.

On the other hand, one particular Omani study conducted in 2009 demonstrated the absence of significant interaction between smoking and GC development (*17*) and certain protective factors have been described in previous research, notably adherence to the Mediterranean diet along with a high level of education (*21*).

Genetics – biomarkers

Over the last few years, modern medicine has increasingly revealed relationships between genetics and carcinogenesis, focusing on its contribution to the diagnosis, prognosis and treatment outcome of tumours.

Several genetic biomarkers have been identified among GC patients in a number of studies conducted in the Arab region. Some genetic characteristics have been linked to an increased risk of developing gastric carcinoma when associated with *H. pylori* infection, notably: polymorphism in IL-1β-31C and IL-1RN alleles (*23,24*); serum soluble E-cadherin level above 5 µg/mL (*25*); plasma miR-204, miR-182 and lncRNA H19 (*26*). Stomach cancer patients had significantly higher levels of Braf, K-ras, methylated *MGMT* and methylated *MLH1* (*27*) as well as *TP53* promoter hypomethylation (*28*). In a 2019 Saudi Arabian study, the prevalence of HER3 was 16% in GC patients (*29*).

A 2009 case–control study in Oman suggested that vascular endothelial growth factor (VEGF) polymorphisms do not play any role in GC risk predisposition (*30*).

Prognostic factors

The prognostic aspect of genetic biomarkers has been considered in several studies. For instance, CD133 was found to be a predictive biomarker of tumour recurrence and metastasis (*31*). It has been demonstrated that methylation of the tumour-related gene p16INK4a (*19*), the genetic profile p53+/Ki-67+/Bcl2- (*32*), as well as COX-2 expression, could be potentially predictive of poor prognosis (*33*).

Epidemiological and histopathological features

Research studies from the Arab World having extensive data on tumour location, staging, grading, Lauren's classification and *H. pylori* infection are illustrated in Table 2. Findings from other studies with less extensive information are reported in the introduction section.

The most common histological type among GC patients in the retrieved articles was primary adenocarcinoma (*34*); the rest were mainly malignant stromal tumours, lymphomas and carcinoids (*14*) (Table 1). Among the adenocarcinoma groups, Lauren's intestinal type was the commonest (*23,29*), followed by diffuse type, mixed type and adenosquamous carcinoma (*25,35*). However, the findings vary from one region to another, with some studies showing a higher frequency of diffuse-type than intestinal-type (*7*).

Tumour localization was described in most of the studies included in our review, with third distal localization (antrum, pylorus) being the most frequent (*14,25*), followed by, body (middle part) and proximal (cardia, fundus) sites (Table 1).

Most GC patients were diagnosed at advanced stages (III and IV) (*7,34*) (Table 1). The 5-year overall survival rate of the patients was low in advanced cancer stages (*36*).

Treatment outcomes

Cancer treatment has been evolving throughout the years, with many improvements in surgical procedures, chemotherapy protocols and targeted therapies, along with a more personalized approach to cancer management (*37*). Surgery is the main treatment for GC, because it offers the only potential for cure, with total, subtotal and distal gastrectomy being the most common procedures (*15,36*).

Some clinical trials have been conducted in the Arab World to assess the efficacy of chemotherapy drugs in patients with GC. On the one hand, preoperative

Table 1 Estimated age-standardized incidence rates per 100 000 population of gastric cancer in countries of the Arab World, both sexes, all ages; source: GLOBOCAN 2020 database

Country	Rate per 100 000
Oman	8.0
Yemen	7.1
Jordan	6.0
Algeria	5.7
Morocco	5.7
Mauritania	5.6
Palestine	5.2
Qatar	5.2
Bahrain	4.8
Iraq	4.8
Somalia	4.7
Syrian Arab Republic	4.6
United Arab Emirates	4.4
Egypt	4.1
Libya	3.7
Tunisia	3.2
Lebanon	3.0
Djibouti	2.9
Kuwait	2.7
Saudi Arabia	2.7
Sudan	2.5
Comoros	1.3

administration of Imatinib was stated as being very effective, producing a great improvement in symptoms and an overall reduction in tumour size and density, which subsequently made the resection process a lot easier (*38*). On the other hand, neoadjuvant chemotherapy using 5FU-Cisplatin and Docetaxel has shown no benefit in advanced GC, with significant toxicity, such as neutropenia and weight loss (*39*).

Discussion

Gastric cancer data in the Arab World

Data on incidence of gastric cancer in the Arab World is scanty. Although an extensive search was conducted using several keywords and MeSH terms, including all types of studies, in French or English, for all years, only 46 articles were retrieved. An important observation was that only 11 out of the 22 Arab countries were indicated in the selected papers.

The cancer incidence and mortality data in GLOBOCAN (*41*) related to the Arab countries were not all extracted from national cancer registries due to a lack of data in some countries. For example, statistics from the Syrian Arab Republic and the Comoros were estimated from nearby regions because of the lack of national data.

These findings suggest that the Arab World needs major investment in cancer research by establishing national registries and publishing new studies.

Incidence

Looking at global statistics, the hotspots for GC incidence and mortality are in East Asia, Eastern Europe and South America (*42*). A recent review identified the low-risk regions as Southern Asia, North America, Africa, Australia and New Zealand (*43*). Some consistent numbers can be extracted from a 2014 American review; for example, the age-standardized incidence rate per 100 000 in men was 65.9 in Korea versus 3.3 in Egypt (*44*).

The totality of these findings is compatible with the GLOBOCAN 2020 database, and the study can conclude that the Arab World is categorized among the low GC risk regions.

Demographics

The mean age of the GC populations in the Egyptian articles was around 50 years, while the average for the rest of the Arab World countries was around 60 years; the median age at diagnosis was 70 years in Western studies (*43,44*). Further investigations are needed to determine if these findings are related to the younger age of the Arab populations in general.

According to the Western series, men are 2–3 times more susceptible than women to developing GC (*42,43*), which is similar to findings for the Arab population.

Risk factors

The association between tobacco and GC is relatively controversial. In most of the studies, smoking was a significant risk factor (*4*) and could increase the odds of GC development by a factor of 3 (*22*). In Lebanon, smoking was considered a major GC risk factor (*16*). A meta-analysis of cohort studies conducted in Portugal demonstrated that the GC risk increased by 60% in male smokers and 20% in female smokers (*45*). In contrast, a study in Oman determined an absence of association between smoking and GC (*17*). Other research efforts have failed to establish any positive association (*46*).

On the other hand, the relationship between the Mediterranean diet and GC was much clearer. Numerous studies in this review highlighted the fact that the Mediterranean diet was a protective factor against developing GC. The World Cancer Research Fund/ American Institute for Cancer Research summed up that fruit and vegetables protect against GC. An Italian case–control study generated the same findings, alongside the fact that non-alcohol consumption played a defensive role against GC (*47*), which is also shown in our review. These findings could partially explain the low incidence rates of GC in the Arab population.

Two Tunisian studies found that the prevalence of Epstein-Barr virus-associated GC was 10% and 14.8% (*18,19*). This is generally compatible with an international meta-analysis of 70 studies with a total of 15 592 GC patients distributed in Europe, America and Asia where

Table 2 Distribution o f the gastric cancer characteristics in 19 research articles from the Arab World, 1971–2022

Author, year, country (Reference No.)	Type	No.	Mean age (years)	M:F ratio	Tumour location No. (%)			Tumour size No. (%)				Nodes No. (%)				Metastasis No. (%)		Overall stage No. (%)				Grade No. (%)			Lauren's classification No. (%)		H. Pylori+ No. (%)
					Proximal (fundus, cardia)	Body (middle part)	Lower part (antrum, pylorus)	T1	T2	T3	T4	No	N1	N2	N3	Mo	M+	I	II	III	IV	I	II	III	Intestinal	Diffuse	
Ksiaa et al. 2010 Tunisia (*20*)	R	61	62.0	1.3:1	-	25 (43)	33 (57)	11 (18)		50 (82)		33 (54)		28 (46)											24 (39)	37 (61)	36/61 (59)
Ben Ayed-Guerfali et al. Tunisia 2011 (*19*)	R	79	59.6	1.5:1	8 (10)	22 (30)	46 (60)															34 (45)		42 (55)	45 (57)	34 (43)	26/73 (36)
Ayed et al. 2014 Tunisia (*32*)	R	90	63.0	1.4:1	8 (10)	23 (27)	54 (63)	17 (19)		71 (81)		16 (20)		66 (80)		42 (69)	19 (31)					40 (46)		47 (54)	52 (59)	38 (41)	31/79 (39)
Ayed-Guerfali et al. Tunisia 2014 (*58*)	R	80	59.6	1.3:1	8 (11)	20 (26)	48 (63)	16 (22)		44 (59)	18 (24)	15 (21)		58 (79)		37 (68)	17 (32)					38 (49)		40 (51)	48 (60)	32 (40)	29/71 (40)
Elghali et al. 2018 Tunisia (*15*)	R	876	59.1	1.4:1	162 (21)		608 (79)	23 (6)	106 (28)	188 (50)	59 (16)	128 (36)	149 (42)	69 (19)	12 (3)	663 (81)	152 (19)								635 (72)	241 (28)	171/876 (19)
El-Shahat et al. 2005 Egypt (*59*)	R	66	52.8	2.3:1	12 (18)	21 (32)	33 (50)	16 (24)		50 (76)		20 (30)		46 (70)								8 (12)	41 (62)	17 (26)			
Zeeneldin et al. 2014 Egypt (*60*)	R	168	54.0	1.3:1	32 (28)	37 (32)	45 (40)											14 (8)	36 (21)	58 (35)	60 (36)						
Mohamed et al. 2019 Egypt (*26*)	C	35	45.2	4:1				24 (25)		72 (75)		24 (25)		72 (75)		89 (93)	7 (7)								38 (39)	58 (61)	
Attia et al. 2019 Egypt (*31*)	R	77	54.4	1.4:1				3 (4)	14 (18)	58 (75)	2 (2)	20 (26)		57 (74)				10 (13)	27 (35)	30 (39)	10 (13)				60 (78)	17 (22)	
Joutei et al. 2018 Morocco (*61*)	R	55	57.0	1.8:1				5 (9)	10 (18)	26 (48)	14 (25)	13 (24)		42 (76)		51 (93)	4 (7)	17 (31)		38 (69)		17 (31)	14 (25)	24 (34)	33 (60)	22 (40)	
Joutei et al. 2020 Morocco (*62*)	R	98	58.0	2:1				13 (13)	21 (21)	37 (38)	27 (28)	27 (28)	26 (27)	26 (27)	19 (19)	94 (96)	4 (4)	27 (28)		71 (72)		24 (24)	30 (31)	44 (45)	27 (28)	71 (72)	
Nshizirungu JP et al. Morocco 2021 (*63*)	R	97	59.8	1.6:1	31 (32)		66 (68)															62 (64)		35 (36)	65 (67)	32 (33)	
El Zouki et al. 2012 Libya (*51*)	R	114	55.5	2.2:1	34 (30)	25 (22)	55 (48)									63 (55)	51 (45)	0	16 (15)	24 (23)	65 (62)				46 (45)	56 (55)	72/114 (63)
Al-Moundhri et al. Oman 2005 (64)	R	121	60.2	2:1	14 (11)	47 (39)	60 (50)	27 (31)		59 (69)		21 (24)		65 (76)				34 (28)		87 (72)		30 (25)	49 (40)	42 (35)	56 (79)	15 (21)	
Al-Moundhri et al. Oman 2006 (*6*)	R	339	59.8	1.9:1	30 (9)	98 (30)	200 (61)	5 (2)	66 (28)	132 (56)	34 (14)	57 (24)	127 (54)	43 (18)	10 (4)			23 (7)	69 (20)	114 (34)	133 (39)	52 (16)	143 (42)	144 (42)	189 (82)	41 (18)	
Al-Moundhri et al. Oman 2010 (*65*)	C	192		1.4:1				32 (17)		160 (83)		26 (13)		166 (87)				33 (17)		159 (83)		11 (6)	80 (42)	101 (52)	93 (48)	99 (52)	67/116 (57)
Al-Moundhri Oman et al. 2012 (*66*)	R	115	59.2	1.7:1	63 (55)		52 (45)	37 (31)		81 (69)		20 (17)	28 (25)	67 (58)				38 (33)		77 (67)					66 (56)	52 (44)	

