Clean our air, water & food

#HealthierTomorrow

Environmental risks, such as air, water and soil pollution, chemicals and waste exposures, climate change and radiation contribute to more than 100 diseases, and responsible for about a quarter of the total burden of disease in the Eastern Mediterranean Region. WHO estimates that about 1 million people die prematurely because of living or working in “unhealthy” environments.
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Members of the WHO Regional Committee for the Eastern Mediterranean
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Consultation on the world report on hearing: implications for the WHO Eastern Mediterranean Region
Cognizant that every human has the right to the highest attainable standard of health, the World Health Organization (WHO) is promoting the health and well-being of all by all. To achieve this mission in the Eastern Mediterranean Region (EMR), a strategic vision was adopted calling on Member States and partners to anchor solidarity and action to achieve Health for All by All in the Region (1). The vision focuses on the need to address the environmental causes of diseases while targeting the Sustainable Development Goals (SDGs), and fulfilling the human rights to live in a healthy environment.

As we commemorate the World Health Day 2022 this year, health systems in the EMR are under extreme pressures due to the COVID-19 pandemic and the climate change crisis. WHO has been on the frontline in the battle against COVID-19, while working with partners to minimize the adverse health impacts of climate change. The fight against COVID-19 and against climate change are continuous, entailing the urgent need to create sustainable wellbeing in healthy societies that do not breach ecological and biodiversity limits. COVID-19 is a warning siren from the nature to our species; and an opportunity to reflect and reset how we live, how we interact with each other, and with other species and mother nature. Recovery from COVID-19 is a historic opportunity to position human health, and environmental protection, at the centre while we rebuild our resilient and sustainable health systems.

Our countries face a mix of traditional and new environmental risks, which are naturally caused by local conditions and circumstances (such as poverty and conflicts), and global phenomena (such as climate change, urbanization and increasing drug resistance). Environmental risks are responsible for 23% of the total burden of disease in the EMR, including the premature death of 1 million people (2). Unfortunately, disadvantaged and marginalized communities are the most vulnerable to these risks. It is devastating to know that 99% of people are inhaling “unhealthy air” (3) and more than 40% do not have access to basic water and sanitation services (4). The recent WHO burden of disease in the EMR estimates that 500 000 deaths are attributable to air pollution, 80 000 to unsafe water and sanitation, 40 000 to eating unsafe food, and other deaths are attributable to other environmental risks (5).

Management of these risks goes far beyond the health sector and needs to focus on upstream preventive interventions. Prevention policies must be integrated into public health promotion strategies, primary health care models and medical practice systems. However, environmental health work and policymaking are practically beyond the jurisdiction of the health sector alone, they require establishing partnerships with other upstream sectors addressing issues of development and services, ecosystem health, pollution control, emissions, and waste reduction.

Addressing health and environmental issues with a coherent and integrated approach within the framework of sustainable development certainly establishes new and effective patterns. Environmental health work in the Region focuses on supporting the leadership of the public health and environmental protection sectors in regulating and monitoring environmental health factors and nexuses with the burden of disease (including Coronavirus), promoting preventive interventions, and catalyzing adequate environmental health services and actions by relevant sectors (e.g. water, municipalities, energy, agriculture, industry, transport, etc.). Ultimately, this close “healthy” link reduces the burden of health care costs and environmental damage, preserves natural resources, and ensures the sustainability of life in all its forms.

It is important to remind ourselves of the recently committed Geneva Declaration-2021: “Recent pandemics have exposed the fractures in society and highlighted the ecological, political, commercial, digital and social determinants of health and health inequities, within and between social groups and nations. Climate change, biodiversity loss, pollution, rapid urbanization, geopolitical conflict and militarization, demographic change, population displacement, poverty, and widespread inequity create risks of future crises even more severe than those experienced today” (6).

WHO classified climate change as the biggest threat facing humanity today, and we are working in the EMR
and globally to deal with this and other environmental threats. During the latest conference of the Parties of the UN Framework Convention on Climate Change COP26, eleven countries from the Region committed to develop climate-resilient and sustainable health systems (7). We will advocate for more countries to join this major initiative during the coming COP27 in Egypt and COP28 in UAE to safeguard our planet and protect our health. In addition, WHO will work with countries of the Region in addressing all the other environmental risks, to save lives, improve wellbeing and substantially reduce, even eliminate, the risks through bold preventive action at national and regional levels (8,9).

References
Epidemiological and clinical characteristics of patients with COVID-19 in Islamic Republic of Iran

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Abstract

Background: Coronavirus disease 2019 (COVID-19) is a worldwide public health emergency.

Aims: This study aimed to investigate the epidemiological and clinical characteristics of patients with COVID-19 in Saveh city, Islamic Republic of Iran in 2020.

Methods: In this descriptive analytical research, 3181 patients suspected of having COVID-19 who visited Saveh medical centres were investigated. Patients were confirmed with COVID-19 using polymerase chain reaction testing. Data on sociodemographic, epidemiological and clinical characteristics of the patients were collected using a validated form through interviews and medical records. The chi-squared, t and Fisher exact tests were used to assess differences in sociodemographic, epidemiological and clinical characteristics between patients with positive and negative polymerase chain reaction results. Logistic regression analysis was used to examine the association between independent variables and death from COVID-19.

Results: About half the patients (48.3%) had a history of chronic disease. Diabetes (16.2%), high blood pressure (14.8%) and cardiovascular disease (12.4%) were the most prevalent chronic diseases among patients who were confirmed positive for COVID-19. Risk factors for death among confirmed COVID-19 patients were: intubation (odds ratio (OR) = 8.97; 95% confidence interval (CI): 5.15–15.63), age ≥ 80 years (OR = 5.81; 95% CI: 1.91–17.60), oxygen saturation < 93% (OR = 2.48; 95% CI: 1.51–4.08), diabetes (OR = 1.88; 95% CI: 1.00–3.54) and shortness of breath (OR = 1.70; 95% CI: 1.02–2.82).

Conclusion: Given the greater risks of contracting and dying from COVID-19 in certain groups of patients, health education programmes targeting these groups are recommended.

Keywords: coronavirus, COVID-19, risk factors, public health, Iran

Introduction

Chinese scientists isolated a new coronavirus from patients in Wuhan, China on 7 January 2020 (1). The cause of the disease named coronavirus disease 2019 (COVID-19) was a new virus strain called severe acute respiratory coronavirus 2 (SARS-CoV-2) (2). The World Health Organization (WHO) declared the outbreak a public health emergency of international concern on 30 January 2020 (3). The pandemic has affected high- and low-income countries and millions of people have been infected by SARS-CoV-2 (4–6). In March 2020, WHO declared COVID-19 a pandemic (global epidemic) (7). The high rate of virus spread have led to high rates of infection and mortality (8). Given the severity of the pandemic and lack of effective treatments, efforts were made to slow the spread of the disease to allow time to produce and administer effective vaccines and/or treatment (8,9).

Until 2 decades ago, human coronaviruses were only known to cause uncomplicated respiratory infections such as the common cold. However, two new coronaviruses, severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), caused severe outbreaks around the world in 2003 and 2012, respectively (10). Infection with SARS-CoV-2 is very similar to other viral infections in terms of clinical manifestations (7,11), and patients show a wide range of clinical symptoms from mild and asymptomatic to very severe including viral pneumonia, respiratory failure and even death (12). The main symptoms of COVID-19 include fever, cough, and fatigue. Other symptoms include headache, haemoptysis (bloody sputum), diarrhoea, shortness of breath and lymphopenia (12,13). Severe cases have also been associated with heart damage and pulmonary opacification. A high percentage of people (about 80%) show asymptomatic infection or mild symptoms of a cold, while about 20% experience more severe symptoms of the disease, such as, pneumonia, sepsis, septic shock and acute respiratory distress syndrome (14–16). Depending on the severity of the disease, patients may need to be assisted in breathing (e.g.)
intervention. The mortality rate of COVID-19 is about 2%, although this rate varies slightly across studies (6,17).

Some research has examined what clinical and epidemiological factors predict mortality and case severity from COVID-19. Given the variability in severity of the disease, it is important to identify which factors may be associated with higher rates of mortality and severe disease (12,18). Greater severity of COVID-19 has been found to be associated with higher levels of D-dimer, procalcitonin and C-reactive protein at hospital admission, as well as older age (14). Risk factors for death from COVID-19 include older age, cardiac disease, hypertension, diabetes mellitus, cancer, chronic obstructive pulmonary disease, higher levels of D-dimer and C-reactive protein at admission, lymphopenia, oxygen saturation levels (PO2) during the course of the clinical visit, CD3+ and CD8+ T cells ≤ 75 cells/μL, cardiac troponin I ≥ 0.05 ng/mL, and higher body temperature (14–19).

Given that COVID-19 is a new disease, knowledge about the epidemiological and clinical characteristics of those infected with COVID-19 is still limited. Further studies are needed to identify factors associated with disease severity and death in order to properly manage this epidemic and take effective preventive and treatment measures. Therefore, the aim of this study was to identify the risk factors for COVID-19 disease severity and death in a community sample in Saveh, Islamic Republic of Iran.

Methods

Study design and sample

We conducted a descriptive analytical study of patients suspected of having SARS-Cov-2 infection who visited Saveh medical centres from 9 February to 25 October 2020. Patients were included in the study if they were suspected of SARS-Cov-2 infection and agreed to participate in the study. If patients refused to consent and/or their medical record was not available, they were excluded.

Data collection

Data were collected by interviews and accessing information in patients’ medical records. For hospitalized patients, the research team conducted interviews at medical centres after obtaining the necessary permission from the hospital administrators. Participants at outpatient centres and patients discharged from the hospital were contacted to obtain necessary data. After explaining the research objectives and obtaining the patient’s consent, the researchers interviewed the patients and collected data while maintaining confidentiality. Data from patients’ files were also accessed with permission from hospital authorities and patients.

Questionnaire

A questionnaire developed by the research team was used to collect data. The questionnaire was created by reviewing scientific literature and consulting with experts in infectious diseases and epidemiology. The form consisted of sociodemographic information (such as age, occupation, sex, occupation, level of education and place of residence) and epidemiological and clinical characteristics of those with COVID-19. Epidemiological information collected included: history of possible contact with COVID-19 patients; history of underlying diseases (cancer, hypertension, diabetes mellitus, cardiovascular disease, chronic obstructive pulmonary disease, asthma, renal disease, liver disease and haematological disease), smoking status and history of substance abuse. Clinical information collected included: duration of hospitalization; shortness of breath (dyspnoea), PO2, cough, fever, intubation, radiological evidence showing lesions compatible with COVID-19 in computed tomography scan as confirmed by a radiologist, loss of consciousness, gastrointestinal disorders, nausea, vomiting, diarrhoea, and myalgia or fatigue.

The content validity of the questionnaire was determined by both qualitative and quantitative methods. The questionnaire was given to 12 professors in the fields of infectious diseases, internal medicine and epidemiology, and they were asked to examine and give feedback on the terminology, order of items and grammar in the form (e.g. items to add or discard). In addition, the content validity ratio and content validity index were calculated to examine the content validity. To determine the content validity ratio, the experts were asked about the need for or not of each item on the form; items with values > 0.56 were retained on the questionnaire. To determine the content validity index, the relevance, clarity and simplicity of each item were reviewed and items with values > 0.79 were retained.

Case definitions

A definitive COVID-19 case was determined by a positive polymerase chain reaction (PCR) test. A suspected case was a patient with at least one of the following symptoms, which could not be attributed to another etiological agent: dry cough, chills, sore throat, shortness of breath and fever. A negative case of the disease was determined as a negative PCR result.

Data analysis

Data were analysed using SPSS, version 21. The chi-squared, independent sample t and Fisher exact tests were used to compare patients by PCR status and demographic characteristics. In addition, a logistic regression analysis was performed to determine the association between independent variables and death from COVID-19. Only those independent variables that showed significant associations with death (P ≤ 0.05) in the univariable analysis were included in the multivariable logistic regression models.

Ethical concerns

Permission to conduct the research was obtained from the Saveh Medical Centres. This research was approved
Results

A total of 3181 patients were included in the study. Their mean age (standard deviation (SD)) was 52.6 (20.8) years. Based on the laboratory data (PCR result), 1422 (44.7%) patients were positive for COVID-19 and 1759 (55.3%) were negative. Of the 3181 patients, 310 (9.7%) died; of these patients, 192 (61.9%) were PCR-positive for COVID-19, while 118 (38.1%) were PCR-negative.

Patients who survived

Of the 2871 patients who survived, 1230 (42.8%) were PCR-positive for COVID-19. The mean (SD) age of these COVID-19-positive patients was 53.7 (18.9) years. The mean (SD) duration of hospitalization was 6.5 (8.5) days. Of the COVID-19-positive patients, 584 (47.5%) were men and 943 (76.7%) reported a history of contact with COVID-19 patients. Half (50.3%) of all the patients who survived (either positive or negative) reported a history of contact with COVID-19 patients. There were significant differences between the PCR-positive and PCR-negative patients in age, smoking, substance addiction, history of contact with COVID-19 patients and duration of hospitalization (\( P < 0.05 \)). The findings are presented in Table 1.

About half of all the patients (48.3%) had a history of chronic disease. The most prevalent chronic diseases among patients who survived and were PCR-positive for COVID-19 included diabetes (16.3%), high blood pressure (14.9%) and cardiovascular diseases (12.4%). Significantly more patients who were PCR-positive had diabetes than PCR-negative patients (Table 2).

The symptoms reported or experienced by PCR-positive patients at hospital admission were: shortness of breath (42.0%), \( \text{PO}_2 < 93\% \) (39.7%), cough (37.2%) and fever (36.8%). A significantly greater proportion of PCR-positive patients (39.7%) had a \( \text{PO}_2 \) saturation < 93% than...
PCR-negative patients (31.2%; \( P = 0.001 \)). In addition, a significantly greater proportion of PCR-positive than PCR-negative patients experienced fever, cough, fatigue, shortness of breath, loss of taste and loss of smell (\( P < 0.05 \)). No significant differences were found between PCR-positive and PCR-negative patients in rate of intubation (1.5% versus 2.0%, respectively; \( P = 0.27 \)) and manifestations observed on computed tomography scans (34.8% versus 27.7%; \( P = 0.52 \)). Full results are reported in Table 3.

**Patients who died**

Of the 310 patients who died, 192 (61.9%) were PCR-positive for COVID-19. The mean (SD) age of these patients was 70.0 (16.1) years and the mean (SD) duration of hospitalization was 7.2 (SD 5.7) days. Of all patients who died, those aged 71–80 years had the highest rate of death (29.4%) (Table 1). Of the patients who died and were PCR-positive for COVID-19, more than half (58.3%) were men. As regards underlying conditions, 69.6% of all the patients who died had a history of chronic disease: diabetes, cardiovascular disease and hypertension were the most common diseases, found in 25.5%, 21.9% and 20.6%, respectively (Table 2).

Among those who died, a significantly greater proportion of patients who were PCR-positive for COVID-19 than PCR-negative patients had the following clinical signs: fever, cough and myalgia or fatigue (\( P < 0.05 \)). However, a significantly greater proportion of patients who were PCR-negative than PCR-positive experienced loss of consciousness (\( P = 0.001 \)) (Table 3). In multivariable logistic regression models the following factors were significantly associated with death (29.4%) (Table 1). Of the patients who died and were PCR-positive for COVID-19, more than half (58.3%) were men. As regards underlying conditions, 69.6% of all the patients who died had a history of chronic disease: diabetes, cardiovascular disease and hypertension were the most common diseases, found in 25.5%, 21.9% and 20.6%, respectively (Table 2).
Table 3  Outcome of patients according to PCR status and clinical investigation results and common symptoms

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CT scan manifestation

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Loss of consciousness

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Intubation

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PO2, %

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Fever

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Cough

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Myalgia or fatigue

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Shortness of breath

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Gastrointestinal disorders

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Nausea

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Vomiting

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Diarrhoea

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Loss of taste

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<td>9 (4.7)</td>
</tr>
<tr>
<td>4.7</td>
<td>95.3</td>
<td>98.3</td>
</tr>
</tbody>
</table>

Loss of smell

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Student t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.190&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>11</td>
<td>181</td>
<td>11 (5.7)</td>
</tr>
<tr>
<td>5.7</td>
<td>94.3</td>
<td>97.5</td>
</tr>
</tbody>
</table>

PCR = polymerase chain reaction; CT = computed tomography; PO2 = oxygen partial pressure.

<sup>a</sup> Chi-squared test.

<sup>b</sup> Student t-test.

<sup>c</sup> Fishers exact test.
death in PCR-positive patients: intubation, PO2 < 93%, shortness of breath, diabetes and age ≥ 80 years (Table 4).

**Discussion**

This study assessed the epidemiological and clinical characteristics of people infected with COVID-19 in Saveh, Islamic republic of Iran. The mean age of PCR-positive COVID-19 patients was 53.7 years which was significantly older than that of PCR-negative patients. This finding is consistent with previous studies that indicated age is a risk factor for infection with COVID-19 (19–21). A study in China reported that the mean age of patients with COVID-19 was 59 years (22).

In our study, just over half of the patients (52.8%) were women. A possible explanation for this finding might be the fact that, in Iranian culture, women tend to be tasked with shopping for daily necessities. Therefore, women may be at higher risk of being exposed to COVID-19 in crowded spaces such as malls and bakeries. Although most of the patients in this study were women, the death rate was higher in men. Some biological differences between men and women might explain the difference, as described by an earlier report (23).

In our study, 13.5% of the COVID-19 positive patients died. This was more than what reported in other studies (24,25), which ranged between 3.0% and 11.0%. However, our rate was similar to the rate reported in another study (20). It has been documented that the mortality rates of COVID-19 are under-reported (19). Several factors contribute to the mortality rate, including quality and quantity of health care services, prevalence of chronic disease and epidemic phase (26,27). Our findings show that deaths were highest in elderly patients and patients with chronic diseases (e.g. high blood pressure, diabetes and cardiovascular disease). These findings highlight the importance of identifying susceptible groups, such as patients with a history of chronic diseases, and establishing a tailored prevention approach for these high-risk groups. Recently, research indicates that the rate of recovery from COVID-19 is increasing (28,29), which may be due to increased knowledge about COVID-19.

Most of PCR-positive patients reported a history of contact with others who were positive for COVID-19. This finding may indicate non-adherence to preventive behaviours and future studies should explore ways to increase preventative behaviours to reduce COVID-19 transmission; for instance, public health education at the population level that encourages the adoption of preventive strategies (17) such as wearing face masks, physical distancing and washing hands. In addition, launching public health campaigns should be a top priority for government officials. Furthermore, proven strategies of isolating infected people and effective contact tracing is necessary to control the COVID-19 pandemic (30).

Tobacco smoking and addiction were not associated with death in patients with PCR-confirmed COVID-19. Among patients who were PCR-negative for COVID-19, the rate of addiction was slightly higher than that of PCR-positive patients. Because of the small number of patients who reported addiction and tobacco smoking, this finding should be investigated in future studies. Absolute and relative frequency of epidemiological and clinical factors of patients have been investigated in this study. Our results are consistent with earlier studies (7,18,20) showing that COVID-19 is a respiratory disease with symptoms such as myalgia, cough and respiratory issues, gastrointestinal problems, and loss of taste and smell.

Due to the nature of the study design, much of the data were self-reported (e.g. contact with a COVID-19 patient, smoking and addiction) and therefore may be subject to recall bias, and also respondent bias and social desirability bias, which is a limitation of our study. For instance, future studies may want to assess past or...
Caractéristiques épidémiologiques et cliniques des patients atteints de COVID-19 en République islamique d’Iran

Résumé

Contexte : La maladie à coronavirus 2019 (COVID-19) constitue une urgence de santé publique mondiale.

Objectifs : La présente étude visait à étudier les caractéristiques épidémiologiques et cliniques des patients atteints de COVID-19 dans la ville de Saveh (République islamique d’Iran) en 2020.

Méthodes : Dans cette recherche analytique descriptive, 3181 patients suspects d’être atteints de COVID-19 et ayant consulté dans les centres médicaux de Saveh ont été examinés. Les cas de COVID-19 ont été confirmés par la méthode de réaction en chaîne par polymérase (PCR). Les données sur les caractéristiques sociodémographiques, épidémiologiques et cliniques des patients ont été recueillies à l’aide d’un formulaire valide par le biais d’entretiens et de dossiers médicaux. Le test du χ², le test de t et le test exact de Fisher ont été utilisés pour évaluer les différences de caractéristiques sociodémographiques, épidémiologiques et cliniques entre les patients ayant des résultats positifs et négatifs à la PCR. L’analyse de régression logistique a été utilisée pour examiner l’association entre les variables indépendantes et les décès dus à la COVID-19.

Résultats : Environ la moitié des patients (48,3 %) avaient des antécédents de maladie chronique. Le diabète (16,2 %), l’hypertension artérielle (14,8 %) et les maladies cardiovasculaires (12,4 %) étaient les maladies chroniques les plus courantes chez les patients ayant obtenu un résultat positif au test COVID-19. Les facteurs de risque de décès chez les patients atteints de COVID-19 étaient les suivants : intubation (odds ratio (OR) = 8,97 ; intervalle de confiance (IC) à 95 % : 5,15-15,63), âge supérieur ou égal à 80 ans (OR = 5,81 ; IC à 95 % : 1,91-17,60), saturation en oxygène inférieure à 93 % (OR = 2,48 ; IC à 95 % : 1,51-4,08), diabète (OR = 1,88 ; IC à 95 % : 1,00-3,54) et dyspnée (OR = 1,70 ; IC à 95 % : 1,02-2,82).

