The WHO Eastern Mediterranean Regional Office hosted the 68th session of the “Regional Committee for the Eastern Mediterranean” at its premises in Cairo, Egypt, during the period 11-14 October 2021, under the slogan of: “rebuilding better and fairer: stronger systems, resilient communities.”
المجلة الصحية لشرق المتوسط هي مجلة رسمية نشطة في مجال الصحة العامة والأجهزة الصحية في المنطقة الشرقية، وهي تهدف إلى نشر الأبحاث والنتائج والدراسات المتعلقة بالصحة العامة في جميع المجالات. تلعب هذه المجلة دوراً حيوياً في تبادل المعلومات والمشورات بين الخبراء في المنطقة الشرقية وخارجها.

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Rebuilding better and fairer in the Eastern Mediterranean Region – the 68th session of the WHO Regional Committee

Ahmed Al-Mandhari

The COVID-19 pandemic remains a major concern in the Eastern Mediterranean Region. At time of writing, nearly 300,000 deaths from the disease have been reported (1), and that figure almost certainly understates the reality. The Region is facing another wave of infection; the Delta variant is widespread; and while some countries have achieved impressively high vaccination rates, overall coverage in the Region is far too low at around 15% (2). Ensuring equitable access to COVID-19 vaccine across all 22 countries and territories in the Region is an urgent priority.

But the Region also has many other urgent health challenges, including addressing other health emergencies, combating both communicable and noncommunicable diseases, and promoting healthier populations, and we cannot wait for the pandemic to end before we tackle them. That was the main message of the 68th session of the WHO Regional Committee for the Eastern Mediterranean, WHO’s governing body for the Region, which brought Member States and other stakeholders together from 11 to 14 October 2021 to discuss key health-related issues, share experiences and formulate ways forward. Continuing disruption to travel and risk from the pandemic obliged us to hold the session as a virtual event for the second year running, and while we certainly missed the opportunities for added interaction and the energy that an in-person session brings, it was still possible to accomplish a huge amount of business through four intensive days of online meetings.

The theme for this year’s Regional Committee session was “Rebuilding better and fairer: stronger systems, resilient communities”, and Member States agreed to a range of proposals to help ensure that the Region emerges both better and fairer from the pandemic. Many of those proposals drew on lessons learned dealing with the pandemic. The COVID-19 response has provided an unwelcome but nonetheless useful opportunity to review and enhance many aspects of WHO’s work, most obviously our ability to manage large-scale emergencies, and that experience informed a new plan of action to accelerate health emergency preparedness and response in the Region which aims both to end the current pandemic and leave countries better prepared for future emergencies (3). Among many provisions, the resolution adopting the plan of action urged Member States to work for greater equity in COVID-19 vaccination in the Region through financial donations to the COVAX Facility and direct donations of vaccines by richer countries (4).

There was also important progress on the key issue of disease surveillance with the adoption of a regional strategy to encourage and support the integration of surveillance systems both within countries and within WHO (5), and Member States also considered broader lessons from the pandemic. In the latter regard, mindful of the value of community engagement in helping to ensure compliance with public health and social measures and combat misinformation about COVID-19, they expressed strong support for a new roadmap on building resilient communities for better health and well-being in the Region (6).

Meanwhile, other health priorities were not neglected. In particular, there were notable developments in efforts to tackle noncommunicable diseases and their associated risk factors. Diabetes is now more prevalent in the Eastern Mediterranean than in any other WHO region: 55 million (12.8%) of the adult population aged 20–79 had diabetes in 2019, and that figure is projected to rise to 108 million by 2045 if effective action is not taken (7). To enable a systematic response in every country, Member States adopted a new regional framework for action setting out a spectrum of strategic interventions covering governance, prevention, management, surveillance and research, all supported by indicators for clear monitoring and evaluation. And Member States also agreed to establish a High-level Ministerial Group on the Control of Tobacco and Emerging Tobacco and Nicotine Products in the Region, to galvanize work in this crucial area (8).

The Regional Committee also considered several matters that had been referred by or related to WHO’s global governing bodies, the World Health Assembly and the Executive Board. This included a rich discussion of five consultation questions from the Working Group on Sustainable Financing (WGSF) (9). The WGSF was established at the start of this year, prompted by concerns that WHO does not receive a high enough level of unearmarked funds to fulfil its mandate, and has been seeking feedback from all the regional committees on possible changes to funding arrangements. While most stakeholders agree that current financing leaves WHO...
too dependent on donors and needs to change, there is as yet no consensus on exactly what form that change should take, and Member State comments in the Regional Committee session reflected diverse views. Sustainable financing is a critical prerequisite for WHO to achieve all its other goals, and we look forward to further fruitful discussion of this and other issues in 2022.