Table 2 Distribution o f the gastric cancer characteristics in 19 research articles from the Arab World, 1971–2022 *(concluded)*

Author, year, country (Reference No.)	Type	No.	Mean age (years)	M:F ratio	Tumour location No. (%)			Tumour size No. (%)				Nodes No. (%)			Metastasis No. (%)		Overall stage No. (%)				Grade No. (%)			Lauren's classification No. (%)		H. Pylori+ No. (%)
					Proximal (fundus, cardia)	Body (middle part)	Lower part (antrum, pylorus)	T1	T2	T3	T4	No	N1	N2	N3	Mo	M+	I	II	III	IV	I	II	III	Intestinal	Diffuse	
Bani Hani et al. 2005 Jordan (67)	R	176		1.7:1	31 (20)	42 (26)	86 (54)											15 (8)	41 (25)	59 (35)	53 (32)				127 (81)	29 (19)	32/176 (18)
Bodoor et al. 2016 Jordan (3)	R	87	60.0	1.2:1								20 (23)		67 (77)				23 (27)		6 (73)		30 (34)	57 (66)		49 (56)	38 (44)	53/70 (75)
Albasri et al. 2017 Saudi Arabia (68)	R	49	58.9	2.3:1		26 (68)	12 (32)					27 (55)		22 (45)								2 (4)	34 (69)	13 (27)	30 (61)	19 (39)	
Bibi et al. 2018 (69) Saudi Arabia	C	35	53.0	4:1				2 (6)	15 (43)	13 (37)	5 (14)	8 (23)	4 (11)	14 (40)	9 (26)	30 (86)	5 (14)		7 (20)		28 (80)						

Type: R = retrospective; C = case–control.

the prevalence of Epstein-Barr virus accounted for 8.7% of GC cases overall (*48*).

It is important to mention *H. pylori*, the most important GC risk factor, and the World Health Organization class I carcinogen (*49*). This bacterial infection is estimated to cause 65–80% of all GC cases (*50*). In this study, *H. pylori* was investigated in 1323 patients in North Africa and 362 in Western Asia and the prevalence was 30% and 42%, respectively, confirming that it is also a major risk factor in the region (*50*). There is evidence that the occurrence of *H. pylori* was closely related to the intestinal subtype (*43*), which was similar in the studies from Libya (*51*) and Egypt (*25*). *H. pylori* screening was not taken into account in all of the articles we retrieved and the methods used may not have been sufficiently sensitive, thus leading to an underestimation of the numbers (*52*).

The results of this Arab World review could be a trigger for designing new education programmes and campaigns to raise awareness of this health issue.

Tumour characteristics and outcomes

Lauren's GC histologic classification distinguishes 2 main GC subtypes: intestinal carcinoma (characterized by visible glands and cohesion between malignant cells) and the diffuse subtype (identified by poorly cohesive infiltrating tumour cells and rare or no glands). Several studies agree that the intestinal subtype is the most common (*53*), which is in agreement with the findings of GC classification in the Arab countries (summarized in Table 1).

From the data on Table 1, it is apparent that in the Arab region, GC is mainly detected at advanced stages. Research in Western countries found the same, adding that diagnosis at advanced stages increases mortality, making it the third most common cancer-related death (*42*).

Our review shows that the most common site for gastric tumours is the lower third of the stomach, including the antrum and pylorus (*25*). This result is inconsistent with the findings of a North American review stating that tumours of the lower part of the stomach have decreased in the last few decades, with cardia GC affecting predominantly Caucasian populations (*54*).

The 5-year overall survival of GC accounted for 16.5% and 21.1% respectively in Oman and Jordan (*6,14*). These findings are similar to the international rates: a comparative study of different 5-year overall survival of GC noted that the rates ranged from 10 to 30% in several European countries and the United States of America (*55*). The only cited exception was in the high incidence country of Japan, where the survival rates were higher, reaching 50–70% for early stages (*56*). This could be explained through the mass screening programmes implemented in that country to reduce the high incidence and elevated mortality rates of the disease.

The oncogenic potential of the John Cunningham virus

The JC virus is a polyomavirus commonly infecting humans and its oncogenic potential is mediated by the T-antigen. A western study was designed to find the possible relation between the JC virus and GC (*57*), finding that the T-antigen

protein expression was detected in 39% of the GC cases and none of the non-neoplastic tissues. A Tunisian study also found that this virus is a potential emerging risk factor with a prevalence of 26% of the cases (*20*).

Strengths and weaknesses

First, a wide combination of MeSH terms along with keywords was used, which helped in the extraction of a maximum number of articles on GC in the Arab World in 2 different databases. In addition to articles in English, we analysed papers published in French since it is also a commonly used language in the region. Most importantly, this review is the first of its kind in the Arab countries combining the few original articles on the subject. The current work summarizes GC tumour characteristics along with an overview of endemic risk factors and other particularities of the region.

Weaknesses are identified as missing data on prevention and screening strategies, as well as genomic characteristics and hereditary syndromes such as hereditary diffuse GC and familial adenomatous polyposis.

Conclusion

In conclusion, this review shows that the Arab World is a low-rate GC incidence region, presenting tumour characteristics similar to those of Western countries, despite some differences like age of presentation. However, the number of studies and the overall data regarding this subject are scarce. A greater number of studies and an increase in national data are required to obtain a more representative overview and a better understanding of the disease in this region.

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Cancer de l'estomac dans le monde arabe : une analyse systématique

Résumé

Contexte : Le cancer de l'estomac est le quatrième cancer le plus fréquent dans le monde. Il se caractérise par une pathogenèse multifactorielle et une distribution géographique hétérogène. La complexité de cette tumeur maligne a évolué, les facteurs environnementaux et génétiques ainsi que les stratégies de traitement étant davantage étudiés.

Objectifs : Notre objectif consistait à regrouper et organiser les caractéristiques clinicopathologiques et épidémiologiques du cancer de l'estomac dans le monde arabe et les comparer aux données provenant des pays occidentaux.

Méthodes : Afin d'obtenir le plus grand nombre d'articles liés au sujet, une recherche en ligne approfondie a été menée dans les bases de données PubMed/MEDLINE et Cochrane jusqu'en mars 2022 en utilisant des opérateurs booléens avec une combinaison de mots-clés et de termes MeSH. Au total, 42 articles ont été retenus après une sélection conforme aux objectifs de l'étude. Les taux d'incidence standardisés selon l'âge dans le monde arabe ont été recueillis à partir de la base de données GLOBOCAN 2020.

Résultats : Au total, 46 articles provenant de 11 pays du monde arabe ont été extraits. Des données épidémiologiques ont été recueillies, notamment les caractéristiques des tumeurs, les facteurs de risque et les caractéristiques de la population, ainsi que certaines stratégies thérapeutiques. Les résultats ont été regroupés par thème, puis organisés sous forme de tableaux et de graphiques, de telle sorte qu'ils permettent de traiter le sujet à l'échelle mondiale et régionale.

Conclusion : Cette analyse montre que le monde arabe est considéré comme une région à faible incidence de cancer de l'estomac, où les caractéristiques des tumeurs sont sensiblement les mêmes que dans les pays occidentaux. Le manque de données sur le cancer de l'estomac dans le monde arabe devrait susciter une augmentation des recherches concernant ce type de tumeur maligne afin de mieux comprendre le sujet.

سرطان المعدة في العالم العربي: استعراض منهجي

مارك عودة، مارك مسلم، مجد عبده، براين يوسف، هامبيك رفايل كوريه، حميد عبيد الشامسي

الخلاصة

الخلفية: يُعدُّ سرطان المعدة رابع أكثر أنواع السرطانات شيوعًا في العالم، ويتميز بأنه ينشأ عن عوامل متعددة، وله توزيع جغرافي غير متجانس. وقد تطور تعقيد هذا الورم الخبيث، مع خضوع العوامل البيئية والجينية واستراتيجيات العلاج لمزيد من الدراسة.

الأهداف: هدفت هذه الدراسة الى تجميع وتنظيم السمات السريرية الباثولوجية والوبائية لسرطان المعدة في العالم العربي ومقارنتها ببيانات من بلدان غربية.

طرق البحث: للحصول على أكبر عدد من المقالات المتعلقة بالموضوع، أُجريَ بحث إلكتروني موسع في قاعدتَي بيانات PubMed MEDLINE و Cochrane حتى مارس 2022 باستخدام عوامل منطقية (Boolean) مع مزيج من الكلمات المفتاحية ومصطلحات العناوين الرئيسية للموضوعات

الطبية (MeSH). وجرى الاحتفاظ بما مجموعه 42 مقالًا بعد الفرز وفقًا لأهداف الدراسة. وجُمعت معدلات الإصابة المقدَّرة المُوحَّدة حسب السن في العالم العربي من قاعدة بيانات GLOBOCAN 2020.

النتائج: جرى الحصول على ما مجموعه 46 مقالًا من 11 بلدًا في العالم العربي. وجرى جمع العناصر الوبائية، ولا سيما خصائص الأورام، وعوامل الخطر، وخصائص السكان، بالإضافة إلى بعض الاستراتيجيات العلاجية. وأعيد تجميع النتائج حسب الموضوع، ثم نُظِّمت في جداول ومخططات، الأمر الذي أتاح اتباعَ نهج عالمي وإقليمي إزاء الموضوع.

الاستنتاجات: يُبيِّن هذا الاستعراض أن العالم العربي يُعدُّ منطقة ذات معدل منخفض للإصابة بسرطان المعدة، إذ تُظهر خصائصَ الأورام نفسها تقريبًا التي تظهر في الدول الغربية. وينبغي أن يؤدي نقص بيانات سرطان المعدة في العالم العربي إلى زيادة الأبحاث المتَعلقة بهذا النوع من الأورام الخبيثة، من أجل التوصل إلى فهم أفضل للموضوع.

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État des lieux des troubles mentaux et de leur prise en charge en Algérie

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Résumé

Contexte : L'Algérie a engagé plusieurs actions et consacré diverses ressources afin d'améliorer les services de santé mentale en matière de prévention et de prise en charge des troubles mentaux. En effet, l'accroissement des troubles mentaux et de la demande de soins font de la santé mentale un enjeu majeur de société.