Conclusion : Étant donné les risques plus élevés de contracter la COVID-19 et d’en décéder dans certains groupes de patients, des programmes d’éducation sanitaire ciblant ces groupes sont recommandés.

الخصائص الوبائية والسريرية لمرضى كوفيد-19 في جمهورية إيران الإسلامية

الخلاصة


طرق البحث: في هذا البحث التحليلي الوصفي، خضع 3181 مريضًا في إصابتهم بـ COVID-19، من زاروا المراكز الطبية في ساوه، للاستقصاء. تم استخدام اختبار تفاعل البوليميراز المتسلسل. وتم ضبط بيانات الخصائص الاجتماعية والسكانية والوبائية والسريرية للمرضى باستخدام استمارة مُتحقَّقة منها، ومن خلال إجراء المقابلات والاطلاع على السجلات الطبية. واستُخدمت اختبارات مربع كاي واختبارات فيشر الدقيقة لتقييم الاختلافات في الخصائص الاجتماعية والسكانية والوبائية والسريرية في صفوف المرضى الذين أزعموا نتائج تفاعل البوليميراز المتسلسل لديهم سلبية. واستُخدم تحليل الانحدار اللوجستي لدراسة الارتباط بين المتغيرات المستقلة والوفاة الناجمة عن كوفيد-19.

النتائج: كان ضعف المرضى تقريبًا (48.3%) مصابين بمرض مزمن، وتبين أن السكري (16.2%)، وارتفاع ضغط الدم (14.8%)، وأمراض القلب والأوعية الدموية (12.4%) هي أكثر الأمراض المزمنة انتشارًا في ضعف المرضى الذين أزعموا إصابتهم بـ COVID-19. وتمت فحص عوامل خطر الوفاة لدى المرضى المؤكدة إصابتهم بـ COVID-19 في الطلب، أو ابتداء أعراض في الحالة الهوائية (نسبة الأرجحية = 97%)، أو فاصل تقة (نسبة الأرجحية = 92% / نسبة الأرجحية = 15.63–0.15)، والعمر ≥ 80 سنة (نسبة الأرجحية = 98% / فاصل تقة 95% / ناسبة الأرجحية = 1.91–7.60)، والانفصال الأكسجيني ≥ 0.95 (نسبة الأرجحية = 90% / فاصل تقة 95% / ناسبة الأرجحية = 15.63–6.31)، وارتفاع ضغط الدم (نسبة الأرجحية = 93% / فاصل تقة 95% / ناسبة الأرجحية = 1.91–6.31). وتبين أن السكري (المتغير المستقل) في ارتفاع ضغط الدم (نسبة الأرجحية = 86% / فاصل تقة 95% / ناسبة الأرجحية = 1.48–6.31)، وقد تنبؤ سوء التغذية في ارتفاع ضغط الدم (نسبة الأرجحية = 85% / فاصل تقة 95% / ناسبة الأرجحية = 1.31–6.31).}

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Competing interests: None declared.
References


Indirect effects of COVID-19 pandemic on reproductive, maternal, newborn and child health services in Pakistan

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Abstract

Background: COVID-19 is having many impacts on health, economy and social life; some due to the indirect effects of closure of health facilities to curb the spread. Closures were implemented in Pakistan from March 2020, affecting provision of reproductive, maternal, newborn and child health (RMNCH) services.

Aims: To appraise the effects of containment and lockdown policies on RMNCH service utilization in order to develop an early response to avoid the catastrophic impact of COVID-19 on RMNCH in Pakistan.

Methods: Routine monitoring data were analysed for indicators utilization of RMNCH care. The analysis was based on Period 1 (January–May 2020, first wave of COVID-19); Period 2 (June–September 2020, declining number of cases of COVID-19); and Period 3 (October–December 2020, second wave of COVID-19). We also compared data from May and December 2020 with corresponding months in 2019, to ascertain whether changes were due to COVID-19.

Results: Reduced utilization was noted for all RMNCH indicators during Periods 1 and 3. There was a greater decline in service utilization during the first wave, and the highest reduction (~82%) was among children aged <5 years, who were treated for pneumonia. The number of caesarean sections dropped by 57%, followed by institutional deliveries and first postnatal visit (37% each). Service utilization increased from June to September, but the second wave of COVID-19 led to another decrease.

Conclusion: To reinstate routine services, priority actions and key areas include continued provision of family planning services along with uninterrupted immunization campaigns and routine maternal and child services.

Keywords: RMNCH indicators, COVID-19, service utilization, maternal health, child health

Introduction

The rapid devastation and global health catastrophe caused by the COVID-19 pandemic is a wake-up call for the world to acknowledge the collective vulnerability of humans to infection across the globe. COVID-19 caused by SARS-CoV-2 was first reported in Wuhan, China in December 2019 (1). SARS-CoV-2 has extremely high transmissibility with an estimated mean reproduction number (R0) within the range of 1.01–2.79, which has resulted in exponential growth in the number of cases worldwide (2). As of May 31, 2021, 170.73 million cases of COVID-19 had been reported worldwide, including 3.66 million deaths, while in Pakistan, the number of confirmed cases surpassed 922,824, with more than 20,000 deaths (3).

With low global vaccination rates (4) and few empirically proven effective treatment methods (5), countries are forced to adopt population-level widespread restrictions such as curfews and lockdowns, in order to limit contact between people to slow down transmission and exponential growth of cases (6). Pregnant women and children in low- and middle-income countries, are likely to face the largest impact owing to disruption of primary health care and essential maternal and newborn services (7). Recent modelling exercises estimate that the four most populous low- and middle-income countries (India, Indonesia, Nigeria and Pakistan) alone could see a 31% increase in maternal and newborn deaths and stillbirths as a result of disruption to essential reproductive and maternal healthcare services in the next 12 months (8). There are lessons to be learned from the Ebola epidemic of 2014, when due to the disruption of these services, the number of maternal and neonatal deaths indirectly caused by the epidemic were more than the number of deaths caused by Ebola virus itself (9).

During the initial phase of the pandemic (March–April 2020), the Government of Pakistan took immediate steps to contain the spread of COVID-19. The outpatient departments in the public sector, including primary, secondary and tertiary level hospitals, were either closed or only partially open during Mar to July 2020. With the emergence of the second wave of COVID-19 in September, a similar approach was adopted and most health services...
were partially restricted. This lack of availability of routine health services including reproductive, maternal, newborn and child health (RMNCH) services, could have resulted in reduced utilization of services by pregnant women and their children. This study was therefore conducted to appraise the effects of containment and lockdown policies on RMNCH service utilization, in order to develop an early response to avoid the catastrophic effects of COVID-19 on maternal, newborn and child health.

**Methods**

We conducted an analysis of routine monitoring data, collected through the district health information system (DHIS), from all primary and secondary level public sector health facilities during 2020. Pakistan has a well-developed DHIS, which serves as a structured routine information source to generate health indicators and reports aggregated data at the district level (10). Using structured reporting tools, information is received from all primary and secondary level public sector health facilities at the respective district health offices. The information is collated at each provincial dedicated DHIS cell, which is responsible for collating the received reports on a monthly basis. At the federal level, the Ministry of National Health Services, Regulations and Coordination (MNHSRC) through its Health Planning, Systems Strengthening and Information Analysis Unit has developed a well-functioning integrated HIS, which is linked with the respective DHIS databases of each province. These linkages are used for deriving national level outputs from the respective DHIS segments of the provinces on a regular basis, and answer health data/analysis requests from the Government of Pakistan and other development partners on a regular basis.

Data were extracted from the national DHIS database to determine if there was a change in the utilization of routine RMNCH services across all public health facilities due to the COVID-19 pandemic. A subset of indicators within the RMNCH continuum of care that showed the greatest impact in similar past epidemics were selected (11–13). Completeness of information and a possibility to track these indicators through the National DHIS database over time were also considered as important factors for the selection of these indicators. The key variables selected for analysis within the maternal health domain included the number of family planning (FP) visits, first antenatal care visit for pregnant women, deliveries conducted in public health facilities, number of caesarean sections, and number of first postnatal visits. Within the child health domain, the number of children who received a third pentavalent injection (vaccine used by the Expanded Program on Immunization in Pakistan to protect against diphtheria, pertussis, tetanus, hepatitis B and *Haemophilus influenzae* type B), number of reported cases of diarrhoea and pneumonia, and number of treated pneumonia cases were included. Data queries were run through the specialized DHIS software and time-and province-based summary outputs were calculated. Analysis was based on three separate time periods in 2020: Period 1 (January–May), corresponding to the first wave of COVID-19; Period 2 (June–September), when the number of cases showed a declining trend; and Period 3 (October–December), when the number of cases declined even further.
Table 1 shows the change in utilization of key RMNCH services during various phases of COVID-19 pandemic in 2020.

<table>
<thead>
<tr>
<th>RMNCH indicators</th>
<th>RMNCH service users</th>
<th>Percent change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-pregnancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family planning visits</td>
<td>283 790</td>
<td>140 157</td>
</tr>
<tr>
<td>Pregnancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANC-1</td>
<td>505 179</td>
<td>325 733</td>
</tr>
<tr>
<td>TT2 vaccine</td>
<td>284 943</td>
<td>233 667</td>
</tr>
<tr>
<td>Delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutional Deliveries</td>
<td>172 588</td>
<td>108 100</td>
</tr>
<tr>
<td>C section</td>
<td>24 778</td>
<td>10 761</td>
</tr>
<tr>
<td>Postnatal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNC-1</td>
<td>204 033</td>
<td>127 460</td>
</tr>
<tr>
<td>Infancy and childhood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children &lt;12 mo received 3rd pentavalent vaccine</td>
<td>365 697</td>
<td>231 859</td>
</tr>
<tr>
<td>Reported cases of pneumonia &lt;5 yr</td>
<td>154 415</td>
<td>42 450</td>
</tr>
<tr>
<td>Reported cases of diarrhoea &lt;5 yr</td>
<td>428 022</td>
<td>381 061</td>
</tr>
<tr>
<td>Pneumonia &lt;5 yr inpatient treatment</td>
<td>22 741</td>
<td>420 2</td>
</tr>
</tbody>
</table>

*Vaccine used by the Expanded Program on Immunization in Pakistan to protect against diphtheria, pertussis, tetanus, hepatitis B and Haemophilus influenzae type B.*

**ANC-1 = first antenatal care visit; PNC-1 = first postnatal care visit; RMNCH = reproductive, maternal, newborn and child health; TT2 = second dose of tetanus toxoid.**
There was a reduction in service utilization for all indicators for both timepoints compared, although there was a greater decline in the use of services in May 2020. The reduction in the number of children aged < 5 years treated for pneumonia was one of the highest in both May and December 2020.

Province-wide analysis showed that Balochistan and Khyber Pakhtunkhwa suffered from massive reductions in the utilization of services for most indicators, which were higher than the national average. Khyber Pakhtunkhwa showed major drops in utilization of services such as first antenatal care visit, first postnatal care visit, family planning, and treatment of children aged < 5 years for pneumonia and diarrhoea. There were larger reductions in service utilization in Balochistan for the second dose of tetanus toxoid, institutional deliveries and caesarean sections. Service utilization also dropped in Sindh,

**Table 2** Comparison of the utilization of key RMNCH services between 2019 and 2020 in Pakistan

<table>
<thead>
<tr>
<th>RMNCH indicators</th>
<th>No. of users May 2019</th>
<th>No. of users May 2020</th>
<th>% change</th>
<th>No. of users Dec 2019</th>
<th>No. of users Dec 2020</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-pregnancy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family planning visits</td>
<td>211 891</td>
<td>141 057</td>
<td>−33.4</td>
<td>202 894</td>
<td>163 751</td>
<td>−19.3</td>
</tr>
<tr>
<td><strong>Pregnancy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANC-1</td>
<td>541 815</td>
<td>325 733</td>
<td>−39.9</td>
<td>493 219</td>
<td>389 620</td>
<td>−21.0</td>
</tr>
<tr>
<td>TT2 vaccine</td>
<td>372 132</td>
<td>233 667</td>
<td>−37.2</td>
<td>302 944</td>
<td>244 316</td>
<td>−19.4</td>
</tr>
<tr>
<td><strong>Delivery</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutional Deliveries</td>
<td>151 939</td>
<td>108 100</td>
<td>−28.9</td>
<td>70 607</td>
<td>61 350</td>
<td>−13.1</td>
</tr>
<tr>
<td>C-section</td>
<td>19 149</td>
<td>10 761</td>
<td>−43.8</td>
<td>25 318</td>
<td>16 360</td>
<td>−35.4</td>
</tr>
<tr>
<td><strong>Postnatal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNC-1</td>
<td>188 067</td>
<td>127 460</td>
<td>−32.2</td>
<td>203 938</td>
<td>189 889</td>
<td>−6.9</td>
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<td><strong>Infancy and childhood</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children &lt;12 mo received 3rd pentavalent vaccine&lt;sup&gt;a&lt;/sup&gt;</td>
<td>361 631</td>
<td>231 859</td>
<td>−35.9</td>
<td>379 733</td>
<td>384 716</td>
<td>1.3</td>
</tr>
<tr>
<td>Reported cases of pneumonia &lt;5 yr</td>
<td>96 498</td>
<td>42 450</td>
<td>−56.0</td>
<td>186 091</td>
<td>95 413</td>
<td>−43.2</td>
</tr>
<tr>
<td>Reported cases of diarrhoea &lt;5 yr</td>
<td>671 067</td>
<td>381 061</td>
<td>−43.2</td>
<td>473 716</td>
<td>353 729</td>
<td>−25.3</td>
</tr>
<tr>
<td>Pneumonia &lt;5 yr inpatient treatment</td>
<td>8737</td>
<td>4202</td>
<td>−51.9</td>
<td>20 099</td>
<td>6251</td>
<td>−68.0</td>
</tr>
</tbody>
</table>

<sup>a</sup>Vaccine used by the Expanded Program on Immunization in Pakistan to protect against diphtheria, pertussis, tetanus, hepatitis B and Haemophilus influenzae type B. ANC-1 = first antenatal care visit; PNC-1 = first postnatal care visit; RMNCH = reproductive, maternal, newborn and child health; TT2 = second dose of tetanus toxoid.
although the reductions were the least when compared with other provinces.

Discussion

Utilization of RMNCH services declined during the first and second waves of COVID-19 in Pakistan. The highest reduction of almost 82% was observed for children aged < 5 years treated for pneumonia. Among RMNCH service, institutional deliveries, first postnatal visit and caesarean sections dropped by more than one third.

Pakistan's mission for improving its RMNCH indicators has faced substantial challenges even in the pre-COVID 19 era (15). With one of the highest maternal mortality ratios and highest neonatal mortality rates in South Asia, the country's public sector has struggled to improve the coverage and quality of maternal and child health services (16–18). However, an incremental increase in utilization of antenatal care services, and institutional deliveries was documented by the most recent Pakistan Demographic and Health Surveys (19, 20). In contrast, the proportion of women with a postnatal check-up within 48 hours after birth has remained largely unchanged, and the neonatal mortality rate is still the highest in South Asia at 94 deaths per 1000 livebirths (21). The last 5 years of RMNCH data in Pakistan show a mixed trend with a few unchanged indicators and substantial gains in specific areas (22).

Our analysis showed that the COVID-19 pandemic was likely to have had a detrimental effect on the gains that Pakistan achieved through improved coverage and enhanced services in recent years. Concomitantly, the disruption in provision of routine essential RMNCH services due to the pandemic likely exacerbated some of the existing access-related challenges for mothers and children. Our analysis reflected a marked decline in the utilization of public health services across the entire essential RMNCH-related continuum of care. Against a backdrop of an already suboptimal availability and use of family planning services in Pakistan, our results showed a further reduction in access to family planning services. Even where family planning services remained available, women were commonly confined within their homes with their husbands, and in the absence of birth control, might be facing a huge challenge of unwanted pregnancies in the coming months. A one-third reduction in the number of women who received their first antenatal care by a qualified health professional will deprive thousands of pregnant women of timely identification of pregnancy-related complications (23). A drop in the number of institutional deliveries and caesarean sections tended to neutralize the recent reduction in maternal mortality ratio. The effects of all three pre-existing delays leading to maternal mortality, that is, deciding to seek appropriate medical help, reaching a facility, and receiving adequate care, were accentuated by COVID-19. This was primarily because of an absence of transportation due to lockdown and partial or complete closures of routine health facilities. The overall magnitude of the negative effect will take time to manifest, although our analysis is already pointing towards deterioration in services uptake.

COVID-19 related restrictions could further affect the already poor outcomes of neonatal and child health in Pakistan. Pneumonia is one of the major contributors towards child mortality in Pakistan (19) and the biggest concern is a significant drop in the number of reported and treated cases in children aged < 5 years. We noticed a substantial drop in these indicators during the first wave of COVID-19, which improved in the later part of the year. However, it is important to note that the overall number of cases of pneumonia reported in December were only a quarter of the number treated in January. This could mean that children suffering from respiratory illnesses were not brought to health facilities, due to the fear of being diagnosed with COVID-19 and its associated stigma (24). We infer that during the COVID era, children who might have had treatable respiratory illnesses and possibly pneumonia, did not receive effective treatment, which could lead to an upsurge in the under-5 mortality rate. Pakistan is one of the three polio-endemic countries globally, and another major concern is that suspension of polio vaccination campaigns for nearly four months is likely to result in an upsurge in polio cases (25). Pakistan has seen a significant increase in the number of fully immunized children during the last 5 years from 54% in 2012–2013 to 66% in 2017–2018 (19, 20). These recent routine immunization gains are likely to be offset due to interruption to both static and outreach-based vaccination programme activities.

Similar disruption to RMNCH services in West Africa was imposed by Ebola during 2014–2015. The largest decline seen within maternal services included decreased utilization of antenatal and postnatal care, a marked reduction in the number of caesarean sections and facility-based deliveries in all Ebola-affected countries (11, 12, 26). There was also a drop in utilization of children's health services, especially in terms of vaccination and treatment of diarrhoea and pneumonia cases; possibly because parents were reluctant to visit a health facility (3). Changes in the coverage of routine essential RMNCH services and life-saving measures resulted in a high number of deaths among children and women of childbearing age. Looking at modelling estimates under the most conservative scenario, the overall decrease in utilization of RMNCH services translated into an additional 3600 maternal, neonatal and stillbirth deaths in Sierra Leone during 2014–2015 (9).

The Government of Pakistan during the initial phase of the pandemic in March 2020 adopted early and stringent nonpharmacological interventions to contain the spread of COVID-19, such as imposition of lockdown in some of the larger urban areas. Within the health sector, the outpatient departments of public sector primary, secondary and tertiary level hospitals were either closed or only partially open. The delayed South Asian COVID-19 pandemic and early implementation of health-sector-related interventions (27, 28), is now being linked with positive outcomes in relation to the control
of COVID-19. These interventions, however, resulted in low rates of utilization across the routine RMNCH services as shown by our study. As a consequence, the medium- to long-term negative effects of COVID-19 and the various containment strategies and restrictions adopted by Pakistan are likely to manifest as higher rates of RMNCH-related morbidity and mortality. Our analysis was limited by the issues of routinely collected data through management information systems such as accuracy, precision and completeness of data collected. Despite these limitations, the study provides valuable information on the effects of the COVID-19 pandemic on the utilization of RMNCH services by women and their children.

We are already seeing the sobering effects of the pandemic on achieving Sustainable Development Goal (SDG) targets. Pakistan secured a score of 55.6 under SDGs’ global index and ranked 122 on the SDG index out of 157 countries in 2020 (29). COVID-19 has exposed the existing inequalities such as lack of health protection and limited universal health coverage, which has affected the poorest and the most vulnerable. Pakistan's expansive disease burden profile, commonly labelled as a double burden of disease in terms of high instance of communicable and noncommunicable diseases, and a rapidly expanding population (fifth highest in the world), warrants a holistic and comprehensive approach to mitigate the respective segments of the diseases burden in times of COVID-19. The improving trend in the coverage of RMNCH services observed during recent years has clearly been affected during the COVID-19 pandemic as reflected in our analyses. To reinstate routine services, public and private sector healthcare needs to work on an urgent basis and in a harmonized manner. Priority actions and key areas to be addressed include continued provision of family planning services along with uninterrupted immunization campaigns and routine maternal and child services. Front line community workers should be mobilized to deliver essential medicines, supplements and basic RMNCH care after providing them basic trainings on how they could protect themselves and those who come in contact with them. The guidelines developed by the MNHSRC for health facilities and service providers should be thoroughly implemented to maintain routine and essential health services. Staff should be adequately trained on these guidelines to prevent further spread of the virus while at the same providing basic RMNCH care to pregnant women and children.

Conclusions
We have seen that measures taken by the Pakistani Government to contain COVID-19 have resulted in a marked reduction in the availability, accessibility and utilization of routine health services. The expected further waves of COVID-19 mean that it is time that the health system in Pakistan worked towards effective and safe provision of routine RMNCH services across the country, while being cognizant of the required infection prevention and control measures instilled across the system. This is anticipated to help mitigate a possible increase in the RMNCH-related morbidity and mortality in Pakistan, and facilitate reversing the negative impact on the recent gains across key RMNCH health indicators.