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Consumer choice of health facility among the lowest socioeconomic group in newly established demand-side health-financing scheme in Pakistan

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Abstract

Background: The Social Health Protection Initiative (SHPI) was introduced initially in Pakistan in Khyber Pakhtunkhwa Province. The initiative aimed to provide the lowest socioeconomic group of the population with in-patient healthcare services, which otherwise would be financially hard to obtain. It is one of the flagship projects of the Provincial Government to contribute towards the United Nations Sustainable Development Goals and universal health coverage.

Aims: To assess consumer choice of health facility and its determinants for public versus private sector health facilities by people enrolled in SHPI.

Methods: We used secondary data of availed health services from February 2016 to September 2017 under SHPI. A proxy outcome variable, visit to health facility, was used to determine consumer choice between public and private sector health facilities. The treatment group (health services received by beneficiaries) was used as an independent variable controlled for age groups, cost groups, and geographic location of health facilities. All statistical analyses were performed by SPSS version 20.

Results: Most beneficiaries chose private over public health facilities (90.25%). The adjusted odds of visiting a public sector health facility for surgical and obstetrics/gynaecological services were 0.12 [95% confidence interval (CI): 0.10–0.16] and 0.11 (95% CI: 0.09–0.14) respectively, when compared to medical services.

Conclusion: SHPI beneficiaries have lesser odds of visiting a public hospital over a private one. The choice may be affected by factors such as age of the beneficiary, cost of health services, and geographic location of health facilities.

Keywords: health insurance, consumer choice, health facilities, Social Health Protection Initiative, Khyber Pakhtunkhwa, Pakistan

Introduction

The Social Health Protection Initiative (SHPI) is a public sector project that financially enables and empowers people of low socioeconomic status (SES) with a choice of health provider by enrolling both public and private health facilities (1). SHPI targets 67% of the lowest SES population of Khyber Pakhtunkhwa Province that earns a daily wage of US$2 or less (1,2). The rates for services are negotiated at the time of contract between insurance company and hospitals and are higher in private compared with public facilities for similar healthcare services (1,3). Hence, the consumers in this programme benefit from zero cost sharing as well as autonomy regarding the choice of healthcare provider.

SHPI assumes 8 members per household, and covers each individual household member with up to US$288 (US$2308 per household) for secondary care inpatient services (1). The premium per household is about US$14 that is paid by the Provincial Government to the insurance company (1). The conversion rate is adjusted by the average dollar exchange rate for 2016.

One of the beliefs underlying SHPI is that low SES beneficiaries would mostly visit the public sector health facilities under SHPI due to the cost cap. This belief may have been based on the premise that limiting expenditure may result in people choosing public sector health facilities. This is the case when low SES groups choose public sector facilities in the absence of social protection because they do not have sufficient finances to spend on treatment in the private sector (4). These beliefs yielded 2 major expectations: (1) SHPI would benefit the public sector through widespread use of public sector health facilities, thus returning public funds to the public sector; and (2) public sector health facilities may improve the quality of their services to gain a larger proportion of public funds by competing with the private sector.

There is little evidence about the trends of consumer choice between the public and private health sector facilities under a demand-side health-financing scheme. SHPI is Pakistan’s first ever demand-side financing model.
for people in the lowest SES group. This study provides empirical evidence for important policy developments regarding optimum allocation and regulation of resources, thus contributing towards the future strategic planning in the public sector for health.

The aims of the study were: (1) to assess consumer choice between public and private health facilities among the lowest SES beneficiaries under SHPI; and (2) to determine the factors affecting consumer choice of the health facility among enrolled beneficiaries in SHPI.

Methods
This was an observational cross-sectional study. The secondary, coded and deidentified data were acquired from the SHPI Office for health services utilized by the beneficiaries from February 2016 to September 2017 in Khyber Pakhtunkhwa Province. All the beneficiaries in this study belonged to the lowest SES in the Province. The study was approved by the Institutional Review Board of the Prime Foundation. Ethical approval was waived by the institution as deidentified secondary data were used.

During the early stages of the SHPI project, limited information was collected on the beneficiaries: including age, type of treatment, treatment cost, location of health facilities, and list of enrolled health facilities. The outcome variable was choice of health facilities. There was no variable in this secondary dataset that measured the choice of public or private health sector facilities by the SHPI beneficiaries; therefore, a proxy measure for consumer choice of health facility was used. This proxy measure was the participant (SHPI beneficiaries) visiting the enrolled public or private sector health facilities to receive inpatient health services. The independent variable was treatment groups, which were broadly categorized as surgical, obstetrics/gynaecological, and medical services. Other explanatory variables included the age groups, cost groups, and geographic location of health facilities. There were 4 age groups: 0–17, 18–35, 36–49, and ≥ 50 years. The cost groups were defined by the total treatment cost incurred estimated by the average US dollar exchange rate in 2016, which were categorized into 7 categories: 1–48, 49–96, 97–144, 145–192, 193–240, 241–288 and > 288 US dollars.