Objectifs : Présenter un état des lieux des troubles mentaux en Algérie ; décrire l'état des structures et des ressources en santé mentale, ainsi que l'état actuel de la psychiatrie comme principal dispositif de traitement et d'accompagnement.

Méthodes : Nous avons réalisé une analyse descriptive des données issues de rapports et d'enquêtes nationales sur l'état de santé des Algériens, ainsi que de celles obtenues des différents recensements de la population ou des statistiques hospitalières.

Résultats : Les quelques enquêtes qui ont été réalisées jusqu'à ce jour ont toutes mis en évidence l'accroissement de la prévalence des troubles mentaux et de la demande de soins en santé mentale. Cependant, la prise en charge des troubles mentaux et l'offre de soins restent insuffisantes et inégalement réparties au niveau des structures d'accueil, des ressources humaines et, surtout, de la législation.

Conclusion : La présente analyse a montré que malgré les efforts consentis en matière de structures, de ressources et de législation, la santé mentale en Algérie méritait d'être davantage prise en considération dans les politiques publiques de santé.

Mots-clés : santé mentale, trouble mental, psychiatrie, prise en charge, Algérie

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Introduction

Les troubles mentaux n'ont jamais été considérés comme une priorité de santé publique dans les pays en développement confrontés à d'autres urgences sanitaires telles que les maladies épidémiques, la protection maternelle et infantile ou la malnutrition (*1*). Pourtant, leur prévalence et les conséquences économiques et sociales qu'ils entraînent ne sont plus sujets à controverse dans tous les pays du monde.

Dans son rapport sur la santé mentale de 2004, l'Organisation mondiale de la Santé (OMS) estimait que les troubles mentaux touchaient environ 450 millions de personnes dans le monde (*2*). Plus d'une personne sur quatre serait affectée par un trouble mental durant sa vie. Lamboy rappelait aussi que plus de 25 % des individus présenteraient un ou plusieurs troubles mentaux ou de comportement au cours de leur vie (*3*). On estime également que l'importance des troubles mentaux s'accentuera dans les décennies à venir et que, d'ici à 2020, ces troubles seront vraisemblablement responsables de 15 % du nombre d'années de vie ajustées sur l'incapacité perdues pour cause de maladie. Dans les pays en développement, les troubles mentaux risquent d'augmenter de façon considérable. Les pays en développement dont les systèmes de soins de santé mentale ne sont guère développés devraient connaître l'accroissement le plus important de la morbidité imputable aux troubles mentaux, et la charge due à ces troubles s'alourdira de façon disproportionnée dans les décennies qui viennent (*4*).

L'augmentation de la fréquence des troubles mentaux en Algérie et l'amélioration souhaitable de l'offre de soins et de la prise en charge, ainsi que la prévention de toute souffrance psychique et la promotion du bien-être mental constituent les principaux enjeux auxquels est confronté aujourd'hui le domaine complexe de la santé mentale. En plus de la difficulté liée à la définition du concept de trouble mental et à son identification, celui-ci demeure une construction sociale en relation étroite avec les logiques des acteurs sociaux qui participent à sa définition et à son identification (*5*). Il est tout à fait vrai que la prévalence des troubles mentaux et les problèmes de santé mentale sont très difficiles à évaluer en Algérie, et varient sensiblement d'une étude/enquête à une autre. Cependant, quelques rapports sur la santé des Algériens font état d'une situation alarmante et très inquiétante, et les spécialistes ainsi que les professionnels de santé

sont unanimes : la santé mentale des Algériens « se porte mal ».

Depuis quelques années, l'Algérie a engagé plusieurs actions et a consacré diverses ressources afin d'améliorer les services de santé mentale en matière de prévention et de prise en charge, ainsi qu'en matière de droit. En effet, l'accroissement des troubles mentaux et de la demande de soins font de la santé mentale un enjeu majeur de société, enjeu qui s'impose, dans toute sa complexité, aux différents acteurs des champs de la santé, du social et du politique.

Dans cet article, nous présentons un état des lieux des troubles mentaux en Algérie et décrivons l'état des structures et des ressources en santé mentale, les modalités de prise en charge ainsi que l'état actuel de la psychiatrie comme principal dispositif de traitement et d'accompagnement. Nous montrons l'importance de la problématique de la santé mentale dans le contexte algérien et mettons en évidence le caractère préoccupant de l'accroissement de la prévalence des troubles mentaux, sujet insuffisamment traité dans le pays.

Méthodes

Nous avons réalisé une analyse descriptive des données issues de rapports et d'enquêtes nationales sur l'état de santé des Algériens, ainsi que de celles obtenues à partir des différents recensements de la population ou des statistiques hospitalières.

Résultats

Prévalence et impact des troubles mentaux

État de la situation en Algérie

Il est très difficile d'avoir des chiffres sur l'état de la santé mentale en Algérie. De fait, on dispose de très peu de données, qui restent peu fiables, sur la prévalence des troubles mentaux en population générale, et qui sont issues de quelques enquêtes nationales ou bien sont obtenues à partir des différents recensements de la population ou des statistiques hospitalières. En effet, les quelques enquêtes, à caractère local ou régional, ont été menées essentiellement par des psychiatres. Ces enquêtes ont porté sur des échantillons spécifiques et se sont centrées sur des sujets divers tels que la dépression, le suicide, la psychose et les troubles anxieux (*6*).

Si l'on se réfère à l'enquête nationale de santé qui a eu lieu au début des années 1990 (*7*), les maladies mentales se retrouvent parmi les dix premières affections chroniques mentionnées par la population. Elles représentaient près de 7 % de l'ensemble des maladies chroniques. Le recensement général de la population et de l'habitat en 1998 montrait que 140 000 personnes présentaient une affection mentale entraînant un handicap, parmi lesquelles on dénombrait 20 000 enfants. L'enquête PAPFAM,[1] menée à la fin de l'année 2002 dans le but d'évaluer la prévalence des maladies mentales dans la population selon l'âge, le sexe et le milieu de résidence, a confirmé les chiffres concernant le handicap mental, obtenus lors du recensement général de la population, et a montré que les maladies mentales touchaient 0,5 % de la population (*7*) (Tableau 1).

Selon le rapport de 2003 du ministère de la Santé, de la Population et de la Réforme hospitalière portant sur la perspective décennale (*8*), cette enquête révélait déjà l'ampleur du problème de la santé mentale en Algérie avec 155 000 personnes souffrant de maladie mentale et 62 000 d'épilepsie, et indiquait qu'il faudrait s'attendre à devoir prendre en charge au minimum 174 000 sujets présentant une affection au long cours touchant la santé mentale. Les statistiques hospitalières montrent quant à elles que 150 000 consultations de psychiatrie sont assurées annuellement par les établissements hospitaliers spécialisés en psychiatrie. Les troubles mentaux représentent environ 1,5 % des motifs de consultation dans les structures sanitaires en général (*9*).

Selon une enquête de l'Institut National de Santé Publique (INSP) sur la transition épidémiologique et le système de santé en 2007, les maladies mentales se retrouvent dans des proportions non négligeables par rapport à d'autres maladies chroniques et représentent 5,44 % (*10*). Elles occupent le sixième rang parmi les pathologies les plus fréquentes en Algérie (Figure 1). D'autres études et enquêtes à caractère régional ou local concernant la psychiatrie et la santé mentale ont été menées, à l'image de l'enquête réalisée à l'hôpital Errazi de Annaba sur les patients hospitalisés pour la première fois durant la période 1986-1987 (*7*). Selon cette enquête, les psychoses constituaient la majorité des causes d'hospitalisation avec un taux de 67,23 %. Les troubles névrotiques et les états réactionnels venaient en seconde position avec un taux de 15,7 %, suivis par les troubles de la personnalité,

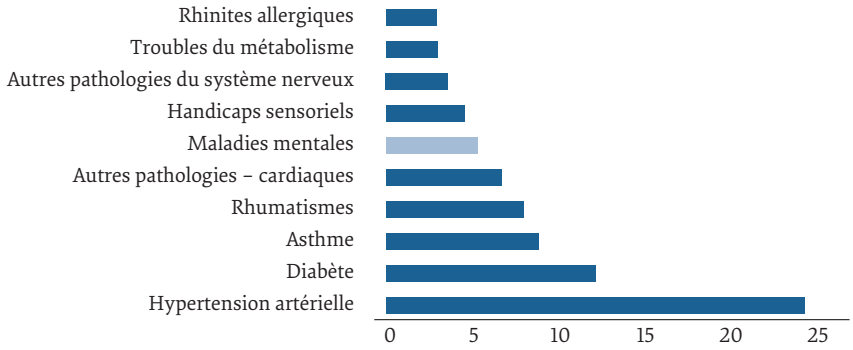
Tableau 1 Prévalence de la maladie mentale dans la population selon l'âge

Maladie	Inférieur à 40 ans	40-49 ans	50-59 ans	60-69 ans	Supérieur à 70 ans	Total
Maladie mentale	1,9 %	0,8 %	1,1 %	0,7 %	1,0 %	0,5 %
Épilepsie	0,8 %	0,3 %	0,2 %	0,2 %	0,4 %	0,2 %

Source : enquête PAPFAM 2002.

[1] *« PAPFAM » : Enquête algérienne sur la santé de la famille réalisée en 2002 dans le cadre du Projet panarabe pour la santé de la famille. Cette enquête a été menée par l'Office National des Statistiques, en étroite collaboration avec les services en charge des questions de population au ministère de la Santé, de la Population et de la Réforme Hospitalière, dans la continuité du projet sur la santé de la mère et de l'enfant « PAPCHILD » initié par la Ligue des États arabes vers la fin des années quatre-vingt.*

Figure 1 Prévalence des maladies chroniques en % de la population totale en Algérie



essentiellement les troubles psychopathiques avec 4,8 %. Parmi les psychoses, la schizophrénie représentait 68,8 % de la population étudiée. Une étude épidémiologique des urgences psychiatriques faite en 1998, toujours dans la région d'Annaba, a montré que sur les 709 sujets examinés, dont 34,6 % consultaient pour la première fois et 65 % étaient d'anciens patients, 15,8 % présentaient des troubles névrotiques, 8,7 % des psychoses aiguës, 47,3 % des psychoses chroniques, 2,3 % des états démentiels et 2,5 % des états d'arriération mentale (7). Pour ce qui est des motifs de consultation, l'agitation psychiatrique concernait 51,1 % des cas. Une étude de population générale effectuée à Alger en 2003 a montré que la prévalence des troubles anxieux atteignait 43 %, dont 13 % se présentaient comme un trouble de stress post-traumatique (*6*).

Il est vrai qu'il n'y a pas eu d'études épidémiologiques de grande envergure en Algérie, et les quelques enquêtes qui ont été faites ne donnent ni une estimation exacte ni une idée réelle de la prévalence et de l'impact des troubles mentaux et des problèmes de santé mentale dans la population générale. Cependant, les données et les résultats de ces études, aussi éparses et dispersées soient-elles, permettent de constater que l'état de santé mentale des Algériens s'est sensiblement dégradé, que les maladies affectant la santé mentale verront probablement leur incidence augmenter et que la situation appelle à un renforcement de la réponse médicale, sociale et politique.