Acknowledgement
The authors would like to thank the provincial health departments and the staff engaged with DHIS for providing provincial data sets for analysis. We would also like to acknowledge the district female health workers and supervisors and the District Health Officer for collecting routine data regularly. The support provided by the MNHSRC is also duly acknowledged. Finally, we acknowledge the Bill and Melinda Gates Foundation for providing financial support for this work.

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Competing interests: None declared.

Effets indirects de la pandémie de COVID-19 sur les services de santé reproductive, maternelle, néonatale et infantile au Pakistan
Résumé
Contexte: La COVID-19 a de nombreux impacts sur la santé, l’économie et la vie sociale, certains étant dus aux effets indirects de la fermeture des établissements de santé pour freiner la propagation. Des fermetures ont été imposées au Pakistan à partir de mars 2020, affectant la fourniture de services de santé reproductive, maternelle, néonatale et infantile.
Objectifs: Evaluer les effets des politiques d’endiguement et de confinement sur l’accès aux services de santé reproductive, maternelle, néonatale et infantile afin de mettre en place une réponse rapide pour éviter l’impact catastrophique de la COVID-19 sur ce type de services au Pakistan.
Méthodes: Les données de suivi de routine ont été analysées pour l’utilisation des indicateurs relatifs aux soins de santé reproductive, maternelle, néonatale et infantile. L’analyse était basée sur la période 1 (janvier-mai 2020,
References


29. Ministry of National Health Services Regulations & Coordination (weblink-SDG3) [Internet]. [cited 2021 Dec 02]. Available from: https://sdg3.nhsrc.pk/
Introduction

The United Nations has defined the civil registration as the “universal, continuous, permanent, and compulsory recording of occurrence and characteristics of vital events (births, deaths, and other civil status events) occurring within the boundaries of a country based on the country’s legal requirements”. Vital statistics are “the collection of statistics on vital events in a lifetime of a person as well as relevant characteristics of the events themselves and of the person and persons concerned” (1).

The main aim of the civil registration and vital statistics system is to have complete registration of births, deaths and other civil status events and the generation of records from which vital statistics can be produced (2). Therefore, regular monitoring is needed of the extent to which civil registration systems are accessible and complete. Access to registration is however complex and covers a range of issues including the availability of registration points, the distance to be travelled, affordability, and cultural and social acceptability (3).

Limited accessibility to birth/death registration offices is an important impediment to the improvement of coverage and effectiveness of civil registration and, consequently, the quality and coverage of vital statistics (4). Therefore, the main goal of the operations of the civil registration system is to reach the lowest geographical level whereby the service point is within reasonable reach of households and individuals who have experienced events that need to be registered. It is therefore necessary that the assessment must be conducted at the municipal division level of government and the community level (2). The author of this paper undertook this project to assess the current status of civil registration and vital statistics in Egypt. The project has two objectives: (i) to calculate the completeness of death registration in Egypt (5), and (ii) to assess the accessibility of birth/death registration offices. The main aim of the current study was to assess the accessibility of birth/death registration offices in the Red Sea Governorate, one of Egypt’s frontier governorates, using buffer analysis and network analysis.

Methods

Study area

The Red Sea Governorate, which is the longest governorate in Egypt, is located between the Nile and the Red Sea in the south-east of Egypt and covers an area of 203 685 km².
km² (6). All its cities and most of its villages lie directly on the Red Sea and are within about 1080 km² of it. The governorate consists of the capital the city of Al-Ghurdaqah (Al-Ghurdaqah 1 and Al-Ghurdaqah 2) in addition to six other cities (Ras Gharib, Safaja, Al-Qusayr, Mersa Alam, Ash-Shalatin and Halayib). There are also 12 main villages (Az-Zafaranah, Wadi Dar Al Zaraey, Oum El-Hwytat, El-Nasr, El-Hamraween, Abu Ghouson, El-Sheikh El-Shazly, Berenice, Marsa Hamira, Abruq, Abu Ramad and Ras Hadraba) (7).

Data preparation

Residential areas

Data from OpenStreetMap (OSM) (8) was downloaded to obtain the residential areas of the Red Sea Governorate in 2019. Residential areas were classified as neighbouring houses as well as hotels (excluding military and industrial areas). The residential areas were established in two phases: first, using OSM residential area polygons and second, by tracing areas around those polygons. Almost all residential areas were determined using these two phases. Residential areas that were within 2 km of each other were aggregated. The population of the Red Sea Governorate was taken from the Central Agency for Public Mobilization and Statistics 2018 (9).

Birth/death registration offices

The website of the Ministry of Planning Monitoring and Administrative Reform was used to retrieve a list of birth/death registration offices in the Red Sea Governorate (10). The Governorate has 10 birth/death registration offices, eight of which are located in urban areas: Ras Gharib, Al-Ghurdaqah, El-Meenaa, Safaja, Al-Qusayr, Mersa Alam, Ash-Shalatin and Halayib. The remaining two are located in rural areas: El-Hamraween and Oum El-Hwytat. The coordinates of each registration office were found through Google Maps.

Building network datasets

The Red Sea road network data was also downloaded from OpenStreetMap (8). The OpenStreetMap toolbox for creating a network dataset was used to generate Red Sea network datasets. The network has the following properties: any vertex connectivity policy and (from end to end) elevation. ArcGIS 10.1 software was used for all data preparation (11).

Network analysis

Buffer analysis (12) and closest facility analysis (13) were performed as accessibility measuring techniques. The road network analysis was run using ArcGIS Network Analyst Extension.

Buffer analysis

A buffer zone is an area of a specified radius drawn around one or more map elements. It was run to identify the coverage of birth/death registration offices within the study area. A buffer of 20 km radius was created around each registration office. It should be noted that part of the buffer was eliminated because it crossed the sea.

Closest facility analysis

A closest facility analysis based on travel time was conducted to calculate the distance between the nearest registration offices and the residential areas. Thus, the residential areas were transformed to a central point using the Feature to point tool in ArcGIS from data management tools.

Results

After tracing residential areas and conducting 2 km aggregation, 73 residential areas were found (eight cities, 12 main villages and 53 residential areas outside of the cities and towns). Almost all residential areas were located along the coast of the Red Sea, as were the birth/death registration offices.

Buffer zone analysis for each birth/death registration office within a radius of 20 km showed that many residential areas were not included in any buffer. In addition, there was high overlap between Al-Ghurdaqah and El-Meenaa buffers, and slight overlap between Oum El-Hwytat and Safaja buffers, and El-Hamraween and Al-Qusayr buffers.

Table 1 shows the shortest distance from the eight cities and 12 main villages to a birth/death registration office and their mid-year populations in 2018.

All cities with a large population (> 3000) had a high level of accessibility to a registration office (Ras Gharib 1.5 km, Al-Ghurdaqah 1 16.7 km, Al-Ghurdaqah 2 12.4 km, Safaja 5.5 km, Al-Qusayr 3.4 km, Mersa Alam 2.5 km, Ash-Shalatin 4.6 km and Halayib 1.8 km). In contrast, most of the main villages had a low level of accessibility to urban registration offices (El-Sheikh El-Shazly 152.8 km, Berenice 110.8 km, Az-Zafaranah 104.5 km, Abruq 86.7 km, Abu Ghouson 80.9 km, El-Nasr 78.7 km, Marsa Hamira 46.7 km, Wadi Dar Al Zaraey 46.5 km, Abu Ramad 42.7 km and Ras Hadraba 16.3 km). Two villages Oum El-Hwytat and El-Hamraween had a high level of accessibility (0.2 km and 0.4 km respectively) to only two rural registration offices as these offices are located in the villages. One village (Berenice) has to go to another municipal divisions (Ash-Shalatin) to register vital events. For all 73 residential areas, the median distance was 37.6 km with 60.65 km interquartile range.

Table 2 shows the mean distances from the central point of the remaining 53 residential areas or hotels to the nearest registration office. In Ras Gharib, 12 residential areas were dispersed over the area. However, the mean (standard deviation (SD)) of the shortest distance of those residential areas to Ras Gharib registration office was 74.93 (36.01) km. In comparison, Halayib has three residential areas with a mean distance of 21.70 (10.00) km to the Halayib registration office. In some areas of Al-Qusayr, Mersa Alam and Ash-Shalatin municipal divisions, the shortest distance is to a registration office that belongs to another municipal division.

Table 3 shows the number of residential areas serviced by registration offices. Oum El-Hwytat and El-
Hamraween registration offices have the lowest service load, while Ras Gharib and Mersa Alam registration offices have the largest service load.

Discussion

This study addressed the second objective of the project assessing the current status of civil registration and vital statistics in Egypt. The first objective was to calculate the completeness of death registration in Egypt. In the Red Sea Governorate, the completeness of death registration was 92.9% – 95.8% for urban areas and 3.7% for rural areas.

Since the completeness of death registration in rural areas is very low, the second objective was developed to evaluate the accessibility to birth/death registration offices in the Red Sea Governorate.

It is likely that the greater the distance to the registration office, the less the opportunity and the more the travel costs for citizens and this can cause a reduction in the registration rate. An area is considered as having a good access if it is located within 4–5 km of a facility and as fairly inaccessible if located within 10 km. (14) In our case, the buffer analysis showed that even 20 km was not enough to cover all the residential areas (most of residential areas were not included within the buffer). Despite this, there was a high overlap between some buffers such as Al-Ghurdaqah and El-Meenaa buffers. In addition, there were wide gaps between some registration office buffers such as Al-Qusayr, Mersa Alam and Ash-Shalatin although there are many residential areas in between these municipal divisions.

<table>
<thead>
<tr>
<th>Municipal division</th>
<th>City/village</th>
<th>Nearest registration office</th>
<th>Distance, in km</th>
<th>Population (2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ras Gharib</td>
<td>Ras Gharib</td>
<td>Ras Gharib</td>
<td>1.5</td>
<td>4365.0</td>
</tr>
<tr>
<td></td>
<td>Az-Zafaranh</td>
<td>Ras Gharib</td>
<td>10.5</td>
<td>254.0</td>
</tr>
<tr>
<td></td>
<td>Wadi Dar El Zaraey</td>
<td>Ras Gharib</td>
<td>4.5</td>
<td>50.0</td>
</tr>
<tr>
<td>Al-Ghurdaqah</td>
<td>Al-Ghurdaqah 1</td>
<td>El-Meenaa</td>
<td>16.7</td>
<td>7227.7</td>
</tr>
<tr>
<td></td>
<td>Al-Ghurdaqah 2</td>
<td>Al-Ghurdaqah</td>
<td>12.4</td>
<td>448.118</td>
</tr>
<tr>
<td>Safaja</td>
<td>Safaja 1</td>
<td>Safaja</td>
<td>5.5</td>
<td>665.50</td>
</tr>
<tr>
<td></td>
<td>Oum El-Hwytat</td>
<td>Oum El-Hwytat</td>
<td>0.2</td>
<td>230.1</td>
</tr>
<tr>
<td></td>
<td>El-Nasr</td>
<td>Safaja</td>
<td>7.7</td>
<td>424.0</td>
</tr>
<tr>
<td>Al-Qusayr</td>
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<td>Al-Qusayr</td>
<td>3.4</td>
<td>986.47</td>
</tr>
<tr>
<td></td>
<td>El-Hamraween</td>
<td>El-Hamraween</td>
<td>0.4</td>
<td>942.0</td>
</tr>
<tr>
<td>Mersa Alam</td>
<td>Mersa Alam 2</td>
<td>Mersa Alam</td>
<td>2.5</td>
<td>012.5</td>
</tr>
<tr>
<td></td>
<td>Berenice</td>
<td>Ash-Shalatin</td>
<td>11.0</td>
<td>870.0</td>
</tr>
<tr>
<td></td>
<td>El-Sheikh El-Shazly</td>
<td>Mersa Alam</td>
<td>152.8</td>
<td>095.1</td>
</tr>
<tr>
<td></td>
<td>Abu Ghosoun</td>
<td>Mersa Alam</td>
<td>8.9</td>
<td>025.1</td>
</tr>
<tr>
<td>Ash-Shalatin</td>
<td>Ash-Shalatin 1</td>
<td>Ash-Shalatin</td>
<td>4.9</td>
<td>732.11</td>
</tr>
<tr>
<td></td>
<td>Mersa Hamira</td>
<td>Ash-Shalatin</td>
<td>46.7</td>
<td>441.0</td>
</tr>
<tr>
<td></td>
<td>Abraq</td>
<td>Ash-Shalatin</td>
<td>86.7</td>
<td>565.0</td>
</tr>
<tr>
<td>Halayib</td>
<td>Halayib 2</td>
<td>Halayib</td>
<td>1.8</td>
<td>131.3</td>
</tr>
<tr>
<td></td>
<td>Ras Hadraba</td>
<td>Halayib</td>
<td>16.3</td>
<td>464.0</td>
</tr>
<tr>
<td></td>
<td>Abu Ramad</td>
<td>Halayib</td>
<td>42.7</td>
<td>421.4</td>
</tr>
</tbody>
</table>

SD= standard deviation.
Table 3 Cities, main villages and residential areas served by registration offices by municipal division, Red Sea Governorate, Egypt

<table>
<thead>
<tr>
<th>Municipal division</th>
<th>Registration office</th>
<th>No. of cities served</th>
<th>No. of main villages served</th>
<th>No. of residential area served</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ras Gharib</td>
<td>Ras Gharib</td>
<td>1</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Al-Ghurdaqah</td>
<td>Al-Ghurdaqah</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>El-Meenaa</td>
<td>El-Meenaa</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Safaja</td>
<td>Safaja</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Oum El-Hwytat</td>
<td>Oum El-Hwytat</td>
<td>0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Al-Qusayr</td>
<td>Al-Qusayr</td>
<td>1</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>El-Hamraween</td>
<td>El-Hamraween</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mersa Alam</td>
<td>Mersa Alam</td>
<td>1</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Ash-Shalatin</td>
<td>Ash-Shalatin</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Halayib</td>
<td>Halayib</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

Of the 73 residential areas, 53 were not considered cities or main villages, and most of these were located along the coast of the Red Sea. In each municipal division, the mean distance from those residential areas to the nearest registration office was calculated, and long distances were found in almost all municipal divisions except Halayib (21.70 km (10.00)) and Al-Qusayr (23.60 km (13.90)) because Halayib had four residential areas and Al-Qusayr had three registration offices near its residential areas with one of them belonging to Safaja municipal division (Oum El-Hwytat registration office).

Three municipal divisions – Al-Qusayr, Mersa Alam, and Ash-Shalatin – have their nearest registration office in another municipal division. As a result some registration offices will have work overload compared with others. It is advisable to register births and deaths in the municipal division in which individuals live (5).

Regarding serviced areas, two registration offices in urban areas serviced many areas: Ras Gharib (one city, two main villages and 12 residential areas) and Mersa Alam (one city, two main villages and 10 residential areas). In addition, the distances travelled to these registration offices from main villages and residential areas were considerable. These registration offices may need support to overcome these issues.

Poor accessibility to birth/death registration offices in rural areas is considered to be a cause of low completeness registration. As there are only two registration offices in rural areas in the Red Sea Governorate, almost all villages will register at other registrations located in urban areas. study has some limitations. Data about residential areas and road networks may be not precise. Furthermore, the study focused on only one governorate (the Red Sea Governorate), and more governorates should be investigated.

The residential areas in the Red Sea Governorate have varying levels of accessibility to birth/death registration offices. Increasing the number of registration offices is not necessarily an appropriate solution in this situation (5) because of the low population levels in the villages. Therefore, there is a need for a new and robust system to register births and deaths such as mobile registration.

Mobile services have been established by the Office of Population Registration in Aceh, Indonesia in the districts of Pangkajene and Kepulauan since 2009 to provide services for civil registration and administrative documentation to remote communities, including birth certificates, family cards and identification cards (15). This policy has been successful with village officials, who consistently ranked mobile services among the top three priorities for improving civil registration coverage. Moreover, bringing registration services closer to communities is a way of increasing ownership of the certificate.

Mobile registration in villages and delegation of authority for civil registration to the subdistrict level could be strategies to meet the demand for birth certificates and other civil registration documents in Egypt.

**Funding:** None.

**Competing interests:** None declared.
Accessibilité des bureaux d'enregistrement des naissances et des décès : Gouvernorat de la mer Rouge (Égypte)

Résumé

Contexte : Les gouvernorats d’Égypte qui sont en bord de frontières comportent des zones résidentielles largement dispersées, ce qui peut rendre l’enregistrement des naissances et des décès difficile pour les personnes en raison de la distance qui les sépare des bureaux d’enregistrement.

Objectifs : La présente étude visait à évaluer l’accessibilité des bureaux d’enregistrement des naissances et des décès dans le Gouvernorat de la mer Rouge, l’un des gouvernorats de l’Égypte qui sont en bord de frontières.

Méthodes : OpenStreetMap a été utilisé pour repérer les zones résidentielles et les réseaux routiers du Gouvernorat de la mer Rouge. Une analyse des zones tampons, dans un rayon de 20 km autour des bureaux d’enregistrement, a été effectuée pour évaluer la couverture. Une analyse de réseau a également été réalisée pour calculer la distance entre les zones résidentielles et les bureaux d’enregistrement. Tous les travaux d’analyse spatiale ont été effectués à l’aide du logiciel ArcGIS 10.1.

Résultats : Lors de la délimitation des zones du Gouvernorat de la mer Rouge, 73 zones résidentielles ont été identifiées (huit villes, 12 villages principaux et 53 zones résidentielles ne faisant pas partie des villes et des villages). L’analyse des zones tampons a montré que même un tampon de 20 km n’était pas suffisant pour couvrir toutes les zones résidentielles. Toutes les villes avaient une bonne accessibilité aux bureaux d’enregistrement par rapport aux villages principaux (par exemple, 1,5 km par rapport à 104,5 km), même si deux villages principaux avaient une bonne accessibilité (0,2 km et 0,4 km) car les bureaux d’enregistrement étaient dans les villages. Pour les 73 zones résidentielles, la distance médiane était de 37,6 km avec un intervalle interquartile de 60,65 km.

Conclusions : Les zones résidentielles du Gouvernorat de la mer Rouge ont une accessibilité plus ou moins grande pour les bureaux d’enregistrement des naissances et des décès. De nouvelles techniques d’enregistrement sont proposées pour améliorer l’accessibilité à l’enregistrement des naissances et des décès.

Réf.: 53, 12, 20, 104, 154, 60, 37, 60, 61, 10, 1.
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Burden of deaths from road traffic injuries in children aged 0–14 years in Turkey

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Abstract

Background: Childhood road traffic injuries (RTIs) are a major public health problem worldwide. Reliable and valid information on childhood RTIs is essential to reduce the number of deaths.

Aims: To determine the burden of deaths from RTIs in children aged 0–14 years from 2006 to 2019 in Turkey.

Methods: This descriptive study examined the change in road traffic fatalities in children according to age, gender, road user type, and place. The necessary data for this study were obtained from the Turkish Statistical Institute. We used Microsoft Excel to analyse data from 4614 children who died from RTIs in 2006–2019 in Turkey.

Results: The fatality rate from RTIs per 100 000 children aged 0–14 years increased from 1.41 in 2006 to 2.13 in 2019. The fatality rate for boys aged 0–9 and 10–14 years was higher than that for girls of the same age. The fatality rate for girls aged 0–9 years was higher than that for girls aged 10–14 years. The fatality rate for boys aged 10–14 years was higher than that for boys aged 0–9 years. Among the children who died from RTIs, 6.65% were drivers, 41.31% pedestrians and 52.04% passengers. Children lost their lives mostly as pedestrians on urban roads and as passengers on rural roads.

Conclusion: The death of children due to RTIs is a significant health burden in Turkey.

Keywords: children, road traffic injury, fatality, health burden, Turkey.

Introduction

Approximately 1.35 million people worldwide die each year due to road traffic injuries (RTIs). In addition to deaths, between 20 and 50 million more people incur nonfatal injuries each year as a result of road traffic accidents (RTAs) (1). Moreover, RTAs cost 3.0% of gross domestic product in most countries (2).

Every year, around 950 000 children aged < 18 years die from injury and violence worldwide. Most of these deaths occur as a result of unintentional injuries, which account for almost 90.0% of injuries and they are among the top 3 causes of death among children aged 5–19 years (3).

Children have not developed a proper awareness of traffic risks, and often exhibit immature behaviour. When RTAs occur, the consequences are often severe because of the increased vulnerability of children (4,5). Every day, 3700 people die in RTAs worldwide, and at least 500 of them are children (1,4). This means that nearly 182 500 children lose their lives every year due to RTIs. These deaths are a major public health issue, especially low- and middle-income countries.

Globally, RTIs are the fourth leading cause of death among children aged 5–9 years, third among children aged 10–14 years and, first among children aged 15–17 years (6–8). RTIs are the leading cause of death in children aged < 15 years in most Organisation for Economic Co-operation and Development countries, and an average of 3.5 children per 100 000 population die in RTAs (9). RTIs are also the leading cause of death in children in World Health Organization European Region (10). More than 30 children are seriously injured every day in the European Union (EU) and 2 are killed in RTAs (4).

In addition to young deaths, financial losses from RTAs are a huge burden for the victims, their families and their countries (11). The cost of deaths from RTIs is higher in children and adolescents than in adults. According to the London School of Economics and Political Science, the socioeconomic impact of life years lost from RTAs with child victims in France, Spain, Italy, Chile, Brazil, Argentina, Puerto Rico and India is $21.8 billion annually (8).