L'offre de soins en matière de santé mentale

Sur le plan de l'offre de soins en santé mentale, le secteur de la santé dispose de trois types d'infrastructures : les structures hospitalières, celles de proximité et celles de prévention et de lutte contre les addictions.

Une offre de soins importante mais qui reste insuffisante

En matière de structures d'accueil et de prise en charge, selon le Plan National de Promotion de la Santé Mentale 2017-2020 (*11*), le pays est doté actuellement, en ce qui concerne les structures hospitalières, de 19 établissements hospitaliers spécialisés (EHS) psychiatriques, de 27 services de psychiatrie en établissement public hospitalier (EPH – en Algérie, hôpital général) et de six services de psychiatrie en CHU (centre hospitalier universitaire) (Tableau 2). Dix autres établissements spécialisés en psychiatrie (hôpitaux psychiatriques), d'une capacité d'hospitalisation allant de 30 à 120 lits, sont achevés mais non fonctionnels, ou en cours de réalisation. Ces structures totalisent 5299 lits au niveau national, avec un ratio de 13,1 lits pour 100 000 habitants. Rappelons que peu d'hôpitaux psychiatriques ont été construits depuis l'indépendance. Le nombre de lits en soins psychiatriques est passé de 6000 en 1962 à près de 5000 lits en 2005, alors même que la population a quadruplé, comme le souligne Benmebarek (*6*). Ce recul pourrait s'expliquer par le désintérêt et la marginalisation des questions relatives à la santé mentale et à la psychiatrie dans les politiques publiques en matière de santé. En ce qui concerne les structures de proximité, il y a 161 centres intermédiaires de santé mentale (CISM) sur les 188 prévus par le Programme National de Santé Mentale (*9*). Quant aux structures de prévention et de lutte contre les addictions, 42 centres intermédiaires de soins en addictologie (CISA) sont fonctionnels (*12*) sur les 53 prévus par le même programme. Il existe également deux centres de cure de désintoxication qui sont fonctionnels et il y en a trois autres prévus selon le Plan National de Promotion de la Santé Mentale (deux sont achevés mais pas encore fonctionnels et un est en cours de réalisation).

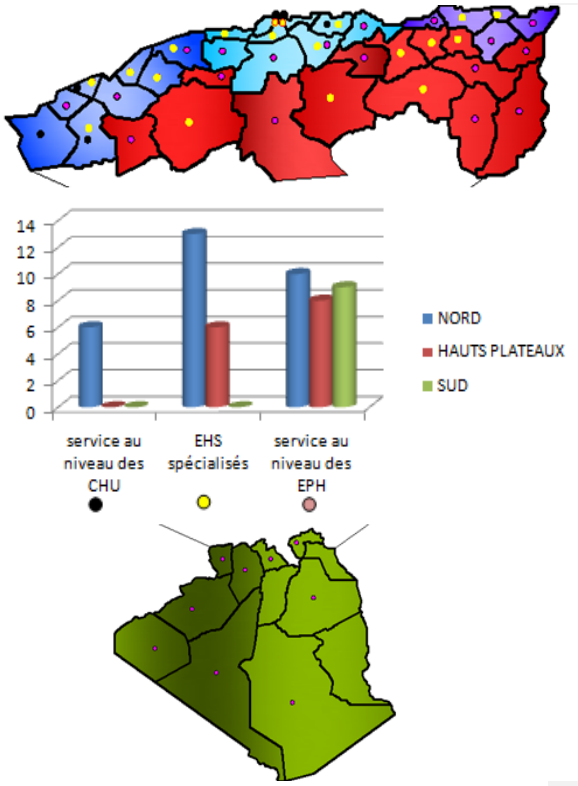
Sur le plan des ressources humaines ou de la démographie professionnelle, le nombre de psychiatres en Algérie atteint aujourd'hui 898, dont 270 dans le secteur privé, alors qu'ils étaient seulement trois durant les premières années de l'indépendance à assurer l'assistance psychiatrique de la population avec d'autres psychiatres étrangers. On dénombre

Tableau 2 Structures spécialisées en psychiatrie et nombre de lits (2016)

Structure	Nombre	Lits
EHS psychiatrique	19	4503
Services de psychiatrie en EPH	27	591
Services de psychiatrie en CHU	6	205

Source : (11).
EHS : établissement hospitalier spécialisé ; EPH : établissement public hospitalier ; CHU : centre hospitalier universitaire.

Figure 2 Établissements et services spécialisés en psychiatrie (2016)



Source : graphique réalisé à partir des tableaux présentés dans le plan national.
CHU : centre hospitalier universitaire ; EHS : établissement hospitalier spécialisé ; EPH : établissement public hospitalier.

également, pour l'année 2016, 150 médecins généralistes affectés aux structures dédiées à la santé mentale, 1368 psychologues (1172 cliniciens et 196 orthophonistes), 2128 infirmiers et 95 ergothérapeutes (*11*). Cette offre de soins, malgré son importance et les avancées réalisées, reste en deçà des standards internationaux, et la capacité litière actuelle ainsi que l'offre de soins en termes de ressources humaines ne peuvent répondre à une demande de soins qui augmente de plus en plus.

Une offre de soins inégale et déséquilibrée

Une analyse de la couverture sanitaire et de l'offre de soins en matière de structures dans les trois régions du pays (Nord, Hauts Plateaux et Sud) nous permet d'avoir une idée des différentes disparités (Figure 2).

C'est la région du Nord qui possède le plus grand nombre de services et d'établissements spécialisés en psychiatrie, avec six services en CHU (trois au Nord-Centre et trois au Nord-Ouest) et 13 EHS sur les 19 que possède le pays, et qui délivre des soins de haut niveau ; l'offre de soins existe au niveau de référence et au niveau périphérique également, avec une moyenne de 16,7 lits pour 100 000 habitants, ce qui est supérieur à la moyenne nationale de 13,1 lits (*11*). Le terme « périphérique » fait référence à l'un des niveaux de l'organisation hiérarchique du système de soins en Algérie qui est subdivisé en trois niveaux : le niveau de référence en haut de la pyramide (CHU, EHS), le niveau intermédiaire (EPH) et le niveau périphérique (centres de soins, polycliniques, établissements publics de santé de proximité – EPSP, etc., qui ne sont pas forcément loin des zones urbaines centrales, ou à la périphérie urbaine).

Au niveau des Hauts Plateaux, plus de la moitié des wilayas (départements) de cette région ne possèdent pas d'EHS spécialisés (seulement six wilayas sur 14 en disposent), mais procurent des soins au niveau périphérique, avec une moyenne d'offre de soins de 10,1 lits pour 100 000 habitants. Or on observe une variabilité entre les wilayas et des disparités dans la même région : par exemple, dans la partie Hauts Plateaux-Centre composée des wilayas de Djelfa et de Bordj Bou Arreridj, l'offre de soins est d'un lit seulement pour 100 000 habitants.

La situation au sud du pays est beaucoup plus compliquée, et l'offre de soins est très réduite. Elle existe seulement au niveau périphérique dans les hôpitaux généraux (EPH) des neuf wilayas sur les 12 qui composent cette région. L'offre de soins au niveau de référence (CHU, EHS) est quasi inexistante. Trois wilayas de cette région (Illizi, El Oued et Ghardaïa) dans la partie Sud-Est sont dépourvues de toute structure psychiatrique, et la moyenne de l'offre est de seulement 4,2 lits pour 100 000 habitants. À cela s'ajoutent les grandes distances à parcourir pour accéder aux structures de soins (*11*).

Limites de l'assistance psychiatrique actuelle

Persistance du modèle asilaire

Dans son article « Le droit et la maladie mentale », Ossoukine avance que « la réforme de la loi sanitaire en 1985 ne bouleversa pas fondamentalement l'ancienne loi française de 1838. Elle demeure une loi répressive, totalitaire et asilaire. Elle reprend dans sa philosophie l'ancienne théorie médico-légale qui ne cesse de considérer le malade mental comme source de danger » (*13*). Cet avis est partagé par Sider qui souligne que l'organisation des soins se résume à de simples mesures d'enfermement et que le seul défi de nos institutions, consiste à offrir un minimum de soins « sécuritaires » sans se pencher réellement sur les problématiques de prévention, de suivi et d'insertion du patient (*14*). En effet, le modèle asilaire reste la seule référence en matière de soins psychiatriques en Algérie malgré les efforts consentis et la volonté de passer de la psychiatrie à la santé mentale, ce qui, selon l'OMS, pérennise la stigmatisation, la marginalisation et l'exclusion des malades mentaux et entrave sérieusement les possibilités de leur intégration sociale.

Persistance de la cure d'urgence

Actuellement, en matière de réhabilitation, les structures qui permettent d'accompagner et de réinsérer des individus dans leur milieu naturel (familial, éducatif, professionnel, etc.) ainsi que d'assurer la post-cure sont méconnues, et souvent leurs missions se limitent à de simples consultations. Les établissements qui dispensent les soins en hospitalisation continuent eux aussi à fonctionner selon une logique essentiellement médicale

et curative. Comme l'aura souligné le psychiatre Boudarene, « la prise en charge des malades mentaux, dans notre pays, est prise au piège dans l'ornière de la cure. L'offre d'accompagnement durant la "post-cure" est pratiquement inexistante » (*14*). En effet, la prise en charge des personnes en souffrance mentale en Algérie continue à être dominée par une approche médicale et axée sur les hôpitaux, centrée sur le curatif et la suppression des symptômes, en excluant à la fois la prévention, la réhabilitation psychosociale et l'intégration de cette population dans son milieu naturel.

Discussion

La prévalence des troubles mentaux et l'ampleur de leurs incidences sur l'individu, la famille et la société dans son ensemble font de la santé mentale un problème majeur de santé publique et une priorité des politiques publiques en matière de santé. Les quelques enquêtes qui ont été réalisées jusqu'à ce jour, en dépit de leur caractère épars et dispersé, ont toutes mis en évidence l'accroissement de la prévalence des troubles mentaux et de la demande de soins en santé mentale en Algérie. Il nous semble qu'un simple observateur avec un œil aiguisé et critique peut, à lui seul, faire le constat que l'état de santé des Algériens se dégrade et ne cesse de s'aggraver, comme en témoignent le retour des épidémies et la montée des pathologies chroniques. À cela s'ajoute l'état des infrastructures et des équipements disponibles. Que dire alors de l'état de la santé mentale qui demeure le parent pauvre du système de santé ? Face à ce constat et compte tenu du caractère préoccupant des troubles mentaux, notre brève analyse, aussi descriptive soit-elle et avec toutes ses limites, a bien montré que l'Algérie avait consacré, depuis quelques années, plusieurs ressources à l'amélioration de la couverture de la santé mentale et aux problèmes liés qui ne cessent de se développer, à l'instar de la dépression, des affections psychiatriques chroniques comme la schizophrénie, voire même des troubles du comportement liés à l'addiction. Cependant, leur prise en charge et l'offre de soins restent insuffisantes et inégalement réparties, tant au niveau des structures d'accueil qu'au niveau des ressources humaines et surtout au niveau de la législation.