The majority of previous studies focused on health effects of child deaths from RTIs in Turkey (12). Limited hospital data were used in most of these studies. In this study, the burden of child deaths due to RTIs was examined according to age, gender, type of road user, and accident location, and which of these is most risky.

Methods

Data on RTAs are compiled from the administrative records of the General Directorate of Security and the General Command of Gendarmerie and published annually.
Research article

by the Turkish Statistical Institute (TurkStat). The data for RTIs for children aged 0–14 years in 2006–2019 were obtained from TurkStat.

The following variables were used: age 0–9 and 10–14 years; gender; types of road users (driver, pedestrian and passenger); location of accident; and fatality rate per 100 000 child population by age and gender. Data on 4614 children who died from RTIs in 2006–2019 in Turkey were analysed in Microsoft Excel. Fatality rates were calculated using the cause-specific death rate formula (13,14) as follows:

\[
\text{Cause-specific death rate} = \frac{\text{Number of deaths from RTIs in a calendar year}}{\text{Total population in that year}} \times 10^5
\]

Findings from the study included a descriptive analysis of child deaths due to RTIs by age group, gender, and road user type and accident location. The study was an overview and helpful in understanding the situation of childhood RTIs for the purpose of developing strategic solutions in Turkey.

### Results

#### Road traffic fatality rate

Children aged 0–14 years constitute 23.10% of the Turkish population, which was 83.2 million as of 2019. This includes 7.65% aged 0–4 years, 7.77% aged 5–9 years and 7.70% aged 10–14 years (5). In Turkey, 5473 people died from RTIs and 283 234 were injured in 2019. Children aged < 15 years constituted 7.49% of those who lost their lives and 13.12% of those injured. According to 2019 data, the share of deaths from RTAs among the total causes of death in children aged < 15 years was 2.59%. When deaths under the age of 1 year are not taken into account, this rate rises to 8.11%.

The high number of children who died from RTIs in 1995 and 2000 is noteworthy (Table 1). There was less motor vehicle traffic and mobility during these years in Turkey, and although the presence of children in traffic was more limited, the fatality rate was high. In 2006, the fatality rate of children aged < 15 years decreased significantly. The rate tended to decrease from 2006 to 2013; it started to increase in 2013 and reached another

### Table 1 Road traffic fatality rates in Turkey

<table>
<thead>
<tr>
<th>Year</th>
<th>Whole population Deaths</th>
<th>Fatality rates</th>
<th>0–14 years Deaths</th>
<th>Child fatality rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>6004</td>
<td>9.38</td>
<td>784</td>
<td>3.92</td>
</tr>
<tr>
<td>2000</td>
<td>5510</td>
<td>8.13</td>
<td>685</td>
<td>3.39</td>
</tr>
<tr>
<td>2006</td>
<td>4633</td>
<td>6.64</td>
<td>267</td>
<td>1.41</td>
</tr>
<tr>
<td>2007</td>
<td>5007</td>
<td>7.09</td>
<td>268</td>
<td>1.44</td>
</tr>
<tr>
<td>2008</td>
<td>4324</td>
<td>5.92</td>
<td>231</td>
<td>1.23</td>
</tr>
<tr>
<td>2009</td>
<td>4324</td>
<td>5.96</td>
<td>251</td>
<td>1.33</td>
</tr>
<tr>
<td>2010</td>
<td>4045</td>
<td>5.49</td>
<td>208</td>
<td>1.10</td>
</tr>
<tr>
<td>2011</td>
<td>3835</td>
<td>5.07</td>
<td>183</td>
<td>0.97</td>
</tr>
<tr>
<td>2012</td>
<td>3750</td>
<td>5.02</td>
<td>179</td>
<td>0.95</td>
</tr>
<tr>
<td>2013</td>
<td>3685</td>
<td>4.81</td>
<td>287</td>
<td>1.58</td>
</tr>
<tr>
<td>2014</td>
<td>3524</td>
<td>4.54</td>
<td>278</td>
<td>1.47</td>
</tr>
<tr>
<td>2015</td>
<td>At the accident 3831</td>
<td>9.56</td>
<td>573</td>
<td>3.03</td>
</tr>
<tr>
<td></td>
<td>30 d after 3699</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>At the accident 3807</td>
<td>9.15</td>
<td>408</td>
<td>2.63</td>
</tr>
<tr>
<td></td>
<td>30 d after 3807</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>At the accident 3534</td>
<td>9.19</td>
<td>506</td>
<td>2.66</td>
</tr>
<tr>
<td></td>
<td>30 d after 3893</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>At the accident 3368</td>
<td>8.14</td>
<td>485</td>
<td>2.42</td>
</tr>
<tr>
<td></td>
<td>30 d after 3307</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>At the accident 2524</td>
<td>6.58</td>
<td>410</td>
<td>2.13</td>
</tr>
</tbody>
</table>

1 Until 2015, only includes deaths at the accident scene; however, since 2015, it also includes deaths within 30 days.
2 Until 2015, only includes deaths at the accident scene; however, since 2015, it also includes deaths within 30 days.

Fatality rates are calculated according to 100 000 population of relevant age group.
peak in 2015, when there were significant increases. It should be stated that the addition of gendarmerie data to the number of deaths under age 15 years since 2013 and the implementation of the 30-day follow-up process since 2015 have been effective in these increases. In 2016, there was a significant decrease in the child fatality rate compared to 2015. Starting from 2018, the child fatality rate started to decrease again.

The age factor

Between 2006 and 2019, 66.06% of 4614 children who died from RTIs in Turkey were aged 0–9 years, and 33.94% were aged 10–14 years. In all years examined, the number of children aged 0–9 years who died from RTIs was higher than the number aged 10–14 years (Table 2). Data for 2006 for children aged 0–9 and 10–14 years could not be obtained from TurkStat and are not included in Table 2. Table 2 shows that the fatality rates due to RTIs in the 14 years were close to each other for both age groups. However, the number of deaths in children aged 0–9 years was almost twice that in children aged 10–14 years.

The gender factor

Boys constituted 51.32% of children aged 0–14 years in 2019 in Turkey, and girls 48.68%. Although the population of boys and girls was almost equal, the former were more likely to be involved in RTAs. Between 2006 and 2019, 63.0% of 4614 children who died from RTIs in Turkey were male and 37.0% were female. More boys than girls died from RTIs in all years studied (Table 3). Table 3 shows that boys aged 10–14 years had the highest risk in terms of RTAs. The fatality rate for boys aged 0–9 and 10–14 years was higher than that for girls of the same age. The fatality rate for girls aged 0–9 years was higher than that for girls aged 10–14 years. In contrast, the fatality rate for boys aged 10–14 years was higher than that for boys aged 0–9 years.

Types of road users

Between 2006 and 2019, 6.65% of 4614 children aged <15 years who died from RTIs were drivers, 41.31% pedestrians and 52.04% passengers (Table 4). In all years studied, most children who died were passengers, followed by pedestrians. The highest number of children who died from RTIs between 2006 and 2019 were male pedestrians aged 0–9 years, followed by male passengers of the same age. This shows that male pedestrians aged 0–9 years were at higher risk of death in RTAs than other age groups and road user types. The highest number of girls who died from RTIs between 2006 and 2019 were passengers aged 0–9 years, followed by pedestrians of the same age. For both genders, more passengers and pedestrians aged 0–9 years died than those aged 10–14 years. There were fewer children who died as drivers than as passengers and pedestrians in both genders and both age groups. Boys who

| Table 2 Road traffic deaths and fatality rates by age in Turkey |
| --- | --- | --- | --- | --- |
| No. of deaths | Age 0–9 yr | Age 10–14 yr | Age 0–9 yr | Age 10–14 yr |
| 2007 | 179 | 89 | 1.46 | 1.39 |
| 2008 | 151 | 80 | 1.23 | 1.24 |
| 2009 | 167 | 84 | 1.35 | 1.29 |
| 2010 | 131 | 77 | 1.06 | 1.17 |
| 2011 | 114 | 69 | 0.93 | 1.05 |
| 2012 | 120 | 59 | 0.97 | 0.91 |
| 2013 | 202 | 95 | 1.62 | 1.49 |
| 2014 | 181 | 97 | 1.44 | 1.55 |
| 2015 | 186 | 85 | 3.04 | 3.02 |
| 2016 | 159 | 101 | 2.59 | 2.59 |
| 2017 | 156 | 122 | 2.82 | 2.58 |
| 2018 | 156 | 112 | 2.46 | 2.41 |
| 2019 | 151 | 95 | 2.36 | 2.02 |

Until 2013, only includes deaths in traffic police responsibility area; however, since 2013, it also includes deaths in the gendarmerie responsibility area. Fatality rates are calculated according to 100 000 population of relevant age group.
died as drivers significantly outnumbered girls in both age groups.

**Urban/rural roads**

Between 2006 and 2019, 54.72% of 4614 children aged <15 years died on urban roads and 45.28% on rural roads (Table 5). In some years, the number of children aged <15 years who died on rural roads was higher, while in other years, more children died on urban roads. However, the number of children who died from RTIs on urban roads increased significantly from 2015 to 2017. Children aged <15 years died mostly as pedestrians on urban roads but as passengers on rural roads. The number of children aged <15 years who died as drivers on urban roads is striking.

**Discussion**

The current study clearly highlighted that children aged <15 years who died from RTIs is a significant health burden for Turkey. In Turkey, as a result of the inclusion of gendarmerie data in the statistics since 2013 and 30-day follow-up process since 2015, there has been an increase in child deaths due to RTIs. However the number of deaths has tended to decrease compared with before 2000. Improvements in the road infrastructure, enforcement of penalties, traffic safety education targeting, social responsibility projects for traffic safety, development in vehicle technologies, and the widespread use of intelligent transport systems have had an impact on these decreases (16).

In Turkey, the fatality rate from RTIs in children aged 0–14 years was 1.41 in 2006 and rose to 2.13 in 2019. In comparison, for 2016, this rate was 0.82 for 27 EU countries (17), 2.04 for the United States of America (USA) and 0.52 for Japan (18). According to WHO, Africa has the highest rate of deaths in children aged <18 years, with 15.6 fatalities per 100,000 population. This region is followed by the Eastern Mediterranean (11.2), Americas and South-East Asia (6.9), Western Pacific (5.7) and Europe (5.6) (6). According to Environmental Health Intelligence New Zealand, the fatality rate from RTIs in children aged 0–14 years decreased from 2.6 in 2006 to 1.4 in 2016 (19). According to the Australian Institute of Health and Welfare, in 2018 the fatality rate among children aged 0–14 years was higher than halfed between 2009 and 2018 (1.7 to 0.7 per 100,000) (20).

In the current study, the number of children aged 0–9 years who died from RTIs was higher than the number aged 10–14 years, but the fatality rates per 100,000 were close to each other in the 2 age groups. This differs from the World Report on Child Injury Prevention Report 2008. This report found that the fatality rate per 100,000 due to RTIs for children aged 1–4 and 5–9 years was higher than in children aged 10–14 years in low- and middle-income countries, while it was lower than in children aged 10–14 years in high-income countries (3). Again, unlike our findings, in Australia, the fatality rate from RTIs in children aged 10–14 years was higher than in children aged 0–4 and 5–9 years (20). According to the Reducing Child Deaths on European Roads Report, 30.0% of deaths from RTIs in children aged <18 years between 2014 and 2016 in 27 EU countries occurred in children aged 0–9 years, while 20.0% occurred in those aged 10–14 years. Children aged 10–13 years had a higher fatality rate than those aged 5–9 years, especially since they were more likely to have been unaccompanied on school trips (17).

In Turkey, it is more likely for boys to put themselves at risk than girls. Observational studies have reported that boys are more likely to run near traffic (21), to play...
Fatality rate of girls aged 0–9 years was higher than in boys. Additionally, the girls were at higher risk of fatality from RTIs. Additionally, the girls were at higher risk of fatality from RTIs. Furthermore, the fatality rate in children aged < 15 years was higher in boys than girls. The report states that boys were involved in traffic accidents almost twice as often as girls (3,6). Similarly, according to the European Report on Child Injury Prevention Report, the death rates of boys aged < 15 years due to RTIs was higher than for girls (10). Of the 630 children who died in 27 EU countries in 2016, 37.0% were girls and 63.0% were boys (24). In the USA between 1996 and 2006, 57.0% of deaths of children aged < 16 years due to RTIs were in boys and 43.0% in girls (25), while between 2010 and 2017, 56.0% of deaths of children aged < 15 years from RTIs were in boys and 44.0% in girls (26). In Lithuania, among children aged 0–14 years who died from RTIs during 1971–2010, boys died almost twice as often as girls (27). In Poland, during 2010–2014, boys died more often than girls (28). In China in 2014, boys had a higher risk of traffic accidents than girls had (29). In the current study, among children aged 0–14 years, boys were at higher risk of fatality from RTIs. Additionally, the fatality rate of girls aged 0–9 years was higher than in those aged 10–14 years, whereas the fatality rates of boys aged 10–14 years was higher than in those aged 0–9 years.

In the current study, 6.65% of children aged < 15 years who died from RTIs were drivers, 52.04% passengers and 41.31% pedestrians. In Turkey, 42.40% of drivers and 31.0% of front seat passengers wear seatbelts within cities but outside the city, these rates are 61.50% and 52.20%, respectively (30). Although the use of seatbelts by drivers and front seat passengers has increased over the years, seatbelt use by rear passengers is still too uncommon. Likewise, the rate of use of child seats is also low.

In all the years studied, we found that child passengers were the type of road users who lost their lives most often, followed by pedestrians. There is a similar situation in the 27 EU countries, where > 8000 children have died in RTAs in the last decade. Half of the 630 children who died in the EU in 2016 were passengers, one third pedestrians, and 13.0% cyclists (4,17,31). According to Ten Strategies for Keeping Children Safe on the Road Report, 38.0% of the children (aged < 19 years) who died in RTAs worldwide were pedestrians and 36.0% were passengers in 2010 (6). The remaining children who died on the roads each year were cyclists and motorcycle drivers (20.0%) who did not use helmets and children who drove vehicles (7.0%) (6). According to an assessment based on income, the proportion of children injured as pedestrians in high-income countries is 5.0–10.0%, while this increases to

### Table 4: Road traffic deaths by road user, by gender and age groups in Turkey

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>0–9 yr</th>
<th>10–14 yr</th>
<th>0–9 yr</th>
<th>10–14 yr</th>
<th>0–9 yr</th>
<th>10–14 yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>driver</td>
<td>Boys</td>
<td>Girls</td>
<td>Boys</td>
<td>Girls</td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td>2006</td>
<td>7</td>
<td>2</td>
<td>13</td>
<td>0</td>
<td>43</td>
<td>49</td>
</tr>
<tr>
<td>2007</td>
<td>4</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>46</td>
<td>50</td>
</tr>
<tr>
<td>2008</td>
<td>6</td>
<td>1</td>
<td>10</td>
<td>0</td>
<td>40</td>
<td>44</td>
</tr>
<tr>
<td>2009</td>
<td>6</td>
<td>1</td>
<td>10</td>
<td>0</td>
<td>49</td>
<td>43</td>
</tr>
<tr>
<td>2010</td>
<td>6</td>
<td>1</td>
<td>12</td>
<td>0</td>
<td>39</td>
<td>42</td>
</tr>
<tr>
<td>2011</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>2012</td>
<td>2</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>34</td>
<td>24</td>
</tr>
<tr>
<td>2013</td>
<td>5</td>
<td>0</td>
<td>12</td>
<td>1</td>
<td>58</td>
<td>42</td>
</tr>
<tr>
<td>2014</td>
<td>5</td>
<td>0</td>
<td>14</td>
<td>0</td>
<td>51</td>
<td>38</td>
</tr>
<tr>
<td>2015</td>
<td>13</td>
<td>0</td>
<td>25</td>
<td>2</td>
<td>107</td>
<td>73</td>
</tr>
<tr>
<td>2016</td>
<td>11</td>
<td>3</td>
<td>27</td>
<td>3</td>
<td>93</td>
<td>63</td>
</tr>
<tr>
<td>2017</td>
<td>8</td>
<td>0</td>
<td>20</td>
<td>0</td>
<td>90</td>
<td>69</td>
</tr>
<tr>
<td>2018</td>
<td>6</td>
<td>0</td>
<td>20</td>
<td>1</td>
<td>89</td>
<td>77</td>
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<tr>
<td>2019</td>
<td>5</td>
<td>1</td>
<td>20</td>
<td>1</td>
<td>78</td>
<td>56</td>
</tr>
</tbody>
</table>

Total No. of deaths

<table>
<thead>
<tr>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>94</td>
<td>213</td>
</tr>
</tbody>
</table>

### Note

Until 2013, only includes deaths in traffic police responsibility area; however, since 2013, it also includes deaths in the gendarmerie responsibility area.

Until 2013, only includes deaths in traffic police responsibility area; however, since 2013, it also includes deaths within 30 days.
Research article

Table 5. Road traffic deaths by accident location in Turkey

<table>
<thead>
<tr>
<th>Age</th>
<th>No. of deaths</th>
<th>Boys</th>
<th>Girls</th>
<th>Urban roads</th>
<th>Rural roads</th>
<th>Pedestrian</th>
<th>Driver</th>
<th>Passenger</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–9</td>
<td>699</td>
<td>165</td>
<td>54</td>
<td>225</td>
<td>47</td>
<td>38</td>
<td>35</td>
<td>28</td>
</tr>
<tr>
<td>10–14</td>
<td>258</td>
<td>55</td>
<td>20</td>
<td>100</td>
<td>58</td>
<td>12</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>15–19</td>
<td>60</td>
<td>14</td>
<td>2</td>
<td>24</td>
<td>36</td>
<td>4</td>
<td>14</td>
<td>0</td>
</tr>
</tbody>
</table>

Until 2015, only includes deaths at the accident scene; however, since 2015, it also includes deaths within 30 days.

In the current study, the number of children aged 0–15 years died was 7.0% on highways, 33.0–40.0% in low- and middle-income countries. However, in Turkey, 6.5% of children and pedestrians were aged 0–9 years, and pedestrians were a greater percentage of passengers than drivers. In Victoria, Australia, the most frequent location of deaths were on roads, and 99.5% of deaths were on roads. In Lithuania, in 2016, 60% of deaths were on roads, and 75.0% of deaths were on roads.

In Turkey, among children aged 0–17 years, 5.0–7.0% were drivers, 7.0% were drivers, and 7.0% were drivers. In Victoria, the most common location of deaths were on roads, and 75.0% of deaths were on roads. In Lithuania, in 2016, 60% of deaths were on roads, and 75.0% of deaths were on roads.

In Turkey, among children aged 0–17 years, 5.0–7.0% were drivers, 7.0% were drivers, and 7.0% were drivers. In Victoria, the most common location of deaths were on roads, and 75.0% of deaths were on roads. In Lithuania, in 2016, 60% of deaths were on roads, and 75.0% of deaths were on roads.
Charge de mortalité liée aux traumatismes dus aux accidents de la circulation chez les enfants âgés de 0 à 14 ans en Turquie

Résumé

Contexte : Les traumatismes dus aux accidents de la circulation chez les enfants constituent un problème de santé publique majeur dans le monde entier. Il est essentiel de disposer d’informations fiables et valides sur ces accidents pour réduire le nombre de décès.

Objectifs : Déterminer la charge de mortalité liée aux traumatismes dus aux accidents de la circulation chez les enfants âgés de 0 à 14 ans entre 2006 et 2019 en Turquie.


Résultats : Le taux de létalité des accidents de la circulation pour 100 000 enfants âgés de 0 à 14 ans est passé de 1,41 en 2006 à 2,13 en 2019. Ce taux chez les garçons âgés de 0 à 9 ans et de 10 à 14 ans était supérieur à celui observé chez les filles du même âge. Chez les filles âgées de 0 à 9 ans, ce taux était plus élevé que chez les filles de 10 à 14 ans. Le taux de létalité des garçons âgés de 10 à 14 ans était plus important que celui des garçons âgés de 0 à 9 ans. Parmi les enfants décédés suite à des traumatismes dus à des accidents de la circulation, 6,65 % étaient des conducteurs, 41,31 % des piétons et 52,04 % des passagers. Les enfants ont perdu la vie principalement en tant que piétons sur les routes urbaines et en tant que passagers sur les routes rurales.

Conclusion : Les décès d’enfants causés par des traumatismes dus à des accidents de la circulation constituent une charge sanitaire importante en Turquie.

Funding: None.

Competing interests: None declared.
النتائج: هدفت هذه الدراسة إلى تحديد عدد إماتة الأطفال الذين تراوح أعمارهم بين 0 و 14 سنة من الفترة من 2006 وحتى 2019 في تركيا. جلبت الدراسة ارتفاع معدل إماتة الفتيات اللواتي تتراوح أعمارهن من 0 إلى 14 سنة أعلى من معدل إماتة الفتيان الذين تتراوح أعمارهم ب 14 سنة. وكان معدل إماتة الفتيات الذين تراوح أعمارهم بين 0 و 9 سنوات أعلى من معدل إماتة الفتيان الذين تراوح أعمارهم بين 0 و 9 سنوات. ومن بين الأطفال الذين توفوا بسبب الإصابات الناجمة عن حوادث الطرق، كان 65% من الساقطين، و 41.3% من الشاة، و 52.4% من الركاب. وفقد الأطفال حياتهم في الغالب في حال كانوا مشاةً على الطرق الحضرية، ورُكابًا على الطرق الريفية.

الاستنتاجات: تُعدّ وفاة الأطفال بسبب الإصابات الناجمة عن حوادث الطرق عبئًا صحيًا كبيرًا في تركيا.

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Domestic violence against women, Islamic Republic of Iran: a grounded theory study

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Abstract

Background: Although a silent phenomenon, violence against women has been well studied. Such violence is a universal problem with different regional and cultural patterns; it imposes heavy costs on society.

Aims: This study aimed to assess the circumstances and features of domestic violence against women in Mashhad, Islamic Republic of Iran.

Methods: This was a qualitative study using the grounded theory approach. Individual semi-structured interviews were held with 24 purposely selected women who had experienced domestic violence and who had gone to the Legal Medicine Organization of Mashhad for help. Data were analysed according to grounded theory.

Results: From analysis of the interview data, seven main categories emerged: risk factors of violence; protective factors against violence; excuses for violence; behavioural and cultural challenges in men; inevitable adjustment; escalation of violence; and presenting to legal medicine organizations. Constant comparative analysis of the data led to the identification of inevitable adjustment as the core variable of the study.

Conclusions: Inevitable adjustment was the main strategy of women to deal with domestic violence against them. Promoting respect for the universal human rights of women, strengthening the network of services and social support for women and enforcing legal protection are necessary to reduce violence against women.

Keywords: domestic violence, risk factors, protective factors, grounded theory, Iran

Introduction

Violence is a legal, health and human problem at the international level. Women who are subjected to violence feel extremely humiliated irrespective of their race, age, ethnicity and nationality (1). According to the World Health Organization (WHO), violence against women affects 30% of women across the world (2). The problem of violence against women is closely associated with sociocultural variables and goes beyond geographical, religious and socioeconomic boundaries (3). Women are not the only victims of violence; children of mothers subjected to violence also feel anger, discomfort and shame. These children are highly vulnerable to abuse and may also attack others. According to an annual report by the United Nations Children’s Fund, US$ 5–10 billion are directly spent by governments in dealing with domestic violence in the United States, while the cost is more noticeable in developing countries (4).

Although the problem of violence against women is universal, it has regional and cultural patterns and often remains secret (5). This type of violence is as a public health problem in view of the consequences on women’s reproductive health and physical and mental health. Research suggests violence is associated with physical damage, chronic fear syndrome, disabilities, suicide, homicide, sexual harassment, pregnancy complications, severe depression, and drug abuse (6,7).

A systematic review of 16 studies presented evidence from countries of the East Mediterranean Region on factors associated with physical domestic violence. The findings showed that young age of women at the time of marriage, anger issues in men, belief in the superiority of men and men’s exposure to domestic violence in childhood were predisposing factors to domestic violence. On the other hand, consanguinity, women’s university education and women’s employment in well paid jobs were protective factors (8).

Although a silent phenomenon, violence against women has been much studied and many statistics are available on it (9). A study conducted in Arab and Islamic countries suggests that at least one in three women is subjected to violence by their husbands (10). Review of published evidence found the global prevalence of physical or sexual partner violence among ever-married women to be about 30%, with the highest prevalence (37%) in the African, Eastern Mediterranean and South-East Asia regions (2,11).

As with other countries, the abuse of women is an important public health and social challenge in the Islamic Republic of Iran, where the prevalence of...
domestic violence is estimated to be 66%. In addition, by geographical classification, the prevalence of domestic violence was 70% in the east of the country (12).

Most studies conducted on violence against Iranian women are correlation studies (13). Moreover, given the extent and importance of the problem, a comprehensive and open-minded view is crucial to understanding and resolving domestic violence against women (14). Grounded theory is a powerful research technique for studying social structures and processes in their own context (15). Given the role of sociocultural factors in violence against women and since most of the studies on the subject are quantitative, we aimed to assess the circumstances and features of domestic violence against Iranian women in Mashhad, the capital city of Khorasan Razavi Province in north-eastern Islamic Republic of Iran.

**Methods**

The grounded theory approach was used to identify the hidden social processes and variables that shape and affect domestic violence against women (16,17). Qualitative research is conducted in an actual natural setting (18). In our study, we held interviews at the Legal Medicine Organization of Mashhad because of its ease of access for female victims of violence. This organization is a centre for victimized women to help them deal with legal proceedings and to get the extent of the damage caused by domestic violence investigated by officers. The organization is also responsible for the judgement and expert analysis of forensic affairs and for performing autopsy and laboratory and clinical tests requested by competent judicial authorities.

To collect data, we used purposive sampling to select individuals who had experienced domestic violence (19). Thus we selected 24 women presenting to the Legal Medicine Organization for domestic violence. Data collection and analysis continued with theoretical sampling to complement and develop a theory (20). The interviews continued until data saturation was reached and no new codes emerged.

We held semi-structured interactive interviews with the participants individually in a quiet and comfortable room at the Legal Medicine Organization. Interviews lasted half an hour to 2 hours depending on the circumstances. First, we asked the participants about their personal details. Then, we used a guiding interview as the primary framework for beginning the interviews. Some of the guiding questions asked included: “Under what exact conditions do you often fall victim to domestic violence?” and “Please describe the conditions under which you have fallen victim to domestic violence”.

The verbal communication between the participants and the interviewer was audio-recorded and promptly transcribed verbatim. All the non-verbal communication was also noted. The data were encoded and analysed according to the Strauss and Corbin approach (17). In the first step, the data obtained from the interview transcripts were broken into small parts as codes. Data similarities and differences were then compared through the constant comparative method. Data were then put in clusters. Categories emerged in the second step of data coding. New data were simultaneously compared with all the existing data to identify an optimal core variable. Finally, a theory describing participants’ experience of domestic violence was generated and a core variable was chosen during the selective coding stage. The transcribed interviews filled 120 pages and led to the identification of seven main categories.

To ensure data robustness and accuracy, we used maximum variation sampling (18). We dedicated enough time to data collection and held more than one interview with each participant if necessary. We also ensured interviewers built a good rapport with the participants and performed external checks, member checks and peer checks (18).

**Ethical considerations**

We registered the study with the Legal Medicine Organization of Mashhad. The Iranian Legal Medicine Research Centre approved the research (code 2820). We obtained written informed consent from the participants, ensured confidentiality of the data and anonymity of the participants (using codes to identify them), allowed participants to withdraw from the study at their own discretion and provided the participants with the results of the study on their request.

**Results**

**Participants’ personal details**

Of the 24 women who participated in this study, 5 were aged 17–20 years, 9 were 21–30 years, 6 were 31–40 years and 4 were 41–44 years. Two women had previously been married and 21 were in their first marriage. One woman was single and had been subjected to violence by her brother and the rest were married and had been subjected to violence by their husband. Their duration of marriage was between 6 months and 23 years, with a mean of 9.5 years. In terms of the level of education, 14 of the women were illiterate, 8 had a high-school diploma and 2 had a university education. Analysis of the data extracted from the interviews resulted in seven main categories and a number of subcategories (Box 1).

**Risk factors of violence**

According to the participants’ experiences, the risk of violence was influenced by: woman’s young age at the time of marriage, woman’s low level of education, woman’s lack of financial independence, man’s exposure to violence in childhood, interference of the spouse’s family in the couple’s life, and low economic status.

In this regard, the husband’s failure to assume responsibility, take care of his wife and children and earn a living for them led to the woman’s exasperation, and when she protested, the husband resorted to violence and fighting. Participant 9, a 29-year-old woman, said, “For 8
Violence was triggered by simple and ordinary issues, such as the husband’s dissatisfaction with the wife’s cooking or the food prepared, housekeeping duties, and woman’s support from her husband’s family. Participant 11, a 37-year-old woman, disclosed that unpaid debts and checks being due were the triggers of violence in her home and said, “Usually he looks for an excuse to beat me when he’s got debts to pay”.

**Behavioural and cultural challenges in men**

Men’s negative personal and behavioural characteristics played a key role in their interactions and relationships with their wives. A husband’s suspicion and mistrust of women, a bad temper, aggressiveness, anger or inability to control one’s anger, and irresponsibility were among the characteristics most of the participants had witnessed in their husband. Participant 2, a 16-year-old woman, said, “My husband wants me to go outside only with him, listen to everything he says, and agree with whatever he says. If I disagree, he only beats or insults me”.

Societal understanding of masculinity, including belief in the superiority of men and that women are part of a man’s property and they have control over women, can lead to violent behaviour and physical and psychological harm to women. Participant 3, a 21-year-old woman, said, “From childhood, men are raised in such a way that they are convinced that they are the superior sex and women should be obedient to men”.

**Inevitable adjustment**

When faced with violence, women first tried to retaliate, but eventually admitted that they could not escape this ugly and unpleasant reality and believed that they had to work hard to keep their marriage. At this stage, they inevitably chose to adjust. They expressed their forced acceptance of violence in their private life with terms such as coercion or desperation. Several factors played a role in women’s inevitable adjustment and eventual “decision” to stay in a violent relationship such as: traditional teachings about the expectations of women in the family, the opinion of others, lack of financial and social support, having a child, and fear of the stigma of divorce.

Traditional teachings hold that women should be calm and patient, do their best to keep their marriage and continue with their married life under all circumstances. Participant 3, a 21-year-old woman, said, “My mother tells me to just go on with my life and that all marriages are the same”.

At times, the fear and sadness the women felt as a result of the opinion of others were deeper than their annoyance with the violence itself. As a result, they tried to hide that they were being subjected to violence to avoid the negative attitudes of other people. Participant 20, a 19-year-old woman, said, “I’ll feel embarrassed if someone finds out I’ve been beaten up or yelled at by my husband. They will blame me and think I’ve been guilty, although I’ve been innocent”.

Lack of financial and social support was another aspect of the inevitable adjustment made by the victims of domestic violence. Participant 5, a 26-year-old woman,
said, "I have to keep my marriage because I have no financial support."

Children were another reason for the women's adjustment to violence and endurance of it. Participant 16, a 23-year-old woman, said, "I'm enduring my husband's violence and living with him just because of my child; I'm living a forced life".

Fear of the stigma of divorce also led to women enduring domestic violence. Participant 20, a 19-year-old woman, said, "Society's view of divorced women is not good at all. I prefer to tolerate this violent relationship and not be a divorced woman in Iranian society".

**Escalation of violence**

Unilateral violence gradually turned the home into a battlefield. The women felt despondent, weak, helpless, coerced, stressed and anxious as a result of repeated episodes of violence. They felt oppressed and feeble and, whether consciously or unconsciously, sought revenge in an effort to defend at least parts of their rights. They found themselves in a position of frequent and bitter argument with their husband which further fuelled the violence. Participant 15, a 23-year-old woman, said, "We always argue. He beats me up and sometimes even threatens me. Once, there was boiling hot water on the heater and he wanted to pour it over me. So I told him I'd break everything he had into pieces if he did that. I started breaking the dishes and then he hit me on the head with those same dishes and broke my head".

**Presenting to legal medicine organizations**

Women presenting to legal medicine organizations was associated with: an escalation of violence; despair over her husband correcting her behaviour; wish to intimidate and punish the husband and force him to give up his violent acts; woman's wish to restore her rights; and wish to seek legal retaliation. Participant 3, a 21-year-old woman, said, "I came to the Legal Medicine Organization not for blood money or anything else. I came here only to prove that this man has beaten me up and must be penalized".

Sometimes, women presented to legal centres to rescue their children from the violent situation and to collect documents that would serve as evidence to file for divorce. Participant 11, a 37-year-old woman, said, "He used to beat me constantly and I overlooked it all. Until now when I found that my daughter would also be in danger if I overlooked [his violence] again. I had to come here [the LMO]".

The violation of the basic human rights and dignity of women at home was another reason discussed by the participants. Participant 3 also said, "I felt that my character was being severely damaged if I didn't come to the legal medicine organization and court".

Sometimes, women presented to legal centres out of fear of their husband acting on their threats and their life being in danger. Participant 15 also said, "I have to come to defend myself and my life now, so he won't let himself easily push me again or hit me in the mouth and fill my mouth with blood".

**Discussion**

We conducted our study to explain the process of domestic violence against women in Mashhad, Islamic Republic of Iran. The constant comparative analysis of the data revealed inevitable adjustment as the core variable of the study.

According to the participants, violence is rooted in the cultural context in which the individuals live. In Ghana, gender discrimination, traditional norms, women's vulnerability to gender-based oppression and power-oriented behaviours by men were also proposed as the cultural and traditional causes of violence against women (21), which is consistent with our findings. Patriarchal ideas and beliefs have also been proposed as a significant underlying cause of violence against women in the neighbouring country of Turkey (22). In a study conducted in Nigeria, most Nigerian women admitted to the adverse effects of their husband's violence on their health, but believed that the husband has the right to control his wife and that she must obey him at all times (23).

In addition to the underlying factors of violence, excuses would also be given for the violence. According to the participants, these excuses were sometimes the economic problems the family was facing, interference of relatives on both sides (husband's and wife's), or dissatisfaction with how the wife handled housekeeping duties. Socioeconomic turmoil, alcohol consumption (2), low income and husband's low level of education (24), economic problems (11), dissatisfaction of the mother-in-law in the case of Taiwanese women (25) and encouragement by relatives to resort to domestic violence (26) were identified as common causes of violence against women that led to escalation of domestic violence.

The relationship between a woman's education and employment and the degree of domestic violence to which she is subjected does not seem to be a simple linear one. Women with higher levels of education and a greater wealth were less likely to be subjected to domestic violence by their husband in Spain and Malaysia (9), which is consistent with the statements made by the participants of our study. In contrast, in a study on violence against female university professors found that having higher education was not enough to protect women from domestic violence (27). In fact, studies have found that increased income and financial independence in women escalated violence against them in Turkey and Ghana, as their husbands felt they had lost their authority at home (21,27).

According to our participants, repeated violence had made the home a place for the husband to demonstrate power and force the wife to execute his irrational commands. A WHO study examined the different types of violence existing and found that violence often arises
out of a need for power, and to control one's wife and exert one's masculinity (2).

Our participant endured violence for different reasons. Sometimes, this endurance went on for a long time and would become intolerable. Fear of the stigma of divorce and the result of non-compliance, and believing in the need for endurance to keep the family together and support the children can be effective in escalating violence and exacerbating its consequences. The notion in some cultures that violence is a private family matter is problematic. For instance, in Ghana, physical aggression of the husband is considered normal behaviour and many women avoid discussing it due to their feelings of shame. Even sexual abuse and harassment between a couple are not defined as violence in the Ghanaian culture (21). In line with the Ghanaian study, a study on Japanese women living in the United States identified cultural factors and institutionalized values such as patience in relation to the family to save face, avoidance of conflict, and cohesion and preservation of the family's unity as the most significant factors inhibiting women from recognizing their husband's behaviour as aggressive and causing them to counteract the efforts made by others to help them (28).

We found that mothers endured their husband's violence because he was the father of their children and they made efforts to preserve their family unit, even at the expense of possible adverse consequences for the children. Witnessing violence against their mothers can damage children and they are the silent victims. They are at risk of two threats: witnessing traumatic events and physical harm to themselves (11).

Violence against women is a violation of universal human rights and a global public health concern, and has several destructive health and social consequences. Therefore, prevention of this devastating phenomenon is a necessity, not only to protect women but also society overall. Violence against women should be prevented and tackled by: strengthening the network of services and social support for women and girls; empowering women through education and economic independence; correcting negative social beliefs and attitudes that value violent masculinity and the inferiority and submission of women; working with religious leaders to spread awareness of religious statements and notes by religious leaders (for example, Imam Baqir) that criticize violence against women and emphasize love and respect for women; and by enacting laws that allow perpetrators of violence against women and girls to be punished.

Conclusion

In this study, most of the participants had selected inevitable adjustment as their solution to domestic violence. Improving public and social support for women, promoting respect for the universal human rights of women, enforcing legal protection and putting further penalties on men who mistreat their family appear necessary to reduce domestic violence against women. Future research is recommended to develop actions to improve the life skills of families (particularly problem-solving skills) and empower women to defend their rights.

Acknowledgement

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Competing interests: None declared.

Violence domestique à l'égard des femmes en République islamique d'Iran : étude théorique ancrée

Résumé

Contexte: Bien qu'il s'agisse d'un phénomène silencieux, la violence à l'égard des femmes a été bien étudiée. Ce type de violence constitue un problème universel présentant des caractéristiques régionales et culturelles différentes ; il impose des coûts importants à la société.

Objectifs: La présente étude visait à évaluer les circonstances et les caractéristiques de la violence domestique à l'égard des femmes à Mashhad (République islamique d'Iran).

Méthodes: Il s'agissait d'une étude qualitative reposant sur la méthodologie de la théorie ancrée. Des entretiens individuels semi-structurés ont été menés auprès de 24 femmes sélectionnées à dessein qui avaient été victimes de violence domestique et qui s'étaient rendues à l'organisme de médecine légale de Mashhad pour obtenir de l'aide. Les données ont été analysées selon la théorie ancrée.
References


Misuse of prescription drugs and other psychotropic substances among university students: a pilot study

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Abstract

Background: Prescription drug abuse has emerged as the fastest growing problem globally. While people of all ages suffer from the harmful effects, the impact on the health of young people and their quality of life constitutes a significant public health problem.

Aims: To estimate the prevalence of the use of prescription drugs and other substances among university students

Methods: An online survey method was used. The tools were distributed in 2019 to 794 university students at Aden University in Yemen 48.2% (n = 383) and King Khalid University in Saudi Arabia 51.8% (n = 411). Students answered the Drug Abuse Screening Test (DAST-10), and a questionnaire on drug and substance abuse.

Results: The overall prevalence of low, moderate, substantial and severe on the DAST-10 scale was 27.2%, 10.5%, 2.1% and 0.8%, respectively. The prevalence of sedative misuse among university students was high (12.5%) and the differences between Yemeni and Saudi Arabian students in prescription drug and sedative misuse were significant. Female students were significantly lower than males on the DAST-10 scale. About 3% of the Yemenis were abusing diazepam, while over 31% of Saudi Arabians were abusing inhalants.

Conclusions: Our findings highlight the differences between university students in Yemen and Saudi Arabia misusing prescription stimulants and sedatives and the inhalation of volatile substances.

Keywords: non-medical drug use, prescription drugs, substance abuse, addiction, university students

Introduction

The non-medical use of prescription drugs and substance abuse among university students is a complex, dangerous and widespread phenomenon (1,2). It is a source of great concern in modern society (3). Prescription drug abuse has emerged as the fastest growing problem consuming globally expending huge efforts for control (4,5). While people of all ages suffer from the harmful effects of the misuse of prescription substances, the impact on the health of young people and their quality of life constitutes a public health problem that has a significant impact on health and society (6), including instances of accidental death (5). Students who abuse prescription substances face many problems in terms of social relationships and may experience difficulty in thinking, attention and memory (7). In addition, the misuse of prescription substances has long-term effects and is associated with many risks, including poor health, quality of life (6) and sleep (8), as well as suicide, depression, personality disorders (9), economic and social burdens placed on the family and society and poor performance (10).

Modern society has an interest in protecting young people from the misuse of drugs and other psychotropic substances because they are the creative energy in society and are highly motivated to work for change and progress. Nowadays, prescribed stimulant abuse, non-medical drug use and use of inhalants among young people, especially university students, has become a global public health concern: research is required in areas related to counselling, protection and treatment, including the development of knowledge of the misuse of prescription substances and the consequences.

There have been many assertions that we need accurate data to build prevention and treatment initiatives in modern communities (5). This is what stands behind many studies aimed at exploring the dangers of addiction and the prevalence of prescribed substances among university students. These studies seek to investigate factors attributable to misuse of prescription substances (11), such as the influence of the cultural or economic context. In this regard, it has been found that university students are the population that is most vulnerable to the risk of substance abuse and addiction-related problems. For example, Kounenou found that 47% of Greek university students used cannabis, 1.4% club drugs, 0.6% tranquilizers and 1.8% cocaine (3).

The high prevalence of prescription stimulant use among university students may be a result of to the influence of friends, lifestyle features at the university (2), and the fact that some students have the misconception...
that using prescription stimulants helps them improve their academic performance (12). The rate of non-medical use of prescription stimulants among American university students has been reported as 18.8% (13), and in other research 62% of students reported that they had been offered a prescription enhancement at least once during their college lives (14), 6.7% reported a current use of medical steroids, and 5.8% reported misuse in the past (15). In an Italian study, 11.3% of the university students reported non-medical use of cognitive enhancers, and this increased to 73.5% among students aged 18–22 years (16). In another study from Italy, 74.7% said they used substances to improve cognitive function (17). In other studies, the proportion of students who used stimulant drugs was estimated to be 17% (18), and the non-medical use of prescription stimulants was 6.7% (15).

However, despite global prevention programmes and ongoing efforts to control the spread of non-medical use of prescription and other psychotropic substances, problems caused by the high rate of substance addiction among university students remain important issues in the Middle East and other developing countries (19). There are assertions that cultural aspects of the Middle East, such as smoking hookah and narghile, may lead to addiction to certain types of drugs (19,20) and that the addiction of some young people to drugs belonging to the benzodiazepine group (especially diazepam) is the result of chewing khat, particularly in Yemen (21).

Therefore, understanding the deterioration in the situation regarding prescription substance abuse and its associated behaviours, including fundamental differences in how individuals behave during the phases of abuse, is important to predict the prevalence rates among university students (22) and to develop new intervention and response programmes. Unlike in many countries, there have been few epidemiological studies in Yemen and Saudi Arabia on the misuse of prescription and other psychotropic substances, particularly stimulants, among university students.