Une nouvelle législation sur la santé mentale a été élaborée dans le cadre de la troisième loi de santé n°18-11 du 2 juillet 2018, dans laquelle la section sur la santé mentale a été améliorée, mais les textes d'application pour l'ensemble des dispositifs de santé mentale n'ont pas été élaborés jusqu'à ce jour, comme l'a déjà souligné Kacha (*15*). Un plan ambitieux pour la promotion de la santé mentale a également été mis en œuvre depuis l'année 2017, mais représentera-t-il vraiment une opportunité ? Et parviendra-t-il à parfaire et remodeler les services de soins en santé mentale, et à améliorer la prévention des troubles mentaux et leur prise en charge, ainsi que les aspects liés aux droits des malades ?

Conclusion

D'un point de vue sociologique, la santé mentale, comme le souligne Demailly, fait référence à l'existence d'un champ professionnel beaucoup plus large que celui de la psychiatrie, et cela signifie l'existence d'un champ de troubles dans lequel le mode d'appréhension du trouble dit « psychiatrique » se fond dans une approche de type santé publique (dépistage précoce, prévention, réflexion sur les besoins) (*16*). De ce point de vue, la promotion de la santé mentale et la prise en charge des troubles mentaux imposent un profond changement dans les pratiques et dans les mentalités. Ainsi, la question de la santé mentale ne doit pas relever de la seule responsabilité des services de santé, ou se confiner à un débat de spécialistes, mais doit être l'affaire de tous les acteurs dans le cadre d'une démarche pluridisciplinaire, globale et coordonnée.

La présente analyse a montré que malgré les efforts non négligeables consentis par l'Algérie et les acquis indéniables, que ce soit au niveau de la formation, des structures, des ressources humaines ou de la législation, le secteur de la santé mentale méritait d'être davantage pris en considération dans les politiques publiques de santé, qui ne doivent pas occulter les questions de suivi et d'intégration des malades mentaux dans leur milieu naturel.

Financements : aucun

Conflits d'intérêt : aucun

Inventory of the situation of mental disorders and their care in Algeria

Abstract

Background: Algeria has undertaken several actions and devoted various resources to improve mental health services in the prevention and management of mental disorders. Indeed, the increase in mental disorders and the demand for care make mental health a major social issue.

Aims: To present an inventory of the mental disorders in Algeria, describe the state of mental health structures and resources as well as the current state of psychiatry as the main device of treatment and support.

Methods: We carried out a descriptive analysis of the data generated from national surveys on the state of health of Algerians, as well as those obtained from various reports and censuses of the population and hospital statistics.

Results: The few surveys that have been carried out to date have all highlighted the increasing prevalence of mental disorders and the increased demand for mental health care. However, the coverage of mental disorders and the supply of

care remain insufficient and unevenly distributed, at the level of reception structures, human resources and, above all, legislation.

Conclusion: This analysis showed that despite the efforts made in terms of structures, resources and legislation, mental health in Algeria deserves more attention in public health policies.

Keywords: mental health, mental disorder, psychiatry, care

وضع الاضطرابات العقلية والتدبير العلاجي لها في الجزائر

محمد المنصف سريدي، إبراهيم بلعادي

الخلاصة

الخلفية: لقد جعل العددُ المتزايد لحالات الاضطرابات النفسية والطلبُ على الرعاية قضيةَ الصحة النفسية قضيةً اجتماعيةً كبيرة. وفي السنوات الأخيرة، اتخذت الجزائر عدة إجراءات، وكرست موارد لتحسين الخدمات المقدمة للوقاية من الاضطرابات النفسية والتدبير العلاجي لها.

الأهداف: هدف هذا البحث الى دراسة حالة الاضطرابات النفسية في الجزائر وحالة موارد الصحة النفسية وخدمات الطب النفسي.

طرق البحث: أجرينا تحليلًا وصفيًّا للبيانات المستمدة من مسوحات وطنية عن الحالة الصحية للجزائريين، والبيانات المستمدة من مختلف التقارير وتعدادات السكان، وإحصاءات المستشفيات.

النتائج: أبرزت المسوحات القليلة التي أُجريت حتى اليوم تزايد معدل انتشار الاضطرابات النفسية، وزيادة الطلب على الرعاية الصحية النفسية في الجزائر. بيد أن تغطيتها وتوفير خدمات الرعاية لا يزالان غير كافيين وغير موزعين بالتساوي، على مستوى تقديم الخدمات، وعلى مستوى الموارد البشرية، ولا سيما من حيث التشريعات.

الاستنتاجات: يُظهر هذا التحليل أنه على الرغم من الجهود المبذولة لتحسين الهياكل وتوفير الموارد والتشريعات، تستحق الصحة النفسية في الجزائر أن تحظى بمزيدٍ من الاهتمام في سياسات الصحة العامة.

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Review of Iraq's nationwide attempts to transform medical school curricula over the last ten decades

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Abstract

Background: The first medical college in Iraq was established in 1927, adopting a subject-based curriculum.

Aims: To provide a description of undergraduate medical education curricula in Iraq and how they developed since 1927.

Methods: We identified Iraqi medical schools and curricula from local and global directories. Curricular data were compared to 3 educational benchmarks (Dale's effectiveness of teaching methods, SPICES, Miller's pyramid). We searched for studies describing curricula and modernization.

Results: There are 34 medical colleges in Iraq (32 with identified curricula) with a wide scope of visions and aims adopting 3 types of curriculum: subject-based (SBC) 20 (63%), integrated (IC) 10 (31%) and problem-based learning (PBLC) 2 (6%). The majority of updates were SBC to IC, with only 1 moving from SBC to PBLC. The predominant type of curriculum at the start of instruction is SBC or IC. Although PBLC and IC provide opportunities for inquiry-driven competencies in the first 3 years only, none provide such opportunities in the clinical phase (last 3 years).

Conclusions: Curricular reform needs to focus on modernizing the learning process/outcomes rather than reorganization of the teaching only. A new approach is needed to provide opportunities for competence and experience to prepare doctors to deal with challenges. One such approach would be the adoption of an outcomes-based curriculum model based on domains of competence with clearly defined outcomes/competencies achievable the time of graduation. All curricula should lead to the achievement of the same outcomes.

Keywords: curriculum, medical education, quality assurance, undergraduate, Iraq

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Introduction

The first college of modern medicine was founded in Iraq in Baghdad in 1927 (*1*). At the time of the establishment of the Royal College of Medicine of Iraq (affiliated to Al-Albayt University), it adopted a post-Flexner curriculum (from Edinburgh) with separate subjects (*2*). In 1935, the study duration was increased from 5 to 6 years (*1*). The same subject-based curriculum format, with updates in the syllabus, was copied by all colleges which started afterwards until 1987 (Table 1). In the mid-1960s, the 6-year programme was divided into 4 phases: non-medical basic sciences (Year 1), basic medical sciences (Years 2 and 3), paraclinical medical sciences (Year 4), and clinical training (Years 5 and 6) (*3*).

The WHO conferences on medical education in the Eastern Mediterranean Region in Tehran in 1962 and 1970 (*4,5*) called for curricular development considering advances in medical education, including the concepts of integration (*6*) and lifelong study/learning (*7*). It also called for the convergence of the medical sciences and clinical disciplines, the elimination of repetition and the participation of teachers from different branches in joint planning and teaching in response to the first call for integration as had been applied at the Western Reserve University in the United States of America in the early 1950s (*8*).

In 1967, the first change in curriculum in Iraq was implemented at Mosul Medical College aimed at extending clinical training and focusing on the social aspects of disease. As a result, teaching basic sciences was significantly reduced to a semester in Year 1 to accommodate basic medical sciences; this continued throughout Year 2 and paraclinical sciences (Year 3) with introductory clinical training (*5*). Clinical training was extended to span the last 3 years of study (Years 4–6). As a result, sporadic participation of clinicians in the teaching of basic medical sciences ensued, with the initiation of student-driven seminars during the final clinical rotation, where students prepared and presented pathophysiological aspects of clinical presentations. The experiment was innovative, enjoyed by students and left a lasting impression and appreciation. Because the clinical aspects of basic science topics were not emphasized during the student examinations, such attempts faded over time (*5,9*). These developments were piecemeal

change of a didactic teaching approach focusing mainly on theoretical knowledge that remained largely unaffected and left little time for students to adopt a deep learning strategy (*10*). In the mid-1960s, multiple choice questions were introduced (*11*), for example in Mosul Medical College. Late in the 1970s, further development of the curriculum in Basrah College of Medicine included establishment of new departments for paediatrics, the addition of public health-structured field training and the organization of national workshops in medical education (*12*,*13*). This was in addition to the implementation of the Objective Structured Clinical Examination in paediatrics and community medicine for the first time in Iraq in December 1978 (Alkafajei AMB, personal communication, 2020). Despite these developments, in the 1980s all 5 medical colleges (Baghdad, Mosul, Basrah, Mustansiriya

Table 1 Medical colleges in Iraq classified by type of undergraduate curriculum adopted

Name of medical college	City	Start of studies	Curriculum		
			First	Current	Adoption/ update
Subject-based curriculum (SBC) *n* = 20 (63%)					
College of Medicine, University of Mosul	Mosul	1959	SBC	SBC	1959
College of Medicine, University of Basra	Basra	1967	SBC	SBC	1967
College of Medicine, University of Mustansiriya	Baghdad	1975	SBC	SBC	1975
College of Medicine, Al-Nahrain University	Baghdad	1987	SBC	SBC	1987
College of Medicine, Anbar University	Ramadi	1990	SBC	SBC	1990
College of Medicine, University of Babylon	Hilla	1991	SBC	SBC	1991
College of Medicine, Sulaymaniyah University	Soleimani	1993	SBC	SBC	1993
College of Medicine, University of Qadisiya	Diwaniya	1997	SBC	SBC	1997
College of Medicine, Nineveh University	Mosul	2002	SBC	SBC	2002
College of Medicine, University of Diyala	Baquba	2003	SBC	SBC	2003
College of Medicine, University of Thee-Qar	Nasiriyah	2004	SBC	SBC	2004
College of Medicine, University of Kirkuk	Kirkuk	2005	SBC	SBC	2005
College of Medicine, University of Misan	Amara	2008	SBC	SBC	2008
College of Medicine, University of Al-Muthanna	Samawah	2008	SBC	SBC	2008
College of Medicine, Al-Iraqia University	Baghdad	2011	SBC	SBC	2011
College of Medicine, Jabir Ibn-Hayyan University	Kufa	2013	SBC	SBC	2013
College of Medicine, University of Fallujah	Fallujah	2013	SBC	SBC	2013
Koya University School of Medicine	Koysinjaq	2014	SBC	SBC	2014
University of Kurdistan Hewler School of Medicine	Erbil	2014	SBC	SBC	2014
College of Medicine, Ibn-Sina University for Medical and Pharmaceutical Sciences	Baghdad	2017	SBC	SBC	2017
Integrated curriculum (IC) *n* = 10 (31%)					
College of Medicine, University of Baghdad	Baghdad	1927	SBC	IC	2012
College of Medicine, Hawler Medical University	Erbil	1977	SBC	IC	2012
College of Medicine, University of Kufa	Kufa	1982	SBC	IC	2012
College of Medicine, University of Duhok	Duhok	1992	SBC	IC	2018
Al-Kindy College of Medicine, University of Baghdad	Baghdad	1998	SBC	IC	2017
College of Medicine, University of Wasit	Kut	2006	SBC	IC	2013
College of Medicine, Al-Ameed Medical University	Karbala	2017	IC	IC	2017
Hammurabi College of Medicine, University of Babylon	Hilla	2017	IC	IC	2017
Al-Zahra'a College of Medicine, University of Basra	Basra	2017	IC	IC	2017
College of medicine, University of Zakho	Zakho	2018	IC	IC	2018
Problem-based learning curriculum (PBLC) *n* = 2 (6%)					
Tikrit University College of Medicine	Tikrit	1989	PBLC	PBLC	1989
College of Medicine, Karbala University	Karbala	2004	SBC	PBLC	2013
Curriculum information not available					
College of Medicine, University of Sumer, Thee-Qar	Rifai	2020		Not known	
College of Medicine, American University of Iraq in Baghdad (expected to start 2024)	Baghdad	2024		Not known	