This study examines the prevalence of non-medical use of prescription stimulants and other substances abused by university students, including sedatives, over-the-counter medications and inhalants.

Methodology

Sample

The study sample consisted of 794 students at undergraduate level. They were randomly selected from 2 large universities: 48.2% (n = 383) from the University of Aden (Yemen) and 51.8% (n = 411) from King Khalid University (Saudi Arabia). We informed students that participation is voluntary, that their information is confidential, and that answering to the questionnaire was considered as expressed written consent.

The University of Aden in Yemen was chosen because it is far from military confrontations, and it is the second largest university in terms of numbers of students, faculties and academic programmes. While King Khalid University is ranked fifth largest among the universities in Saudi Arabia, it was chosen as it is the largest university in the southern region bordering Yemen, where there is a similarity between the citizens of the 2 countries in habits and traditions.

Instruments

The following tools were used in this study:

- The Drug Abuse Screening Test (DAST-10) (23) is a self-report measure of drug abuse assessment. The version of this test consists of 10 items, responded to with “yes” or “no.” The final score ranges between 0–10 (0 = no problems reported, 1–2 = low level, 3–5 = moderate level, 6–8 = substantial level, and 9–10 = severe level). The DAST-10 has been used in a number of previous studies and has been reported to have good psychometric properties.

- A questionnaire on drug and substances abuse was prepared by the researcher to assess the prevalence of the abuse of drugs and other psychotropic substances among university students. The initial form of the questionnaire was presented for review by mental health experts at the university. The final form of this questionnaire consisted of 18 items asking about the use of drugs and other substance abuse.

Demographic variables included age, sex, marital status, college, and year of study.

We would like to clarify that the tools used in this research cover drug use, non-medical use of drugs, such as diazepam, and the misuse of psychoactive substances, such as inhalants, tranquilizers and pain and fever relievers.

Procedures

This study was approved by the Deanship of Scientific Research of Aden University in Yemen (Ref 2013/311) and King Khalid University in Saudi Arabia (Number 28423). All students gave written consent with the questionnaire, and all responses were anonymous.

The questionnaire was distributed by the administrative communications unit: 1380 students at the 2 universities were contacted via email and 794 responded, a response rate of 57.5%. The study tools were applied before the end of the first semester, between 11 November and 18 December 2019.

The analysis was not pre-registered and thus the results should be considered exploratory.

Results

Of the 794 university students participating in the study, 46.6% (n = 370) were female and 48.2% (n = 383) were Yemeni (Table 1). They were distributed over 10 colleges, faculties and academic programmes. While King Khalid University is ranked fifth largest among the universities in Saudi Arabia, it was chosen as it is the largest university in the southern region bordering Yemen, where there is a similarity between the citizens of the 2 countries in habits and traditions.
In this study, for DAST-10 Cronbach’s alpha was 0.779, and 0.555 in split-half reliability (Spearman–Brown coefficient equal length = 0.714); internal consistency was 0.549–0.648 and all correlation coefficients were statistically significant ($P < 0.05$). For the drug and substances abuse questionnaire, Cronbach’s alpha was 0.794 and split-half reliability was 0.423 (Spearman–Brown coefficient equal length = 0.594); the internal consistency coefficients ranged between 0.212 and 0.616 and the correlation coefficients were statistically significant ($P < 0.05$).

Table 2 presents the prevalence rate of non-medical drug use among students with a comparison between students of the 2 countries. It is clear that the students who misuse prescription drugs, according to their assessment in the last 4-level scores of the DAST-10 (low, moderate, substantial, severe) had a percentage of 40.6%, and the differences between the 2 countries in terms of the scale of drug use were statistically significant ($P < 0.05$). There were also significant differences between Yemen and Saudi Arabian students in the total score of DAST-10 scale, as the mean of Yemeni students was higher than the Saudi Arabian students ($P < 0.05$).

The differences between male and female students on the DAST-10 scale are shown in Table 3: As per table 3. The differences between male and female students on the DAST-10 scale were significant (in the total sample only, not in the samples of Yemeni or Saudi Arabian students separately). There were more males than females at all severity levels of the DAST-10 scale, and the differences were significant at the 0.05 level.

In both countries, 12.5% ($n = 99$) of students stated that they used sedatives without a medical requirement, and the differences between the 2 countries in misuse of sedatives was statistically significant ($\chi^2 = 43.71; P < 0.05$).

It was also found that 2.9% ($n = 11$) of Yemeni students were taking diazepam with khat and that 31.4% ($n = 129$) of Saudi Arabians enjoyed inhaling volatile substances.

### Table 1: Sociodemographic characteristics of participants, university students in Yemen and Saudi Arabia, 2019

<table>
<thead>
<tr>
<th>Variable</th>
<th>Yemen sample (n = 383)</th>
<th>Saudi Arabian sample (n = 411)</th>
<th>Total (n = 794)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>214 (27.0)</td>
<td>210 (26.4)</td>
<td>424 (53.4)</td>
</tr>
<tr>
<td>Female</td>
<td>169 (21.3)</td>
<td>201 (25.3)</td>
<td>370 (46.6)</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>337 (42.4)</td>
<td>379 (47.7)</td>
<td>716 (90.2)</td>
</tr>
<tr>
<td>Married</td>
<td>42 (5.3)</td>
<td>27 (3.4)</td>
<td>69 (8.7)</td>
</tr>
<tr>
<td>Divorced/widowed</td>
<td>4 (0.5)</td>
<td>5 (0.6)</td>
<td>9 (1.1)</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td>21.76 (2.78)</td>
<td>21.25 (2.33)</td>
<td></td>
</tr>
</tbody>
</table>

SD = standard deviation.

### Table 2: Prevalence of non-medical drug use among university students in Yemen and Saudi Arabia, 2019

<table>
<thead>
<tr>
<th>DAST-10 cross tabulation</th>
<th>Yemen</th>
<th>Country</th>
<th>Saudi Arabia</th>
<th>Total</th>
</tr>
</thead>
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<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td><strong>DAST-10</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>No problems</td>
<td>203</td>
<td>25.6</td>
<td>269</td>
<td>33.9</td>
</tr>
<tr>
<td>Low</td>
<td>119</td>
<td>15.0</td>
<td>97</td>
<td>12.2</td>
</tr>
<tr>
<td>Moderate</td>
<td>51</td>
<td>6.4</td>
<td>32</td>
<td>4.0</td>
</tr>
<tr>
<td>Substantial</td>
<td>8</td>
<td>1.0</td>
<td>9</td>
<td>1.1</td>
</tr>
<tr>
<td>Severe</td>
<td>2</td>
<td>0.3</td>
<td>4</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>383</td>
<td>48.2</td>
<td>411</td>
<td>51.8</td>
</tr>
</tbody>
</table>

$\chi^2 = 15.58$  $Df = 4$  $P = 0.004$

<table>
<thead>
<tr>
<th>Total DAST-10 score</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>1154</td>
<td>1.69</td>
<td>0.8443</td>
<td>1.697</td>
<td>2.546</td>
<td>0.011</td>
</tr>
<tr>
<td>%</td>
<td>2.1</td>
<td>10.3</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
</tbody>
</table>

$Df = degrees of freedom.$  
$SD = standard deviation.$
Discussion

The current study is among the first to examine the prevalence of non-medical use of prescription drugs and other substances among university students in Saudi Arabian Arabia and Yemen. And the results indicated the existence of high rates of prescription drug abuse among university students in 2 countries. The students’ grades were distributed at the 5 levels in the DAST-10 differently, more than half were at level 1 (no problems) and more than a quarter were on level 2 (low). At these levels psychiatrists do not recommend any need for treatment for addiction; rather, they advise psychological counselling to address the misuse of medications (24).

Just over 10% of the participants stated a moderate level of non-medical drug use on the DAST-10 scale. This is considered a risk indicator that should concern parents and psychotherapists as students who receive this assessment may develop worsening problems and prescription drug abuse is evaluated as risky behaviour at this level (24). On the other hand, in our participants, prevalence rates were low at the substantial level and very low at the severe level.

According to the National Drug Prevention Project in Saudi Arabia, the prevalence of psychotropic substance use was reported at 17% in residential neighbourhoods where students live, 8.2% in their relatives, 8.3% in the student environment, and the prevalence of psychotropic substances use among students’ friends ranges between 6.8% and 10.9% (25).

Our results are consistent with a number of studies which indicated a high prevalence of non-medical drug abuse among students (26,27). Brandt et al. investigated the prevalence of prescription drugs among university students and they found a high prevalence of using prescription medications for non-medical purposes, e.g. painkillers, stimulants and anti-anxiety medication (26).

While our findings differed from those of some other studies that found low prevalence of non-medical drug use among college students (28,35), Jia et al. reviewed drug prevalence studies among students in China from 2004 to 2013 and found that the prevalence rate of the use of sedatives (hypnotics) in students was 6.10% (28).

Additionally, the statistical analysis revealed significant differences between students of the 2 countries in terms of taking prescription drugs for non-medical purposes. Common explanations include poverty and cultural and social factors causing increases in substance use (29,22). Yemen is classified among the poor countries and Saudi Arabia is among the rich countries; these economic differences play an important role in the differences between the populations in financial capabilities. In this regard, a report on high school students in Italy found an association between drug use and high socioeconomic level, low academic achievement, high rates of school failure and impairment in terms of social coping (31).

Environmental and cultural influences may differently affect males and females and how they respond to prescription drugs abuse and to treatment programmes (30). Our findings showed significant differences between male and female students; males were more likely to use prescription drugs than females. These differences can be explained by the fact that society imposes many restrictions on female mobility compared to males, who obtain a lot of independence and freedom of action. Some research indicates that addiction is both a biological and cultural phenomenon (30), and has demonstrated that addiction and its consequences differ according to sex (32,33). The interactions between biological, social, cultural, environmental, and developmental influences result in gender differences and these can influence reactions to this phenomenon (30). Our results are consistent with the results of Wagner et al., who found significant gender differences in drug use, with men showing a significant increase over women in using tobacco, marijuana, and hallucinogens (34). In a multi-country cross-sectional study among university students in south-east Asian countries, Yi et al. found significant differences between males and females in illicit drug use. Male students were “significantly more likely to be ever users compared to females” (35).

One of the primary goals of this study was to examine the prevalence of sedative abuse among university students. The results showed that the prevalence rate was more than 12% in the 2 countries and this was statistically significantly higher among Saudi Arabian students. Among Yemenis, the prevalence of the misuse of diazepam while chewing khat was low – a level that may not reveal the true extent of the problem as perceived by the local media, but sufficient to serve as a risk indicator based on accurate scientific data.

The high sedative abuse rates among university students may be attributed to the misconception among many young people that prescribed drugs are safer alternatives to other, illegal drugs (36,37). University students might use sedatives to reduce feelings of tension
or to cope with stress or anxiety (27). Daily, university students are exposed to fatigue, exhaustion, stress and anxiety, which lessens their ability to meet academic demands. Consequently, they may search for substances that will help them. The differences between countries in the use of sedatives may be due to the availability of other alternatives for Yemeni students such as chewing khat, while this option is not available for Saudi Arabian students. This highlights the role of cultural factors in this case.

Our results revealed a high prevalence rate of inhalant misuse among Saudi Arabian students: one third of them reported that they enjoy inhaling paints and other chemicals. This is a large and worrying proportion that should prompt appropriate preventive action among agencies concerned with combating substance addiction. There have been few studies in the Middle East on the abuse of sedatives or inhalants. In Lebanon, one study revealed a high prevalence of the non-medical use of sedatives, especially pain relievers (15.1%), among students in the American University of Beirut (20). A study in Sudan found a high prevalence (31%) of substance abuse; current prevalence of the use of cannabis, alcohol, amphetamines, tranquilizers, inhalants, opiates, cocaine and heroin was 4.9%, 2.7%, 2.4%, 3.2%, 1%, 1.2%, 0.7%, and 0.5%, respectively (38). Yi et al. found significant differences in drug use between students in low-middle-income countries and middle–high-income countries; drug use was lower among students from lower-middle-income countries than among students from middle–high-income countries or high-income countries (35).

It is clear from the results of the current study that the prevalence of prescription drug and substance use in university life constitutes a threat to the educational policies that countries pursue to protect young people and make the most of their energies. Due to these challenges. The authorities in both Yemen and Saudi Arabia must develop new policies to deal with such problems.

This study has certain limitations. The respondents might not be representative of all students in the Aden and King Khaled Universities owing to the employment of an online survey method.

A second limitations was that prescription stimulants and substance abuse were self-reported. Students might not disclose their use of drugs or substances abuse, which exposes this study method to the limitations of all self-reported surveys (37). Therefore, the data may not indicate accurate estimates of the problem and its findings cannot be considered illustrative of all students in the 2 universities or of other universities in Saudi Arabia and Yemen. Nevertheless, the responses of the students participating in the study include valid calculations for those who reported non-medical use of prescribed drugs or inhalants as described in the questionnaire and DAST-10.

Conclusions
The results of this study should be considered in planning intervention programmes to reduce the use of prescription stimulants and other substances among university students. We suggest developing specific strategies to combat, control and mitigate the use of prescription stimulants and other substances among college students.

Acknowledgment
I am grateful to Professor Dr Kay M Mach for proofreading and editing this article.

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Competing interests: None declared.

Usage abusif de médicaments soumis à prescription et d'autres substances psychotropes parmi les étudiants universitaires : étude pilote
Résumé
Contexte : L’abus de médicaments soumis à prescription est aujourd’hui le problème qui connaît la croissance la plus rapide au niveau mondial. Les effets néfastes de ce phénomène touchent des personnes de tous âges, mais l’impact sur la santé des jeunes et leur qualité de vie constitue un important problème de santé publique.
Objectifs : Estimer la prévalence de l’usage abusif de médicaments soumis à prescription et d’autres substances parmi les étudiants universitaires.
Méthodes : Une méthode d’enquête en ligne a été utilisée. Les outils ont été distribués en 2019 à 794 étudiants de l’Université d’Aden au Yémen à hauteur de 48,2 % (n = 383) et de l’Université King Khalid en Arabie saoudite à hauteur de 51,8 % (n = 411). Les étudiants ont répondu au test de dépistage de l’abus de drogues (DAST-10), ainsi qu’à un questionnaire sur l’abus de drogues et de substances.
Résultats : La prévalence globale des scores bas, modérés, substantiels et sévères sur l’échelle DAST-10 était respectivement de 27,2 %, 10,5 %, 2,1 % et 0,8 %. La prévalence de l’usage abusif des sédatifs parmi les étudiants...
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Impact of noncommunicable diseases on direct medical costs and worker productivity, Saudi Arabia

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Abstract

Background: The prevalence of noncommunicable diseases (NCDs) has been increasing in Saudi Arabia.

Aims: Our objective was to estimate the effect of NCDs on direct medical costs and workforce productivity in Saudi Arabia.

Methods: To estimate direct medical costs, we estimated the unit cost of treating 10 NCDs, then multiplied the unit cost by disease prevalence and summed across diseases. To estimate workforce productivity losses, we multiplied gross domestic product per person in the labour force by the loss in productivity from each NCD and the prevalence of the disease in the labour force of each NCD.

Results: We estimated annual direct medical costs of 11.8 billion international dollars (Int$) for the 10 NCDs assessed (13.6% of total annual health expenditure). We estimated workforce productivity losses of Int$ 75.7 billion (4.5% of gross domestic product).

Conclusion: The economic burden of NCDs in Saudi Arabia – particularly the effect on worker productivity – is substantial.

Keywords: noncommunicable diseases, health expenditure, workforce, Saudi Arabia

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Introduction

The prevalence of many noncommunicable diseases (NCDs) – especially diabetes mellitus (i) – has increased sharply in Saudi Arabia in recent decades. This increase has been widely attributed to rising rates of obesity due to changes in diet and physical activity brought on by westernization, such as the proliferation of fast-food restaurants and sugar-sweetened beverages and reductions in active lifestyles due to new technology. The rising cost of NCDs, which often include expensive long-term treatment, is a major economic challenge to Saudi Arabia’s health care system in which most health costs are financed by the public sector.

The purpose of this study was to estimate two types of costs that arise as a result of NCDs: (i) direct medical costs (including the cost of hospitalizations, outpatient visits, emergency department visits, general practitioner visits and prescription drugs); and (ii) productivity losses in the workplace due to increased absenteeism and presenteeism (diminished productivity while at work).

Methods

We identified 10 NCDs for which data were available: (i) asthma, (ii) breast cancer, (iii) chronic obstructive pulmonary disease (COPD), (iv) colon cancer, (v) coronary heart disease, (vi) diabetes mellitus, (vii) major depressive disorder, (viii) osteoarthritis, (ix) rheumatoid arthritis, and (x) stroke. We excluded many NCDs for which data were unavailable.

To estimate direct medical costs, we estimated the prevalence and per unit cost – the cost of treating one person’s illness for 1 year – for each of the 10 NCDs separately. We used prevalence data from the Institute for Health Metrics and Evaluation’s Global Disease Burden database (2). Our per unit cost estimates for breast cancer, colon cancer, coronary heart disease, diabetes mellitus, and stroke are from a 2016 global analysis of major NCDs (3). We obtained per unit cost estimates for other illnesses – asthma, COPD, major depressive disorder, osteoarthritis and rheumatoid arthritis – from the literature (4–15). We adjusted estimates upwards or downwards based on per capita health spending in Saudi Arabia compared with the countries in which these studies were conducted.
We updated monetary figures in local currencies to 2019 costs using inflation data (16). We converted these figures to 2019 international dollars (Int$) by dividing the local currency by the purchasing power parity exchange rate (17). We multiplied the prevalence rate for each disease by the population of Saudi Arabia (18) to obtain estimates of the number of cases of each disease, and then multiplied the number of cases by per unit annual costs to arrive at an estimate of total annual direct medical costs for each condition in the country. We summed the costs of each disease to obtain estimates of total annual direct medical costs of the 10 NCDs.

We used the same estimates as in a report to the United States Chamber of Commerce regarding the percentage productivity loss due to each NCD - defined as the percentage increase in absenteeism costs plus the percentage increase in presenteei costs (19). We multiplied the loss of productivity for each disease by the estimated number of cases of each disease among workers and by per capita gross domestic product (GDP) among those in the workforce to generate disease-specific productivity losses. We again summed the estimates of all 10 diseases to generate total worker productivity losses for the country as a whole.

To put these estimates in perspective, we compared the estimated direct medical costs to Saudi Arabia’s annual health expenditure, and productivity losses to Saudi Arabia’s GDP.

To assess the robustness of our results, we conducted several sensitivity analyses. We considered the effect of replacing our base case per unit cost estimates for diabetes mellitus (3), COPD (4), major depressive disorder (8) and osteoarthritis (11) with lower and higher estimates from the literature (5,6,9,10,14,20,21). We also replaced our base case type 2 diabetes prevalence estimate (2) with a higher estimate from the International Diabetes Foundation (22).

Results

The estimated prevalence and direct medical costs of the 10 NCDs are shown in Table 1. The estimated annual per capita cost ranged from a high of Int$ 3056 for COPD to a low of Int$ 414 for asthma. The most prevalent NCD among the 10 we assessed was diabetes mellitus (estimated prevalence 7.2%), followed by osteoarthritis (4.4%). The least prevalent NCDs were breast cancer, colon cancer and rheumatoid arthritis, all estimated at 0.1%. Multiplying the estimated number of cases by Saudi Arabia’s population showed that the estimated annual direct medical costs of these 10 NCDs totalled Int$ 11.8 billion, which is equal to 13.6% of the total annual health expenditure in Saudi Arabia. Diabetes mellitus accounted for 40.6% of the estimated direct medical costs among the 10 NCDs, followed by osteoarthritis (21.2%). Rheumatoid arthritis was the least costly of the 10 NCDs, accounting for just 0.2% of total estimated costs.

Table 2 shows estimated worker productivity losses due to each of the 10 NCDs in our analysis as well as combined worker productivity losses due to all 10 NCDs. The total estimated worker productivity loss was Int$ 757 billion a year, equal to 4.5% of GDP. Whereas diabetes mellitus was the largest driver of direct medical costs, major depressive disorder was the largest driver of worker productivity losses at Int$ 21.1 billion (1.3% of GDP). The smallest driver of workplace productivity losses was colon cancer, at Int$ 173 million (0.0% of GDP).

In the base case analyses reported above, we used the per unit diabetes mellitus cost from a 2016 global analysis of major NCDs (3). When we used a higher estimate from a 2014 Saudi Arabian study (20), the estimated direct medical costs increased more than twofold to Int$ 29.3 billion (33.7% of health spending). When we replaced our base case per unit diabetes mellitus cost with a lower estimate from a 2013 study in Saudi Arabia (21), combined estimated direct medical costs fell to Int$ 11.0

<table>
<thead>
<tr>
<th>NCD</th>
<th>Per unit cost, Int$</th>
<th>Prevalence, % (2)</th>
<th>Cases, no.</th>
<th>Direct medical costs</th>
<th>% of total costs of all 10 NCDs</th>
<th>% of overall health expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>414 (3)</td>
<td>2.5</td>
<td>849 859</td>
<td>352</td>
<td>3.0</td>
<td>0.4</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>891 (3)</td>
<td>0.1</td>
<td>47 976</td>
<td>43</td>
<td>0.4</td>
<td>0.0</td>
</tr>
<tr>
<td>COPD</td>
<td>3056 (4)</td>
<td>1.3</td>
<td>431 783</td>
<td>1320</td>
<td>11.2</td>
<td>1.5</td>
</tr>
<tr>
<td>Colon cancer</td>
<td>2655 (3)</td>
<td>0.1</td>
<td>17 134</td>
<td>45</td>
<td>0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>958 (3)</td>
<td>2.4</td>
<td>832 725</td>
<td>798</td>
<td>6.8</td>
<td>0.9</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>1936 (3)</td>
<td>7.2</td>
<td>2 477 615</td>
<td>4796</td>
<td>40.6</td>
<td>5.5</td>
</tr>
<tr>
<td>Major depressive disorder</td>
<td>656 (3)</td>
<td>3.6</td>
<td>1 247 374</td>
<td>819</td>
<td>6.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>1676 (ii)</td>
<td>4.4</td>
<td>1 494 108</td>
<td>2505</td>
<td>21.2</td>
<td>2.9</td>
</tr>
<tr>
<td>Rheumatoid arthritis</td>
<td>567 (5)</td>
<td>0.1</td>
<td>37 695</td>
<td>21</td>
<td>0.2</td>
<td>0.0</td>
</tr>
<tr>
<td>Stroke</td>
<td>2331 (3)</td>
<td>1.4</td>
<td>479 759</td>
<td>1118</td>
<td>9.5</td>
<td>1.3</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Int$ 11 817</td>
<td>-</td>
<td>13.6</td>
</tr>
</tbody>
</table>

NCDs = noncommunicable diseases; Int$ = international dollars; COPD = chronic obstructive pulmonary disease.
billion (12.6% of total health spending). Replacing base case estimates for COPD, major depressive disorder and osteoarthritis costs with higher or lower estimates from the literature (5,6,9,10,14) did not greatly change total direct medical costs. When we replaced our base case type 2 diabetes mellitus prevalence estimates with higher estimates from the International Diabetes Foundation (22), the estimated direct medical costs and workplace productivity losses increased to Int$ 15.3 billion (17.6% of health expenditure) and Int$ 89.9 billion (5.4% of GDP), respectively. A summary of our sensitivity analyses is provided in Table 3.

Discussion

Our base case cost estimates are significantly lower than those reported in previous studies. The United Nations Interagency Task Force on NCDs used data from national health accounts to estimate that the direct medical costs of cancers, cardiovascular diseases, endocrine and metabolic diseases, and respiratory diseases accounted for just above 20% of total health expenditure in Saudi Arabia (23). A World Health Organization study that compared costs in many European and North American countries for these four disease classes reported estimates of the percentage of annual total health expenditure ranging from 19% for Canada to 44% for Estonia (24). The discrepancy between these estimates and our estimates may be due our limited list of NCDs and our use of diabetes mellitus per unit cost and prevalence estimates on the lower end of published estimates.

Even our conservative estimates, however, make it clear that NCDs impose a considerable economic burden on Saudi Arabia, especially in terms of productivity losses. Indeed, workforce productivity losses in our base case analysis are more than six times as large as direct medical costs.

Table 2 Estimated workplace productivity losses due to NCDs, Saudi Arabia 2019

<table>
<thead>
<tr>
<th>NCD</th>
<th>Productivity loss (19), %</th>
<th>Prevalence of condition (23), %</th>
<th>Cases of condition in the labour force, no.</th>
<th>Workplace productivity loss, millions Int$</th>
<th>Workplace productivity loss, % of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>16.0</td>
<td>2.2</td>
<td>318 795</td>
<td>5 942</td>
<td>0.4</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>15.5</td>
<td>0.2</td>
<td>26 809</td>
<td>484</td>
<td>0.0</td>
</tr>
<tr>
<td>COPD</td>
<td>23.3</td>
<td>1.7</td>
<td>237 610</td>
<td>6 449</td>
<td>0.4</td>
</tr>
<tr>
<td>Colon cancer</td>
<td>15.5</td>
<td>0.1</td>
<td>9 566</td>
<td>173</td>
<td>0.0</td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>9.6</td>
<td>3.2</td>
<td>465 347</td>
<td>5 204</td>
<td>0.3</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>12.2</td>
<td>9.6</td>
<td>1 384 491</td>
<td>19 676</td>
<td>1.2</td>
</tr>
<tr>
<td>Major depressive disorder</td>
<td>26.0</td>
<td>4.8</td>
<td>696 733</td>
<td>21 102</td>
<td>1.3</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>13.7</td>
<td>5.8</td>
<td>834 908</td>
<td>13 324</td>
<td>0.8</td>
</tr>
<tr>
<td>Rheumatoid arthritis</td>
<td>15.5</td>
<td>0.2</td>
<td>21 062</td>
<td>380</td>
<td>0.0</td>
</tr>
<tr>
<td>Stroke</td>
<td>9.6</td>
<td>1.8</td>
<td>262 153</td>
<td>2 932</td>
<td>0.2</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>75 666</td>
<td>5.4</td>
<td></td>
</tr>
</tbody>
</table>

NCDs= noncommunicable diseases; Int$: international dollars; GDP= gross domestic product; COPD= chronic obstructive pulmonary disease.

*Productivity losses are losses incurred due to increased absenteeism and presenteeism as a percentage of full worker output.

*In Saudi Arabians ≥ 15 years old.

Table 3 Sensitivity analyses

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Direct medical costs</th>
<th>Productivity losses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Billions Int$</td>
<td>% of overall health spending</td>
</tr>
<tr>
<td>Base case</td>
<td>11.8</td>
<td>13.6</td>
</tr>
<tr>
<td>Higher diabetes per unit cost (13)</td>
<td>29.3</td>
<td>33.7</td>
</tr>
<tr>
<td>Lower diabetes per unit cost (14)</td>
<td>11.0</td>
<td>12.6</td>
</tr>
<tr>
<td>Higher COPD per unit cost (9)</td>
<td>12.8</td>
<td>14.7</td>
</tr>
<tr>
<td>Lower COPD per unit cost (6)</td>
<td>10.9</td>
<td>12.6</td>
</tr>
<tr>
<td>Higher major depressive disorder per unit cost (9)</td>
<td>12.5</td>
<td>14.3</td>
</tr>
<tr>
<td>Lower major depressive disorder per unit cost (10)</td>
<td>11.8</td>
<td>13.5</td>
</tr>
<tr>
<td>Higher osteoarthritis per unit cost (14)</td>
<td>13.8</td>
<td>15.8</td>
</tr>
<tr>
<td>Lower osteoarthritis per unit cost (9)</td>
<td>10.1</td>
<td>11.6</td>
</tr>
<tr>
<td>Higher diabetes prevalence (22)</td>
<td>15.3</td>
<td>17.6</td>
</tr>
</tbody>
</table>

GDP= gross domestic product; Int$: international dollars; COPD= chronic obstructive pulmonary disease.

*No change from the base case.
Because the median age in Saudi Arabia is 27.5 years (18) and the people at highest risk of most NCDs are middle-aged and elderly adults, the economic burden of NCDs is likely to increase without interventions, which provides further financial justification for implementing programmes aimed at reducing risk factors for NCDs.

The largest contributors to NCDs are lifestyle factors (in particular, diet and exercise choices that lead to obesity) and tobacco use. Interventions that tackle these factors, including targeted sin taxes, restrictions on advertising, low-cost education programmes and warning labels on the most harmful products, should continue to be priorities.

Lastly, it is worth noting that our estimates predate the emergence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes coronavirus disease 2019 (COVID-19). Interventions addressing NCDs should take on even greater importance during this time since evidence suggests that people with obesity and some NCDs are at increased risk of developing severe COVID-19 (25–27), which increases both the costs and likelihood of poorer health outcomes. Thus, as a result of the COVID-19 pandemic, the rationale for reducing NCDs is even more compelling than would otherwise be the case.

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Competing interests: None declared.

Impact des maladies non transmissibles sur les coûts médicaux directs et la productivité des personnels (Arabie saoudite)

Résumé

Contexte : La prévalence des maladies non transmissibles (MNT) est en augmentation en Arabie saoudite.

Objectifs : L’objectif de la présente étude était d’estimer l’effet des maladies non transmissibles sur les coûts médicaux directs et la productivité des personnels en Arabie saoudite.

Méthodes : Pour évaluer les coûts médicaux directs, nous avons estimé le coût unitaire du traitement de dix MNT, puis nous avons multiplié ce coût unitaire par la prévalence de la maladie et avons fait la somme pour toutes les maladies. Pour apprécier les pertes de productivité des personnels, nous avons multiplié le produit intérieur brut par personne dans les personnels par la perte de productivité due à chaque MNT ainsi que par la prévalence de chaque MNT dans les personnels.

Résultats : Nous avons estimé les coûts médicaux directs annuels à 11,8 milliards de dollars internationaux pour les dix MNT évaluées (13,6 % des dépenses de santé annuelles totales). Nous avons évalué les pertes de productivité des personnels à 75,7 milliards de dollars internationaux (4,5 % du produit intérieur brut).

Conclusion : Le fardeau économique des MNT en Arabie saoudite – en particulier l’effet sur la productivité des personnels – est considérable.
References


Access to safe, timely and affordable surgical, anaesthesia and obstetric care in Pakistan: a 16-year scoping review

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Abstract

Background: Very little is known about the state of surgical, anaesthesia and obstetric care in Pakistan.

Aims: This study aimed to assess the literature available on surgical, anaesthesia and obstetric care in Pakistan to understand the strengths and weaknesses of this care based on the domains of the framework of national surgical obstetric anaesthesia plans, namely: infrastructure, workforce, service delivery, information management, governance and service delivery.

Methods: Relevant studies in English published between 2003 and 2018 were identified by searching electronic databases including PubMed/MEDLINE, EMBASE and Scopus. Searches of the grey literature were also done for documents of various organizations. Thematic content analysis was conducted to collate, summarize and analyse the data.

Results: A total of 2347 studies were identified and screened, of which 57 articles met the inclusion criteria. While national-level surveys, reviews and policy documents provided an understanding of the existing surgical, anaesthesia and obstetric care services in the country, most of the studies were limited in their scope and therefore were not representative of the situation at the national level. In terms of surgical, anaesthesia and obstetric care, the health care infrastructure, availability of services, workforce, financial protection, information management and governance frameworks have failed to develop at the same pace as the needs of the ever-growing population in Pakistan.

Conclusions: Our findings can be used to guide future research activities as part of efforts to strengthen the surgical system in Pakistan. Recent government initiatives hold promise for future improvement in access to surgical care.

Keywords: surgery, anaesthesia, obstetrics, health services accessibility, Pakistan

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Introduction

The Lancet Commission on Global Surgery in 2015 estimated that 5 billion people lack access to safe, timely and affordable surgical and anaesthesia care worldwide (1), including over 95% of the population in South Asia compared with only 5% of the population in Australia, North America and Western Europe (2). If this unmet need is not addressed urgently, low- and middle-income countries face a US$ 12.3 trillion loss in economic growth by 2030 (1). The Lancet Commission recommended that all countries evaluate their surgical, anaesthesia and obstetric infrastructure, workforce, service delivery, information management, governance and financing through the collection of six indicators measuring the strength of their surgical care system (1). Shortly after the Lancet Commission, the World Health Assembly unanimously adopted Resolution 68.15 in May 2015 that commits to “strengthening emergency and essential surgical care and anaesthesia as a component of universal health coverage”. The third edition of the Disease Control Priorities (DCP-3) published its first volume on essential surgery in the same year, corroborating the need to invest in cost-effective, emergency and essential surgical services as part of universal health coverage (3,4).

The updated six-domain national surgical, obstetric, and anaesthesia care plan and framework, a modification of the original five-domain framework recommended by the Lancet Commission, is being widely used to analyse and strengthen surgical care systems within a country. The framework includes domains for infrastructure, workforce, service delivery, information systems, governance and financing, which comprehensively captures all inputs, processes, outputs and outcomes of the delivery of surgical services. Based on data from the Lancet Commission, low- and middle-income countries had wider gaps in the five original domains and poorer availability of timely surgical care.

Pakistan is the sixth most populous country in the world with a population of 207.8 million. The country ranks 152 out of 189 countries according to the Human Poverty Index with two thirds of its population living in rural areas (5,6). The country is divided into four provinces (Balochistan, Khyber Pakhtunkhwa, Punjab and Sindh), two autonomous territories (Azad Kashmir
and Gilgit Baltistan) and a Federal Capital Territory (Islamabad). Similar to other low- and middle-income countries, Pakistan faces a large burden of communicable diseases, road traffic injuries, and maternal, neonatal and child health issues (7). In addition, Pakistan has one of the lowest per capita health care budgets in the world (8).

Based on data from other low- and middle-income countries and poor national health indicators, the availability of surgical, anaesthesia and obstetric care in Pakistan is likely to be suboptimal. As a result, in a national stakeholder’s meeting for Pakistan’s National Vision for Surgical Care in November 2018, public and private stakeholders committed to improve surgical, anaesthesia and obstetric care in Pakistan. To inform future policy and strategy development around surgical, anaesthesia and obstetric care, we conducted a 16-year scoping review of the literature from 2003 to 2018 relevant to surgical, anaesthesia and obstetric care in Pakistan. Our aims were to understand the nature and extent of the literature available, and identify the status of surgical, anaesthesia and obstetric care in Pakistan according to the domains of the national surgical obstetric and anaesthesia plan and framework: infrastructure, workforce, service delivery, information management, governance and service delivery.

Methods
Given the wide breadth of the topic and to include different study designs, research and literature, we used a scoping review approach as opposed to a systematic review approach. This scoping review was based on the Arksey and O’Malley methodological framework (9), which has been widely used for reviews that aim to capture literature regardless of their study design and quality. This methodological framework includes six stages: i) identifying the research question; ii) identifying relevant studies; iii) selecting studies; iv) charting the data; v) collating, summarizing and reporting the results; and vi) consulting with relevant stakeholders, although this last stage was not applied in our scoping review. We chose a time span of 16 years because very little literature on gaps in surgical care delivery in Pakistan is available before 2003. Extending the time to earlier years would have provided very little additional value to this review.

Identifying the question
After thorough discussions between the research teams at the authors’ institutes and becoming familiar with the literature, the following research question was identified: What is the status of surgical, anaesthesia and obstetric care in Pakistan across health system domains of infrastructure, workforce, service delivery, information management, governance and financing?

Identifying relevant studies
Relevant studies to evaluate the current state of access to surgical, anaesthesia and obstetric care in Pakistan were identified by searching electronic databases of published literature including PubMed/MEDLINE, EMBASE and Scopus. To ensure that the maximum amount of relevant information was captured, grey literature searches were conducted across various organizations (e.g. World Health Organization, and federal and provincial health departments) and Google Scholar to include unpublished reports and policy documents. The search strategy was limited to articles published in English only. Reference lists of the articles selected were manually reviewed for other relevant sources.

The search terms “Pakistan” and “surgical procedures” were combined with appropriate MeSH terms and wildcards of the following terms: operative, surgeon, surgery, surgical, anaesthesia, anaesthesia, obstetric, obstetrics, caesarean, caesarean, urology, urological, neurosurgery, neurosurgical, orthopaedic, orthopaedics, orthopaedic, orthopaedics and trauma.

Studies were included in the final synthesis if they covered any of the six domains of the national surgical obstetric and anaesthesia plan. Studies that primarily focused on other related concepts (e.g. articles unrelated to the six domains) and focused on clinical interventions were excluded. Primary and secondary studies using qualitative, quantitative or mixed-method designs were included. Single-centre studies, case reports, clinical reports, abstracts and editorials were excluded.

Selection of studies
Two independent reviewers screened the title and abstract of all retrieved articles for inclusion against the set criteria. Disagreements were independently screened and resolved by the research lead. This was followed by a full-text review by the two independent reviewers who assessed the eligibility of all articles against the selection criteria. Any discordance was resolved by discussion between the three members of the review team until full consensus was reached (Figure 1).

Data collection
Information was charted on a standardized data extraction sheet on Microsoft Excel for Microsoft 365 (version 2111) for study details including title, authors’ names, journal, publication year, country of origin, study setting, study design, main findings and health care domain.

Data summary and synthesis of results
We conducted a thematic content analysis to collate, summarize and analyse the data using the six domains of the national surgical obstetric and anaesthesia plan. Each article was read by two reviewers and any concepts identified relevant to the theoretical framework were listed in our data extraction sheet. We then translated the concepts into themes and subthemes under headings of any of the six domains. The themes generated were analysed and synthesized.

Bias
Our team included senior and junior researchers, surgeons and medical trainees working in global and local delivery of and research on surgical care services. All au-
Authors are strong advocates for surgery on high-level national and international platforms. The authors' collective experiences as researchers on health disparities and their striving for excellence as clinicians and advocates may have influenced the analysis; authors may have had a higher likelihood of identifying and documenting health system weaknesses as compared to strengths. However, aware of this bias from the start, the team searched the literature to find encouraging examples; thus, the team specifically searched and highlighted previous successful interventions and methodologically strong research outputs. The team's aim has been to ensure that the results and discussion highlight not only the weaknesses but also the strengths in Pakistan's surgical care system.

Results

Articles retrieved

The search strategy identified 3050 records overall, of which 2340 remained after removing duplicates. An additional seven records were identified from the grey literature. Abstracts of all 2347 articles were reviewed, of which 2206 did not meet the inclusion criteria. The full texts of the remaining 141 articles were reviewed and 84 were excluded because they did not meet the defined criteria. Thus, 57 articles were included in the study (Figure 1). Twenty-one publications had a national focus (10–27). Among the regional literature, 19 articles provided data from Sindh (28–46), eight provided data from Punjab (47–55) and one provided data from Khyber Pakhtunkhwa (56), while three studies provided combined data for Punjab and Khyber Pakhtunkhwa provinces (57–59). Four records provided data from Islamabad (60,61), Gilgit/Baltistan (62) and Azad Jammu Kashmir (63) regions, while no records were found for Balochistan.

Type and focus of articles

Twelve of the retrieved articles were based on facility assessment surveys, which included an evaluation of the relevant workforce, equipment, supplies, infrastructure, information management system and governance at the surveyed facilities (21,34,45,49,50,52,53,57–59,64,65) (Table 1). Nine of these articles evaluated the capacity of services for emergency obstetric and neonatal care (21,49,50,53,57–59,64,65) while three articles evaluated the capacity of services for trauma and emergency care.

Eleven articles were literature reviews (10,11,13,14,26,27) or institutional experiences (28,32,35,62,66). These included comprehensive literature reviews on: the state of the surgical care system in Pakistan (11); barriers to surgical care access in the country (13); a national overview of surgical training programmes (26); considerations and performance of health policy in the devolved health system of Pakistan (10); the success of the National Eye Health Programme (14); and country-wide burden of injuries (27). Furthermore, the institutional experience of surgical care delivery included: the Aga Khan Health Services surgical care provision in the remote mountains of Gilgit Baltistan (62); the Indus Hospital provision of free-of-cost surgeries with a financial model supported by philanthropic and religious donations (35); Sindh Institute of Urology and Transplant provision of free transplant and urology surgery through a public–private partnership model (28,66); and Aga Khan University's...
establishment of a trauma registry in five hospitals in Karachi (32).

The four policy documents found in the literature review were the National Health Vision 2025 (19), Human Resource for Health 2018–2030 (18), National Health Accounts 2015–2016 (67) and Minimum Service Delivery Standards (55) highlighting the federal and provincial government’s commitments and priorities in health care strategy development and health care service delivery.

Furthermore, we found a mix of patient- and community-based qualitative and quantitative studies exploring the financial, logistical and quality aspects of surgical, anaesthesia, obstetric and trauma care in Pakistan (13,15,16,23,24,29,36–39,42,43,46,51,56,60,61,63,68,69). Some of the studies explored the competencies and work-related challenges of the current workforce providing surgical, anaesthesia and obstetric care, in addition to factors that influence the choice of Pakistan’s medical students in choosing specialties related to surgical, anaesthesia and obstetric care (12,20,22,25,30,33,40,44,47,70).