and Erbil) adopted the traditional "unified subject-based curriculum" (*14*). In 1987, Saddam College of Medicine (renamed to Al-Nahrain in 2003) was established, adopting a semester courses curriculum with electives and was under the supervision of the then Presidency Office (*15*). In 1989, a problem-based learning (PBL) curriculum was adopted at Tikrit University College of Medicine upon its establishment (*16*). This completely different model was community-oriented, problem-based, student-centred and fully integrated (*16*). The college was supported by the WHO because "there has been an increasing awareness of community-oriented medical education and of the need to reform medical education and make it more relevant to community health needs. WHO visits to model educational institutions adopting such approaches like in Gezira (Sudan) and Suez Canal (Egypt) were intensified, and consultants from these and other institutions were assigned to help Member States (e.g. Tikrit in Iraq)" (*17*). The programme adopted the educational strategies of Harvard Medical School (the New Pathway) (*18*) and those of the WHO (*17*) and designed its own community needs programme content based on Iraq's Ministry of Health priorities (*19*).

A study in 1981 conducted a comprehensive evaluation of the performance of Iraqi doctors who had graduated from the existing medical colleges using 2 tools: patient management problems and assessment of the resident's daily performance by their supervising clinicians (*20*). It showed that only 4% of residents were able to obtain the minimum level of competence in dealing with common cases according to the patient management problems, compared with two-thirds of residents through evaluation by their supervisors. This showed that the dominant subject-based approach was not providing students with opportunities to acquire needed abilities. It recommended changing the curricula in Iraq to focus on skills rather than on information (*20*). Almost 2 decades later, another study found significant differences between the performance of newly graduated doctors of Iraqi medical colleges when compared with graduates of the only PBL programme introduced in Iraq in 1989 (*21*). Studies in other colleges assessed students and graduates and indicated the inadequacy of subject-based curricula in preparing graduates (*22–25*).

Iraq has experienced significant armed conflicts and sanctions since 1980. As a result, the health system has been destabilized and marked by instability, leading to significant disruption, ineffectiveness and inefficiency (*26*). Competent but unprepared newly graduated doctors are vulnerable to psychosocial harm (*27*). To prepare a new generation of physicians to deal with the health system challenges ahead will require a new approach and new inquiry-driven competencies (*28*).

Globally, medical curricula have witnessed major developments over the last 7 decades, moving from subject-based (*2*), integrated (*8*), life-long learning (*7*) and PBL (*29*) to competency- and outcomes-based curricula (*30*) and now advancing to the introduction of "entrustable professional activities" (*31*) to provide more explicit measures of student education and training to meet population needs. Other countries have developed outcomes-based frameworks and models to improve the quality and outcomes of education such as Outcomes For Graduates/General Medical Council United Kingdom (*32*), CanMEDS/Canada (*30*) and Hybrid Curriculum/United States of America (*33*). More recently, there have been calls for more experiential learning opportunities in these competencies during the undergraduate study (*27,28*). The provision of such opportunities for experiential learning could be argued as being a necessary step in any future curriculum design based on inquiry-driven educational activities (*34*). Reviewing the medical education curricula in the Iraqi schools needs to be looked at through the lens of global advancements in medical education.

This review aims to provide a description of undergraduate medical education curricula in Iraq (since the establishment of the first medical college in 1927) and how they have developed compared with global developments in educational strategies.

Methods

To identify the individual medical colleges operating in Iraq, we searched the websites of the Iraqi Ministry of Higher Education and Scientific Research, World Directory of Medical Schools and the World Higher Education Database. Information about current curricula and evolution over time were obtained from the individual colleges' websites. We obtained curriculum details, vision/mission, institutional objectives, departmental educational activities and weekly timetables of educational activities and assessments. The data were compared to parameters from 3 benchmarks:

- Dale's effectiveness of teaching methods measuring recall by the learner (*35*). The highest rates were achieved by participatory teaching methods (teach other 90%, practice by doing 75%, discussion groups 50%) compared to passive teaching methods (lectures 5%, reading 10%, audio-visual 20%, demonstration 30%);
- the quality of educational strategies (known as SPICES) domains (active/passive learning): student-centred/teacher-centred, problem-based/information-gathering, integrated/discipline-based, community-based/hospital-based, elective/uniform and systematic/apprenticeship-based (*36*);
- George Miller's four-stage pyramid runs through student training and the assessment of competencies to be acquired at graduation (*37*). The stages were used to evaluate the training opportunities available for students to acquire different competencies.

We conducted a search in the English and Arabic literature of relevant studies irrespective of year of publication using the terms: Iraq, medical education, curriculum and undergraduate. We searched in PubMed, Google Scholar, ResearchGate and the Iraqi Academic Scientific Journals (IASJ) databases websites. The

references lists were scanned for additional sources. Last search was performed in December 2020.

Results

The number of medical schools in Iraq has increased markedly over the past 4 decades in relation to the population, with a total of 34. We identified 32 colleges where the type of curriculum was mentioned (Table 1). Broadly, there are 3 types of curriculum in use:

- subject/discipline-based curriculum (SBC): the majority of colleges 20 (63%) still follow the unified (standardized) curriculum (*14*) which is based on separate subjects dominated by lecture-based teaching with piecemeal curricular updates (e.g. small groups teaching, objective examinations, introduction of teacher-led problem-solving sessions);
- integrated curriculum (IC): 10 (31%) colleges adopted the new integrated curriculum starting with Kufa (2012) and followed by other colleges; this curriculum was either used as the first adopted curriculum since establishment or as a move to change the adopted curriculum;
- problem-based curriculum (PBLC) adopted by Tikrit (1989) and Karbala (2013) (6%);
- curriculum unknown yet: 2 colleges.

Irrespective of chronology, the predominant form of curriculum on the establishment of studies is SBC (27/32, 84%). Of these, 6 have (since 2012) changed to the IC. Four new colleges (4/32, 13%) since 2017 adopted the IC on establishment. One college changed to PBLC from SBC (1/32, 3%). Only 1 college (1/32, 3%) started with PBLC (Figure 1).

The SBC is dominated by passive learning and training strategies throughout the years of medical study (Table 2). All adopted curricula provide limited curricular training opportunities for students to acquire inquiry-driven competencies and experiential learning in the clinical phase of studies (last 3 years). During the 6 years of medical study, most of the colleges use traditional student assessment focused on the bottom stage of Miller's pyramid (knows), less on the second stage (knows how), and seldom on the third (shows how) and fourth (does) stages. Without such curricular training opportunities, students would not acquire the ability to use these competencies upon graduation. The colleges adopting the SBC have not yet adopted a recommended set of outcomes and competencies (*38*).

No doubt the adoption of an elaborate set of graduate competencies in integrated curriculum is a key achievement and development compared to the more general set of optimum competencies adopted by PBLC (*19*). During training, each competency is linked to educational activities in integrated curriculum compared with the use of standardized checklists used in PBLC. However, on examining the SBC curricula (*14*), competencies could not be traced because these have not been well developed, aligned or blueprinted with learning objectives, teaching and learning strategies, and assessment methods. Even SBCs need better alignment and blueprinting.

Discussion

Over the last 4 decades, the number of medical colleges has increased from only 5 in 1980 to 34 (Table 2), tracking the growth in population (*39*). The number of operating schools is 33 (2020). The college:population (per million) ratio has steadily increased since 1927(*39*), from 0.29 (1:3.5) to 0.27 (2:7.29) in 1960 rising to 0.37 (5:13.65) in 1980, 0.6

Figure 1 Sankey diagram illustrating the evolution of undergraduate curricula in Iraqi medical colleges (1927-2020)

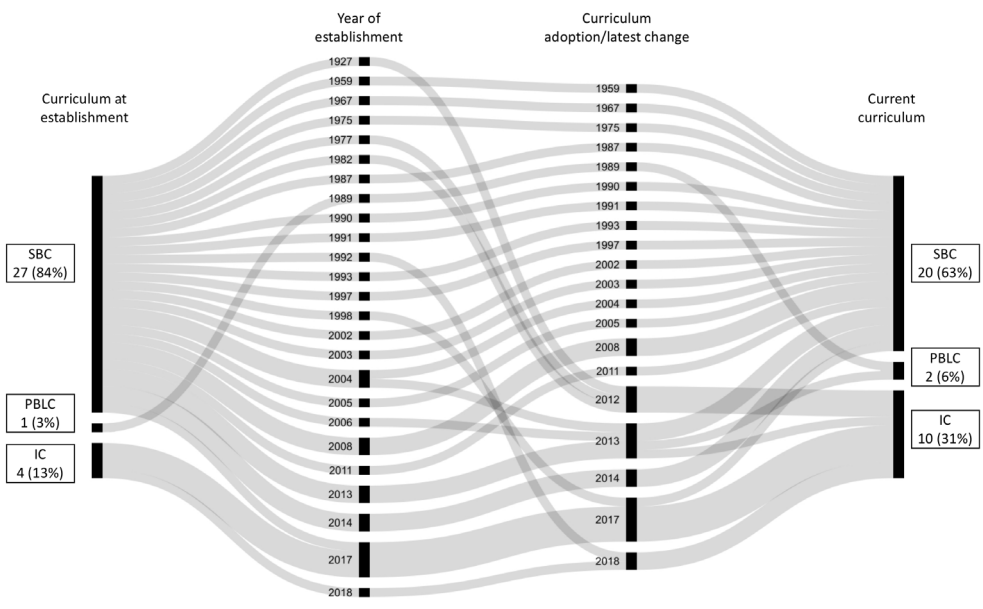

Table 2 Assessing the 3 types of undergraduate curricula in Iraqi medical colleges against learning tools