**Key themes and findings**

The themes identified in the literature reviewed included: poor functioning of secondary-care hospitals; poor indicators for physical accessibility to surgical, anaesthesia and obstetric care facilities; lack of equipment at hospitals; varying quality of prehospital ambulance services; estimates for physician/surgical care workforce; training programmes on surgical, anaesthesia and obstetric care; specific shortages in the workforce; medical competency and professional conduct; burnout or job dissatisfaction among professionals working in surgical, anaesthesia and obstetric care; estimates for volume of surgery; rates of caesarean section; service delivery at secondary-care hospitals; dependence on tertiary-care hospitals; use of private care; safety practices related to surgical, anaesthesia and obstetric care; issues with the district health information system; management of maternal health-related data; national health examination and mortality surveys; health care financing in Pakistan; out-of-pocket expenditure; innovative financing models; national and provincial health care policy mandates; health care policy documents; and facility-level administrative monitoring and evaluation. Key findings related to these themes were categorized across the six domains of the national surgical obstetric and anaesthesia plan (Table 2).
Table 2: Key findings in the six domains of surgical, anaesthesia and obstetric care

<table>
<thead>
<tr>
<th>Domain</th>
<th>Key findings</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>• Public secondary-care hospitals can serve as frontline providers for emergency surgical, anaesthesia and obstetric care (ii); however, some districts such as Gilgit do not have any secondary-care facilities (62). Other districts such as Bahawalpur, Gujranwala, Multan and Muzaffargarh do not meet the United Nations recommended standard of one facility for emergency obstetric and neonatal care per 500 000 (49,53,64). • Four studies highlight indicators of poor access to surgical, anaesthesia and obstetric care, lack of availability of surgical, anaesthesia and obstetric care within 10 km (60), long distances between hospitals (38,52), and delays due to late or multiple referrals, long distances or unavailability of transport (43). • Minimum equipment required for surgical, anaesthesia and obstetric care is lacking in most public sector secondary-care hospitals (21,34,52,64). • Quality of ambulance services varies by province and type of provider. Private providers have a large network but lack trained paramedical staff and life-saving equipment (55,37,45).</td>
<td>Findings from various facility assessments are not recent. Facility and health services mapping can help identify infrastructure deficiencies objectively.</td>
</tr>
<tr>
<td>Workforce</td>
<td>• Official physician density is 0.46 per 100 000 (2017) (8). • Estimate includes the 2011 national estimate of 150 neurosurgeons (12), 2011 estimate of 300 anaesthetists and 200 anaesthesia postgraduate trainees (20) and 2009 national estimate of 2000 trained ophthalmologists (14). • Official combined density of nurses, midwives and lady health workers is 0.49 per 100 000 population (18). • Official national count is 107 medical schools and 2145 nursing and midwifery schools (18); author estimates are 49 training programmes for general surgery, 32 for ophthalmology, 27 for orthopaedics, 23 for ear, nose and throat, 17 for neurosurgery, 11 for plastic surgery, nine for cardiac surgery, and only three for paediatric surgery (20). • Reports indicate specific shortages of gynaecologists and anaesthetists at district headquarters hospitals (21), female staff (13,29,58), nurses and paramedical staff (10,18), and frequent migration of trained specialists to other countries (16,38). • Reports and evidence highlight: lack of resuscitation-related knowledge among medical officers and postgraduate trainees; (40) unprofessional practice of self-referrals to private clinics among public sector doctors (29); and discriminatory practices against patients who are poor or belong to religious minorities (29). • Long working hours, high burn-out rate and job dissatisfaction are reported among gynaecology residents (47) and anaesthesiologists (20).</td>
<td>Estimates from policy documents are official estimates. Estimates from national audits are unreliable. A national registry of the health workforce is needed.</td>
</tr>
<tr>
<td>Service delivery</td>
<td>• A 2011 annual volume of surgery estimated 85.9 to 1200 surgeries per 100 000 population (ii) and a 2010 annual volume of cataract surgeries estimate of 310 752 surgeries (44). • The Demographic and Health Survey 1990–2013 estimated a home-based delivery rate of 48.3%, a community-based caesarean-section rate of 15.8% and facility-based caesarean-section rate of 29.0%–31.2% (23). • Lack of adequate equipment, suboptimal use of existing resources and understaffing are reported in secondary health care facilities (21,49,53,55,64). • High dependence on tertiary care with minimal use of secondary-care hospital leads to complicated, late and mismanaged patients (43). • Most (70%–75%) of the population access health care at private facilities (10,29,42); a private facility provides services in Gilgit (52); while free-of-cost surgical services and transplant surgeries are provided at large private centres in Karachi (28,35,66). • Poor compliance with the surgical safety checklist reported at 10 tertiary facilities (44), and a high rate of preventable critical incidents at a large centre (33) in Karachi.</td>
<td>Estimates of annual surgical volume by authors are unreliable and outdated. Rates of caesarean section from the Demographic and Health Survey are reliable but are based on data from 2013.</td>
</tr>
<tr>
<td>Information</td>
<td>• Government reports show the district health information system is inefficient, paper-based and not correctly used by doctors (10,35). • Maternal death and complication registers are non-standardized, underutilized or completely ignored at public hospitals (57,65). • National health review and examination survey and mortality surveys are lacking (10); private electronic trauma registry project in Karachi was discontinued due to shortage of funds and lack of institutional interest and incentive. (12).</td>
<td>Data from government reports on the district health information system are considered official. Community- and facility-based registries to track surgical cases are needed.</td>
</tr>
<tr>
<td>Finance</td>
<td>• Pakistan spent 3.1% of its gross domestic product on health in 2015–2016, a per capita health expenditure of 4 688 Pakistani rupees (US$ 45) (67). • Public sector funds financed 13.9% while private sector funds financed 64.4% of the overall national health care spending (67). • Patients incur substantial out-of-pocket expenditure even at public sector facilities (60,68) leading to disparities in demand for surgery and facility-based deliveries (16,42). • Transport costs are a major burden for patients (29). • Private sector non-profit service providers, philanthropic funding and private–public partnership are financing models used in Pakistan (10,28,31).</td>
<td>Financial spending data from National Health Accounts report are official statistics.</td>
</tr>
<tr>
<td>Governance</td>
<td>• Health care policy, financing, service delivery and regulation have been devolved to provincial governments since 2001. Health workforce and national health system planning is the responsibility of the Council of Common Interest which consists of federal and provincial government representatives (17). • National Health Vision 2025, the most recent, comprehensive national health policy document was published in 2016 (9). This was followed by the Pakistan: Human Resource for Health Vision policy document in 2018 (18). Surgical care challenges have not been addressed specifically in these documents. • Administrative monitoring and evaluation visits to secondary-care facilities are lacking according to a survey in 2012 (21). • Three 5-year plans under the National Eye Health Programme successfully improved ophthalmology care capacity in Pakistan (14).</td>
<td>Facility-level governance and administrative deficiencies are based on 2012 facility assessment. A new facility assessment is required to evaluate monitoring and evaluation processes at hospitals.</td>
</tr>
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</table>
Discussion

This comprehensive review spanning 16 years shows that a considerable amount of information on surgical care services in Pakistan is available. While national-level surveys, reviews and policy documents provided an understanding of the existing services for in the country, most of the studies were limited in their scope and therefore were not representative of the national situation. Overall, we determined that many gaps exist in the health care infrastructure, service availability, workforce, financial protection, information management and governance frameworks.

It is clear that the development of public sector hospitals has failed to keep pace with the rate at which the country’s population and its needs have grown. As a result, many districts failed to meet the recommended target of one comprehensive facility for emergency obstetric and neonatal care per 500 000 population. Multiple reviews and facility assessments noted different deficiencies in infrastructure, workforce and financing at the secondary-level district headquarters hospitals and tehsil (subdistrict) headquarters hospitals in the rural areas, where 60% of Pakistan’s population lives. The lack of trust in rural health care facilities owing to poor quality of services results in patients travelling long distances to urban tertiary referral hospitals and selected urban district headquarters hospitals. Consequently, many patients present to these facilities late and in a more complicated state; delays in decision-making and unavailability of transport funds compound the problem. This situation inevitably results in preventable mortality and morbidity.

The private sector has contributed to improving the availability of affordable or free-of-cost surgical, anaesthesia and obstetric care through independent and public–private partnership models. Prime examples are the service delivery model of the Aga Khan Health Service, Pakistan in Gilgit, various hospitals run by the Indus Hospital and Health Network and the Sindh Institute of Urology and Transplant free-of-cost renal transplant arrangement. Thus, the private sector has the potential to play a crucial role in improving universal accessibility to surgical care and hence health care. Moreover, the government can engage the private sector by supporting it in those areas where public sector service delivery is deficient. This support requires population-based mapping of surgical needs and a thorough understanding of the existing surgical infrastructure, workforce and services.

No comprehensive registry of the health workforce exists that provides accurate estimates of the volume and distribution of the workforce providing surgical, anaesthesia and obstetric care in Pakistan. The existing registries, which include those at the College of Physicians and Surgeons Pakistan and the Pakistan Medical and Dental Council, are not updated to reflect migration or professionals who have stopped working; as a first step, these registries need to be updated with facility-level details to allow a better understanding of workforce distribution. An overall figure of 0.96 physicians per 100 000 population quoted by the Ministry of National Health Services Regulation and Coordination clearly shows that Pakistan falls short of the workforce density target of 20 surgical, anaesthesia and obstetric specialists per 100 000 as recommended by the Lancet Commission. The need for professionals in surgical, anaesthesia and obstetric care, particularly female providers, at the secondary level needs to be specifically addressed.

Universal financial risk protection against surgical care expenditure in the population has not been achieved. With high dependence on the private sector and urban hospitals, patients from rural areas and poorer backgrounds are unable to access health care due to the high cost of travelling and high out-of-pocket expenditure on private health services. Even in the supposedly free-of-cost public sector facilities, patients pay up to 40 000 Pakistani rupees (PKR; equivalent to US$ 1066, at the current purchasing power exchange rate) for supplies, equipment or services that the government is unable to provide. Improving services at the facility level by ensuring efficient supply chain systems and the availability of standardized care would help address this barrier to timely and good-quality care.

The Prime Minister social health insurance scheme (Sehat Sahulat Programme Pakistan) has been adopted by Azad Kashmir, Gilgit Baltistan, Khyber Pakhtunkhwa and most of Punjab. More than 7 000 000 families nationally are now covered for up to PKR 600 000 for inpatient expenses for all surgical procedures, maternity care, local transportation cost and provision of transport to tertiary care hospitals. This scheme has led to much needed relief from out-of-pocket expenditure. In addition, the ministry is working on the essential universal health benefits package using the DCP3 framework with the aim of making fund allocations more equitable. Lastly, the Ehsaas cash transfer programme continues to grow and support persistently excluded and deprived families and has potential to decrease cases where health care is limited due to financial barriers.

Systematic health care monitoring and evaluation mechanisms are lacking in the country. Moreover, multiple gaps exist in the mechanism of information collection from facilities and practically no system is in place to provide feedback to the end-providers. As a result, it is impossible to gauge the evolving status of health care resources and delivery of health care services in Pakistan, accountability is affected and well planned governance structures do not translate into practical reality. Facility-based administrative incompetence, incidents of medical neglect and unethical practices go unchecked and, not surprisingly, health outcomes deteriorate.

Similar to systems in place in high-income countries, Pakistan needs a robust information management system where data on health care facility resources, services and performance are collected and uploaded on online...
open-access public portals promoting transparency and accountability (77,78). Such a system will allow all levels of government and society to monitor the efficiency and effectiveness of health services and resource utilization as per defined minimum standards.

It is indeed encouraging that the government passed the Pakistan Medical Commission Act 2020 which represents the government’s commitment to regulate minimum standards within the medical profession (79). In addition, by enlisting both the public sector and private facilities to provide care to beneficiaries, the Social Health Insurance scheme has the potential to improve the monitoring of services for quality and improvement. This may eventually lead to a reduction in inefficiencies within the private and public sector by introducing market competition (73).

Overall, much more work is required to comprehensively fill the gaps in surgical care services in Pakistan. The governments of Balochistan and Sindh have yet to adopt the Prime Minister Social Health Insurance scheme (80). The question also remains as to whether the steps taken by the present government will survive the current financial crises and political changes in the future. Regardless, strong advocacy and research are needed at the national and provincial levels to ensure surgery and surgical service reforms are not overlooked during prioritization. In addition, with projected limitations in financial capacity over the next few years, international donor support may help boost progress in improving surgical care services in the country (81). It is essential to continue the momentum of strengthening the surgical care system given the cross-cutting nature of surgical services and their potential to help control the burden of communicable and non-communicable diseases, maternal and child health care, and injuries.

In our efforts to improve surgical care services, we have worked closely with the federal and provincial governments to develop the policy dialogue around surgical care improvement (82). At the National Stakeholders’ Conference for the National Vision for Surgical Care in 2018, the federal and provincial governments, along with private sector representatives, committed to improving equity in access to surgical care services in Pakistan (82) (Box 1). The importance of surgical care within the broader scope of global health has been recognized, with organizers of local medical conferences and meetings now dedicating sessions to global surgery. A dedicated journal supplement on global surgery – a first for Pakistan – is indicative of the increasing focus (83). It is hoped that this interest will translate into an increased body of high-quality research that will in turn guide interventions on strengthening the surgical care system. The timing of the Ehsaas and Sehat Sahulat Programme (76,84) initiatives, as well as the DCP-3 Essential Universal Health Benefits Package for the Islamabad Capital Territory (75), provide a unique opportunity to restructure surgical services as an essential component of health care across the country.

Our review has some limitations. Since only literature from 2003 to 2018 was included, information from earlier studies may have been missed, although we believe that the study period provides better insight into the actual state of surgical, anaesthesia and obstetric care in Pakistan. Moreover, only articles in English were included in the review because English is the language for all medical school education, training and research and therefore no journals or articles written in the national language, Urdu, are available. While some grey literature may be published in Urdu, we believe that this literature would not substantially alter our results. Lastly, some documents quoted in this article are non-peer-reviewed local journal articles or government reports for which assumptions of validity had to be made on inclusion.

A national household and patient survey is currently in progress to estimate the proportion of Pakistan’s population that has access to surgery within 2 hours and to document the financial and logistical challenges faced by patients in accessing care for basic surgical care procedures at the public sector hospitals of Pakistan. The survey is being conducted by Indus Hospital Network in collaboration with the Ministry of National Health Services, Regulation & Coordination and with technical support from the Program in Global Surgery and Social Change. This survey will provide the first national-level data set on surgical services in Pakistan. Furthermore, we plan to conduct a follow-up scoping review to explore changes in the nature, extent and findings of the literature on global surgery in a 5-year period after 2018.

**Box 1: Conclusions from National Stakeholders’ Conference for the National Vision for Surgical Care 2018**

- Stakeholders are engaged with the need for emergency and essential surgical care as a component of universal health coverage
- Consensus was reached to create the National Vision for Surgical Care 2025 document that outlines the national plan for strengthening the surgical system.
- The federal government committed to liaise with the provincial governments to guide the provinces in implementing the recommendations of the National Vision for Surgical Care 2025.
- Each province committed to include and prioritize surgical, anaesthesia and obstetric care in their strategic plans in alignment with the national vision.
- Nongovernmental organizations, professional health care societies and academic partners committed to support the process by providing advocacy and technical expertise.
Conclusion
Access to surgical, anaesthesia and obstetric care remains limited in Pakistan, with particular barriers in workforce, infrastructure, service delivery and financing across the country, especially in poorer provinces and territories, and rural areas. Continued political commitment and primary data are needed to better understand and address these gaps in Pakistan. The new initiatives from the Ministry of National Health Services, Regulation & Coordination have potential to fill in the gaps identified.

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Competing interests: None declared.

Accès à des soins chirurgicaux, anesthésiques et obstétricaux sûrs, opportuns et ayant un bon rapport coût-éfficacité au Pakistan : étude exploratoire sur 16 ans
Résumé
Contexte : La situation des soins chirurgicaux, anesthésiques et obstétricaux au Pakistan est très peu connue.
Objectifs : La présente étude visait à évaluer la littérature disponible sur les soins chirurgicaux, anesthésiques et obstétricaux au Pakistan afin de comprendre les forces et les faiblesses de ces soins en fonction des domaines du cadre des plans nationaux de chirurgie, d'obstétrique et d'anesthésie, à savoir infrastructures, personnels, prestations de services, gestion de l'information et gouvernance.
Résultats : Au total, 2347 études ont été identifiées et examinées, parmi lesquelles 57 articles répondaient aux critères d'inclusion. Si les enquêtes, examens et documents de politique générale réalisés au niveau national ont permis de comprendre les services de chirurgie, d'anesthésie et de soins obstétricaux existant dans le pays, la plupart des études avaient une portée limitée et n'étaient donc pas représentatives de la situation au niveau national. En matière de chirurgie, d'anesthésie et de soins obstétricaux, l'infrastructure des soins de santé, la disponibilité des services, le personnel, la protection financière, la gestion de l'information et les cadres de gouvernance n'ont pas évolué au même rythme que les besoins d'une population pakistanaise toujours croissante.
Conclusions : Nos résultats peuvent servir à orienter les futures activités de recherche dans le cadre des efforts visant à renforcer le système chirurgical au Pakistan. Les récentes initiatives gouvernementales sont prometteuses pour l'amélioration future de l'accès aux soins chirurgicaux.
References


Consultation on the world report on hearing: implications for the WHO Eastern Mediterranean Region

Introduction
An estimated 22.1 million people currently live with disabling hearing loss in the Eastern Mediterranean Region (EMR) of the World Health Organization (WHO), and this number is likely to increase to over 52 million by 2050 (1). Nearly 80% of these people live in the low- and middle-income countries, where they mostly lack access to the required medical interventions for their condition (2).

Following a request by the World Health Assembly Resolution WHA70.13 in 2017 (3), WHO developed the World Report on Hearing (4), which outlines essential steps for scaling-up the provision of integrated people-centred ear and hearing care services at country level. In July 2021, WHO Regional Office for the Eastern Mediterranean Region (WHO/EMRO) held a virtual “Consultation on the World Report on Hearing: Implications for the WHO Eastern Mediterranean Region” (4) aiming at: presenting an overview of the global and regional findings of the World Report on Hearing and WHO support tools, resources and initiatives; reviewing the situation of ear and hearing care and efforts to integrate such care into health systems in the EMR; and agreeing on how best to make use of the World Report in strengthening ear and hearing care in the Region, considering the WHA70.13 and recommendations of the 2019 regional expert consultation for promoting ear and hearing care.

Summary of discussions
The meeting featured a presentation on findings of the World Report on Hearing, which highlighted the main causes of hearing loss, including preventable infectious diseases such as meningitis, measles, mumps, and rubella; exposure to excessive noise; ototoxic medications; ageing; and ear or head injuries. The three main risk factors for hearing loss in the EMR are consanguinity, otitis media, and noise-induced hearing loss. Chronic otitis media was identified as a leading cause of hearing loss among children.

At least 50% of hearing loss cases is preventable if diagnosed and treated early, yet nearly 1 in 3 people aged 65 years and above suffers from disabling hearing loss, and only 16% of those in need of hearing technologies in EMR have access to them (2).

Several countries in the region are making progress in ear and hearing care. For example, Djibouti is advancing early childhood screening for hearing loss and training doctors and midwives to conduct such screening. The Islamic Republic of Iran is implementing neonatal hearing screening, it has developed educational materials on sign language for health care workers and appointed translators for people with hearing disabilities in COVID-19 referral centres. Egypt has expanded its ear and hearing care programme and improved neonatal screening programmes for hearing loss in primary health care units. A newly decreed Karama law ensures that people with hearing loss in Egypt have access to several benefits such as specialized pension schemes, prioritization for civil jobs, and access to tax- and customs-exempt cars, as part of the larger population of persons with disabilities.

As a result of the COVID-19 pandemic, Oman has established virtual and remote ear and hearing care services. It published the 3rd edition of the manual for ear health in June 2020, developed sign language courses for health care workers, and embarked on mass dissemination of educational videos on COVID-19 for persons with disabilities and their caregivers. Pakistan has created audiologist positions at district level hospitals, developed school curricula in sign language for all grades, provided offline low-cost ed-tech learning resources, and is hosting online sign language educational courses targeting the whole country. Guidelines on how to prevent COVID-19 for persons with disabilities, including those with hearing loss, were developed.

Saudi Arabia has made neonatal hearing screening mandatory across the country, including in private clinics, developed workforce capacity and sustainable financing modalities to ensure service continuation, and taken steps to ensure that persons with hearing loss have access to media messages on all national broadcasting channels. The country recently launched a mobile application, Eshraa, which provides services to answer all relevant questions in sign language 24 hours daily. Remote ear and hearing care services, such as remote programming of hearing aids, are being provided to mitigate the impact of the COVID-19 pandemic.
WHO events addressing public health priorities

Recommendations

To Member States

- Setting up national committees and developing or updating national strategies to facilitate provision of ear and hearing care through Universal Health Coverage.
- Including ear and hearing care in essential service packages being developed for Universal Health Coverage.
- Adapting WHO materials and resources on ear and hearing care to the country context.
- Raising awareness at all levels on hearing loss and hearing care.
- Ensuring that hearing screening is integrated into child and school health services.
- Including indicators for ear and hearing care in national health information systems.
- Initiating actions to address the risk of hearing loss due to environmental, occupational, and recreational noise, including the “Make Listening Safe” initiative.
- Integrating ear and hearing care into programmes for the care of elderly people.
- Training health care workers, including nurses, general practitioners, and other relevant cadres, in ear and hearing care.

- Undertaking national-level prevalence surveys and situation analyses on hearing loss and hearing care.

To WHO

- Strengthening engagement of ear and hearing care professionals at national and regional conferences.
- Advocating for pre-employment tests for people constantly exposed to occupational noise.
- Identifying research priorities and developing multi-country collaborations for research on ear and hearing care.
- Mapping available resources, expertise, opportunities, and needs for mutual benefit across countries, including setting up a platform for sharing resources on ear and hearing care.
- Strengthening regional collaboration for experience- and knowledge-sharing on ear and hearing care.
- Developing a regional position paper and engaging in advocacy on ear and hearing care through a request for a side event in the Regional Committee.
- Organizing a webinar on one of the regional ear and hearing care priorities, possibly on newborn hearing screening in the Region, to foster experience-sharing and explore technology and industry advances.

References

Environmental risks, such as air, water and soil pollution, chemicals and waste exposures, climate change and radiation contribute to more than 100 diseases, and responsible for about a quarter of the total burden of disease in the Eastern Mediterranean Region. WHO estimates that about 1 million people die prematurely because of living or working in “unhealthy” environments.

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