Educational activity/item	Curriculum		
	Subject-based	Integrated	Problem-based learning
First tool: Dale's effectiveness of teaching methods			
Lectures	Main teaching method	Starting point at the beginning of educational activities	Fewer keynote lectures as needed to respond to student's learning needs in the first 3 years
Memorization	Focus of teaching and exams with heavy load on student	Student still overwhelmed by load of theoretical content	Covers only concepts
Use of audiovisual aids	In lectures as demonstration	Students react to audiovisual aids	Students interact and apply
Lab work	Extensive but irrelevant to parallel educational activities in the first 3 years	Related to organ-system module in the first 3 years	Responsive to student's learning needs in the first 3 years
Small group tutorials	Occasional and non-curricular	Teaching led by related resource faculty	Learning led by students and tutored by faculty
Curricular opportunities to apply competencies	Rare in the first 3 years and guided opportunities in the last 3 years (clinical phase)	Limited in timetable in the first 3 years and guided opportunities in the last 3 years (clinical phase)	Part of timetable and repeated weekly in the first 3 years and guided opportunities in the last 3 years (clinical phase)
Curricular opportunities to practise peer-teaching	Non-existent	Limited, non-curricular	Curricular and assessed in the first 3 years. Repeated weekly
Second tool: the quality of educational strategies (SPICES)			
Student role	Teacher centred	Teacher role	Student centred
Problem solving	Memorization	Understanding and questioning a problem	Facing and solving new problems
Integration	Separate subjects	Integrated teaching	Integrated learning
Clinical training	Hospital-focused	Curative content-focused	Community-oriented
Electives	Not offered	Offered	Not offered
Systematic training	Clinical training depends on availability of patients in teaching hospitals.	Planned availability of patients or alternatives (skills lab) for training based on adopted set of competencies/ outcomes	Planned availability of patients or alternatives for training in health and community settings based on adopted set of graduate competencies and Cognitive skills in the weekly problem solving steps.
Third tool: Miller's pyramid for training and assessment of clinical skills competence / performance			
Knows (knowledge)	Theory	Theory + training (skills lab)	Theory + training in skills lab, class, and community settings
Knows how (competence)	Theory and observation	Describe, observe and apply in skills lab	Describe, observe and apply in class, skills lab and community settings
Shows how (perform)	Limited in later clinical years only	Separate opportunities to show how	Repeated opportunities in the first 3 years (multiple settings)
Does (action)	Limited and only in last year	Limited opportunities in clinical modules	Repeated weekly curricular opportunities in the first 3 years

(14:23.5) in 2000 and 0.82 (33:40.22) in 2020, surpassing the Eastern Mediterranean Region average of 0.44 (*40*).

There are 2 important national benchmarks for curricular evaluation. The first is the Graduate Outcomes for Iraqi Medical Colleges, which was proposed and discussed during a national workshop on accreditation (September 2012) (*38*). It is divided into 3 domains of competency (knowledge and application, skills and behaviours). Only a few Iraqi colleges have adopted and worked on such outcomes. To date, there is no nationally adopted graduates outcomes similar to CanMEDS (*30*), UK Outcomes for Graduates (superseding Tomorrow's Doctors in 2018) (*32*).

The second document is the accreditation standards of the Iraqi Council for Accreditation of Medical Colleges Accreditation (*41*). Various (but separate) decision-making centres in the Ministry of Higher Education and in the National Council for Accreditation of Medical Colleges failed to support the operation of a system of accreditation of colleges to monitor the change and curriculum development in all colleges. Strengthening the regulation and accreditation of medical education accomplished 2 out of the 7 strategic priorities set up by WHO for countries of the Eastern Mediterranean Region, including Iraq (*42*).

The national outcomes framework standards and accreditation process can have a major influence over curricular reform and offers a structured, evidence-based evaluation of the currently adopted curricula and the proposed reform. Accreditation can be the antidote to "fossilization" of the curriculum (*43*) and can help steer medical colleges towards implementing processes likely to improve the quality of medical education (*44*).

Table 3 **Teaching/learning formats and the role of teacher and student**

Teaching/learning format	Teacher role	Student role
Lecture based teaching	Information provider	Passive receiver
Inspiring lectures	Motivator	Motivated receiver
Delegating duties	Delegator	Coached learner
Small group teaching	Teaching tutor	Cooperative learner
Inquiry, case based learning	Specialist facilitator	Inductive learner
Inquiry, problem based learning	Non-specialist facilitator	Deductive learner

It is rare to find one curriculum today that can be described as applying a single learning strategy or using a single learning method. The boundary between the roles of teachers (as an outlet for the teaching process) and students (as an outlet for learning) is a sensitive and influential area in determining the effectiveness of any curriculum (Table 3). The results of the analysis of the currently used curricula in Iraqi medical colleges (SBC, integrated curriculum, PBLC) using the 3 educational benchmarks stated above are described in Table 2. The findings indicate that PBLC uses more active teaching/learning methods than integrated curriculum, which, in turn, adopts more active methods than the SBC. In fact, PBLC adopts clearer student-centred, problem-based, meaningful integration and systematic community-oriented training in health and community settings; it also offers repeated curricular opportunities for all students to practise competencies in class and in health/community settings more than those offered in both integrated curriculum and SBC. However, there are no systematic inquiry-driven learning and training opportunities during the clinical phase (last 3 years) in all 3 curricula throughout which learning is mainly based on observation and unstructured and subjective clinical exposure.

The integrated curriculum adopts a mixed approach of several educational strategies and depends on the horizontal and vertical integration of separate subjects, with complementary modules that are systems-based. This type of study covers the normal and abnormal structure and function of the body parts. The integrated curriculum applied in Iraqi medical colleges seems to be based on the "compare-and-contrast learning strategy" to facilitate learning and develop a better objective understanding of the approach based on separate topics (*45*). This is an important development from the SBC because it guides students' understanding and integration of information by placing the learning process within a clinically relevant framework. The learning process starts with lectures, followed by teacher-centred small group teaching and then followed by case discussions. The addition of activities such as "small group teaching" and not "small group learning" results in an imbalance between the large volume of scientific information taught to students and the limited amount of learning activities. The amount of factual knowledge being assessed is far greater than clinical knowledge/skills/behaviours. It retains the teacher-centred role and encourages teaching delivery rather than promoting learning. There is a lack of opportunities to practise knowledge which would help students gain in-depth integrated knowledge. As long as the focus is on teaching compared to learning, mixed hybrid approaches fail to achieve its clinical integration goal because of the limited opportunities to deal with the needs and abilities of the learner (*33*). Compared to the problem-based approach, implementing the integrated approach creates far fewer curricular opportunities to allow students to use and implement the higher steps on Miller's pyramid for training on and evaluating competencies which cover the stages of "Shows how" and "Does" (*37*). It is important to assess the level of integration of the newly adopted curriculum and the outcomes of such integration. The mere reorganization of parts of scientific subjects, clinical disciplines and other components of the curriculum without the corresponding creation of clearly measurable learning outcomes has been superseded by newer evidence-based concepts and strategies since the curriculum was developed in the early 1950s (*8*).

In PBLC, through a weekly programmed discussion of a problem, followed by study activities and practice, the learner will meet the educational objectives of the problem that students themselves formulated earlier in the same week. The content of the educational activities of the week are combined in a way that meets the students' educational needs in regard to the knowledge, skills and behaviours to solve a particular problem, thus promoting deep experiential learning. However, the PBLC only provides inquiry-driven learning and training in the first 3 years while clinical training (last 3 years) mainly comprises traditional bedside teaching (Table 2). The problem-based approach allows the self-identified students' learning needs recognized through structured small group discussion. The presence of the need to learn followed by inquiry motivates students to extend their investigations and "practise" their own pursuit of self-study, self-assessment (*46*) and self-reliance (*47*). This weekly repeated process enhances learning throughout the medical study and beyond. According to comparative research, the PBLC provides opportunities for students to practise how to apply knowledge, skills and professional behavioural abilities described in the graduates' outcomes (*48*).

Several Iraqi medical colleges have recently implemented curricula supported by British universities,

starting at Kufa (in 2012) with other colleges in Iraq following the same integrated curriculum applied at the University of Leicester with varying degrees and differences in application. Other colleges, e.g. Al-Kindy, have collaborated with American universities and made their own efforts to design their integrated curriculum and adapted the most appropriate elements for themselves (*49*). Students and staff will be affected most with the adoption of a "ready-to-use" imported curriculum. There will always be doubts on the level of effectiveness and outcomes. Of note, the integration in some colleges has been confined to reorganizing the teaching activities in the timetable without integrating the students' examination and assessment. Is it a different curriculum when the teaching activities, the majority of which are delivered as lectures, and magnitude of knowledge required, are unchanged? An effective curriculum for Iraqi medical colleges is the one that achieves the main goal of the whole process of education, namely "experiential learning". The methods of learning, teaching and assessment of competencies determine the nature of any given curriculum. A successful curriculum is one that includes all the necessary components to provide curricular opportunities for students, not only to use but to repeatedly practise what has been learned to attain experience not just competence (*27*). The students being trained need to be able to use the same principles during medical studies (problem solving plus inquiry-based learning) in not only solving day-to-day issues but also considering societal needs, public health and adaptation to the rapid change in health care delivery systems (*28*), particularly in the case of Iraq, which has been extensively affected by wars and instability over the last 40 years (*50,51*).

As bioethics is not clearly addressed by the 3 curricular models, it is necessary to clearly emphasize the way these behavioural abilities are taught, trained and assessed as an essential core curricular component and not as part of the immeasurable components of the "hidden curriculum". Previous research has indicated that the PBLC graduates scored higher in 7 out of 8 behavioural abilities when compared with SBC (*21*). However, with the existence of 3 curriculum models at present, it seems legitimate to ask for studies to evaluate graduate outcomes to inform policy-making.

A potential new approach to cover the 6 years of study involves combining deductive (e.g. problem-based learning for the first 3 years) and inductive learning strategies (e.g. case-based learning for the final 3 years), which incorporates the essence of inquiry and discovery learning (*34,52*). The deductive method is suitable for beginner learners to acquire and experience the basic inquiry skills. The inductive method is suitable for advanced learners who need to experience what is known to, and followed by, experts (*53*). This combination provides curricular opportunities for all students to gradually attain experience and competence which help graduates to work in health settings upon graduation (*27,34*). This arrangement first builds students' problem-solving abilities and basic inquiry capabilities, and they then progress to learn the working methods of the doctor as carried out in daily clinical practice through developing their clinical reasoning skills. The work with the patient's clinical complaint concludes with care planning, diagnosis, treatment and prevention. This is the basis of the doctor's job. The curriculum encourages students to plan their study based on their own needs to search, find, use and apply knowledge, basic and clinical, to solve the patient's problem. The steps to develop and adopt the innovative curriculum and a brief account of the most effective curricular approach have been described previously (*54*). This 6-year curriculum allows the integration of learning and training (results of teaching) and not only the integration of teaching (the process of teaching) and therefore moves beyond the concepts adopted in the theories of the 1950s on integration at the level of teaching (*8*).

All curricula, regardless of their type, must be contextualized to the needs of the local community. An outcomes-based model can set curricular guidelines for all colleges to frame their curricula within the identified boundaries.

Future directions include:

- establish an effective national mechanism to oversee curriculum reform in the form of national curriculum guidelines with clear outcomes;
- design responsive curricula to produce change agents–graduates equipped with experience and inquiry-driven competencies;
- transform teacher-dominated to student-centred educational strategies;
- emphasize training and assessment of skills and behaviour as essential core elements;
- promote evaluative research studies to provide evidence for policy.

Conclusion

The preparation of a new generation of doctors, able to deal with the evolving challenges facing the national health service in Iraq, requires a new inquiry-driven approach. A curricular approach that combines deductive inquiry for the first 3 years (e.g. problem-based learning) and inductive inquiry for the last 3 years of study (e.g. cased-based learning) offers ample opportunities to inspire deep learning through repeated practice of inquiry-based competencies. It integrates the learning and not just the teaching. It is important that the regulatory authorities adopt an outcomes-based curriculum model (like CanMEDS, Outcomes for Graduates), with clearly defined outcomes and competencies to be achieved through the curriculum. The regulatory authorities can develop curriculum guidelines based on the local community needs. Whatever teaching/learning strategies are used, all should lead to the achievement of the same outcomes.

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Examen des tentatives nationales de transformation des programmes des écoles de médecine en Iraq au cours des 10 dernières décennies

Résumé

Contexte : La première école de médecine d'Iraq a été créée en 1927, et son programme d'enseignement était centré sur les matières.

Objectifs : Décrire les programmes de l'enseignement médical de premier cycle en Iraq et leur évolution depuis 1927.

Méthodes : Nous avons identifié les écoles de médecine iraquiennes et leurs programmes d'enseignement à partir de répertoires locaux et mondiaux. Les données concernant les programmes ont été comparées à trois référentiels pédagogiques (le cône d'apprentissage de Dale, le modèle SPICES, la pyramide de Miller). Nous avons recherché des études décrivant les programmes d'enseignement et la modernisation.

Résultats : Il y avait 34 écoles de médecine en Iraq (32 disposant de programmes d'enseignement identifiés) dont les visions et les objectifs variaient. Celles-ci avaient recours à trois types de programmes d'enseignement : l'apprentissage centré sur les matières, 20 (63 %), l'apprentissage intégré, 10 (31 %) et l'apprentissage centré sur les problèmes, 2 (6 %). La plupart des évolutions consistaient à remplacer un programme d'enseignement centré sur les matières par un programme d'enseignement intégré, et une seule école est passée d'un programme centré sur les matières à un programme centré sur les problèmes. Le type de programme prédominant au début de l'enseignement était le programme centré sur les matières et le programme intégré. Le programme d'enseignement centré sur les problèmes et le programme d'enseignement intégré ont permis l'acquisition de compétences axées sur la recherche au cours des trois premières années seulement, mais aucun programme n'a offert de telles possibilités durant la phase clinique (trois dernières années).

Conclusions : La réforme des programmes devrait se concentrer sur la modernisation du processus d'apprentissage et des résultats au lieu de réorganiser uniquement l'enseignement. Une nouvelle approche est nécessaire pour améliorer les compétences et l'expérience des médecins et ainsi les préparer à faire face aux défis de la vie réelle. Une telle approche consisterait à adopter un modèle de programme d'enseignement centré sur les résultats, fondé sur des domaines de compétence, dont les résultats et les compétences sont clairement définis et réalisables avant l'obtention du diplôme. Tous les programmes d'enseignement devraient permettre d'atteindre les mêmes résultats.

استعراض محاولات العراق لتحويل مناهج كليات الطب خلال العقود العشرة الماضية في جميع أرجاء البلد

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الخلاصة

الخلفية: تأسست أول كلية طب في العراق عام 1927، واعتمدت منهجًا دراسيًّا قائمًا على المواضيع.

الأهداف: هدفت هذه الدراسة الى تقديم وصف لمناهج التعليم الطبي الجامعي في العراق وكيفية تطورها منذ عام 1927.

طرق البحث: حدَّدنا كليات الطب العراقية والمناهج الدراسية من أدلة محلية وعالمية. وقورنت بيانات المناهج الدراسية مع 3 معايير تعليمية (فعالية ديل في أساليب التدريس، ونموذج SPICES، وهرم ميلر). وبحثنا أيضًا عن دراسات تصف المناهج والتحديث.

النتائج: هناك 34 كلية طب في العراق (32 كلية تدرس مناهج مُحدَّدة) تتميز بنطاق واسع من الرؤى والأهداف، مع اعتماد ثلاثة أنواع من المناهج الدراسية: المنهج القائم على المواضيع 20 (63٪)، والتعليم المتكامل 10 (31٪)، والتعلم القائم على المشكلات 2 (6٪). وكانت غالبية التحديثات من المنهج القائم على المواضيع إلى التعليم المتكامل، مع وجود تحديث واحد فقط شمل الانتقال من المنهج القائم على المواضيع إلى التعلم القائم على المشكلات. ويتمثل النوع السائد من المناهج الدراسية في بداية التعليم في المنهج القائم على المواضيع، أو التعليم المتكامل. وعلى الرغم من أن التعلم القائم على المشكلات والتعليم المتكامل يوفران فرصًا للكفاءات التي تعزز البحث في السنوات الثلاث الأولى فقط، فليس من بين هذين النوعين من التعليم ما يوفر فرصًا من هذا القبيل في المرحلة السريرية (السنوات الثلاث الأخيرة).

الاستنتاجات: يجب أن يركِّز إصلاح المناهج على تطوير عملية/ نتائج التعلُّم بدلًا من إعادة تنظيم التدريس فقط. وثمة حاجة إلى نهج جديد لتوفير الفرص للكفاءة والخبرة لإعداد الأطباء للتعامل مع التحديات. ويتمثل أحد هذه النهج في اعتماد نموذج منهاج دراسي قائم على النتائج يستند إلى مجالات الكفاءة، مع تحديد النتائج/ الكفاءات القابلة للتحقيق في وقت التخرج بوضوح. وينبغي أن تؤدي جميع المناهج الدراسية إلى تحقيق النتائج نفسها.

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Thirty-fifth meeting of the Eastern Mediterranean Regional Commission for Certification of Poliomyelitis Eradication

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The COVID-19 pandemic has significantly impacted polio surveillance activities in the Eastern Mediterranean Region (EMR), including acute flaccid paralysis (AFP) case detection and reporting. Almost all resources, human and financial, have been diverted to the pandemic response, thus affecting laboratory and specimen shipments and causing delays in detection. Polio immunization activities were suspended, especially during the early days of the pandemic, giving the virus opportunity to spread further.

In 2020, only 14 Member States in the Region met the two key performance indicators for the non-polio AFP rate and stool adequacy, compared with 20 Member States in 2019 *(1)*. As of 30 April 2021, only 11 Members States met the certification standards and nearly 80 million vaccination opportunities were missed or delayed due to the pandemic *(2)*.

However, despite the impact of the COVID-19 pandemic on the health system, countries have been implementing some polio eradication activities, although at a much slower pace. Countries like Egypt, Somalia, Sudan (cVDPV2), and Yemen (cVDPV1) have responded to outbreaks of vaccine-derived polio in addition to the pandemic response. The technical advisory groups for Afghanistan and Pakistan had set several strategic programme objectives for 2021. In October 2020, the Sixty-seventh Session of the WHO Regional Committee for the Eastern Mediterranean endorsed a resolution to establish a ministerial-level regional subcommittee for polio eradication and outbreaks.

Consequently, the Eastern Mediterranean Regional Commission for Certification of Poliomyelitis Eradication (RCC) held its 35th meeting from 1 to 3 June 2021 *(3)*. During the meeting, the RCC reviewed polio surveillance by Member States and recommended actions to strengthen polio activities at country level.

During the 12 months preceding the meeting, 69 wild polio virus type 1 (WPV1) and 871 circulating vaccine-derived poliovirus type 2 (cVDPV2) cases were reported globally, and the number of wild poliovirus (WPV1) and circulating vaccine-derived poliovirus type 2 (cVDPV2) cases had decreased in Afghanistan and Pakistan. These two countries remain endemic and accounted for almost half of the cVDPV2 cases during this period *(1)*. New cases of cVDPV2 were reported in Somalia following the use of Sabin-2 oral polio vaccine (OPV) *(1)*. In Madagascar and Yemen there were cVDPV1 outbreaks in 2021, largely due to persistent suboptimal routine immunization coverage *(1)*.

There have been concerns regarding the emergence of cVDPV1 in some countries, particularly the low-grade continued cVDPV2 transmission in Somalia and the recent spread of cVDPV2 between countries within and outside the EMR. Tackling this requires greater efforts on multi-country, cross-border, and interregional coordination among and between the WHO/AFRO and WHO/EMRO regions, and better integration with other disease programmes.

Two major barriers to the eradication of polio in the EMR have been insecurity and the lack of access to some communities in some of the countries. Despite efforts to stop cVDPV2 transmission in Afghanistan and Pakistan, cross-border cVDPV2 transmission between the two countries continues to be a challenge. Inability to access children for vaccination in these countries constitutes a significant risk to the success of the polio eradication programme *(4)*.

Despite these challenges, participants in the RCC meeting were confident that the Region would soon achieve its polio eradication target. The National Commission for Certification of Poliomyelitis Eradication (NCC) of Member States have been implementing recommendations of the 34th meeting of the RCC and they are committed to continued implementation despite the challenging pandemic situation, with the support of the WHO regional office. Some Member States in the WHO/AFRO Region have started using the nOPV2 and six in the EMR were preparing to start using it as of the time of the 2021 RCC meeting.

As Member States take actions to restore polio surveillance activities in the Region through weekly follow-up meetings with team leaders and close coordination between WHO/EMRO and Member States, accessing under-immunized children in Afghanistan and Pakistan is essential to prevent a resurgence of polio transmission.

Limited progress towards eradication triggered a revision of the global eradication strategy of the Global Polio Eradication Initiative (GPEI) in 2021, as the Initiative continues to support countries in accelerating preparedness for nOPV2 use under the emergency use listing, and in fast-tracking the review of nOPV2 "initial use period" to enable wider use.

The GPEI strategy 2022–2026 *(5)*, "Delivering on a Promise", has two goals: (i) to permanently interrupt poliovirus transmission in the remaining WPV-endemic countries and (ii) to stop cVDPV transmission and prevent outbreaks in non-endemic countries. The GPEI

is transforming its approach in each region and country through five mutually reinforcing objectives that lay the foundation to achieve these goals. These include: (i) creating urgency and accountability to generate greater political will by re-envisioning the GPEI's relationship with governments and systematizing political advocacy; (ii) generating vaccine acceptance through context-adapted community engagement; (iii) expediting progress through expanded integration efforts with a broader range of partners in immunization, essential health care and community services; (iv) improving frontline success through changes to campaign operations, including the recognition and empowerment of the frontline workforce; and (v) enhancing detection and response through sensitive surveillance.

The GPEI gender equality strategy has been aligned with the eradication strategy, in recognition of the essential role gender plays in the path to eradication. This new global polio eradication strategy recommends a systematic approach to closing the remaining gaps.

The RCC called on Member States to ensure that their polio surveillance action plans offer significant improvements over the pre-pandemic era, requested them to conduct polio outbreak simulation exercises and ensure that at least 5–10% of adequate non-polio AFP samples are reviewed by the National Expert Group for completeness. They requested them to prioritize the independent review of their surveillance activities, including independent routine immunization coverage surveys, which should be reported in subsequent certification reports. National and international specimen transport and laboratory processing should be improved to provide long-term solutions to shipment challenges, and Member States should expedite implementation or expansion of their environmental sampling. They demanded Member States to always use the WHO standardized risk assessment tools, and to improve the content and quality of their reports. They should strengthen multi-country and inter-regional coordination and cross-border coordination among WHO/AFRO and WHO/EMRO countries.

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Editorial

Research articles

Reviews

WHO event addressing public health priorities