The geographic location of health facilities in the Province was categorized into 3 categories: northern, central, and southern districts.

The total number of observations was 37,323, and 408 (1.09%) were excluded because of incomplete information about variables of interest. The final number of observations was reduced to 36,915.

All the variables were categorical in nature; therefore, the χ² test was used to describe the data and assess the association of all variables with the outcome variable. Multivariable logistic regression analysis was also conducted to find an adjusted association of the choice of health facilities by the SHPI consumers for the type of treatment sought, controlling for age, cost, and geographic location of health facilities. P ≤ 0.05 was considered significant. All the statistical analyses were conducted using SPSS version 20.

Results
It was noted that 90.3% of the total visits were made to the private sector health facilities as compared to 9.7% of the total visits to the public sector health facilities. More than half of the visits were for surgical services, followed by one third for medical services. Almost a quarter of all the visits were made to the health facilities by each age group. One third of the total visits fell in the cost range of US$1–48, followed by 23.2% in US$96–144. Moreover, nearly half of the total visits were made in the central districts of the Province. Further details on the distribution of health facility visits can be seen in Table 1. Table 1 also shows the association of the characteristics of SHPI beneficiaries’ visits with the choice of public or private sector health facilities. All the variables showed a highly significant statistical association with the choice of public/private sector health facilities.

The multivariable logistic regression analysis was conducted to predict the consumers’ choice of public sector health facilities for health services received (treatment groups) controlling for age group, cost group, and geographic location of the health facilities (Table 2). The Nagelkerke R² value showed that predictor variables explained 17.2% of the variation in the outcome variable. Logistic regression showed that the adjusted odds of a consumer choosing a public sector health facility were significantly low for all the treatment groups in the southern region. For example, the adjusted odds of choosing a public sector health facility for surgical and obstetrics/gynaecological services were 0.12 [95% confidence interval (CI): 0.10–0.16] and 0.11 (95% CI: 0.09–0.14), respectively, when compared to medical services. Similarly, the adjusted odds of choosing a public sector health facility were 0.18 (95% CI: 0.16–0.21) for the southern region when compared with the northern region. However, the adjusted odds of choosing a public sector health facility significantly increased with age and cost. The 18–35 years’ age group had 1.26 times (95% CI: 1.22–1.30) the odds of choosing a public sector health facility when compared with the 0–17 years’ age group. The 36–49 and ≥ 50 years’ age groups had 1.52 (95% CI: 1.48–1.55) and 2.51 (95% CI: 2.25–2.79) times the odds of choosing a public sector health facility as compared to the 0–17 years’ age group. This demonstrated that the likelihood of a consumer visiting a public sector health facility increased with age. Similarly, the adjusted odds of visiting a public sector health facility increased from 1.76 (95% CI: 1.40–2.19) to 9.89 (95% CI: 6.61–14.81) for the US$48–96 and > 288 cost groups, respectively.
Discussion

This study assessed the utilization of public and private sector healthcare facilities in terms of medical, surgical, and obstetrics/gynaecological services. Demand-side financing encourages people to choose between the public and private sector health facilities (4). This study also showed a freedom to choose between public and private sectors for different categories of health services. We found an increased utilization of private sector health facilities for surgical and obstetrics/gynaecological services as compared to medical services. The findings from several studies (5–9) also support the finding of increased utilization of private healthcare facilities by consumers in demand-side financing. However, this is in contrast to the findings of the World Health Report that the utilization of public sector health facilities has increased in low- and middle-income countries (10). Similarly, SHPI consumers, who belong to the lowest socioeconomic group and who would otherwise have no choice of choosing health service provider (11), significantly prefer private health facilities when the financial risk is minimized (9).

The elderly population mostly suffers from chronic illnesses and need frequent and continuous health care as compared with younger age groups (13). Most chronic illnesses require medical management, thus, it is not possible to predict the number of inpatient visits for medical management for the same or different illnesses when compared to surgical or obstetrics/gynaecological services. Therefore, there is a risk of going over and beyond the spending limit in an insured period. If elderly patients exhaust the insured financial limit, they may still obtain treatment at the government's subsidized rate that is available to everyone in society. This could be why the utilization of medical health services increases with age (13), to continue receiving uninterrupted medical services in the public sector health facilities.

There was more utilization of private health facilities in the southern region compared with the northern region. One reason for this might be the less-developed public sector healthcare facilities in the southern region, with issues of staffing, performance and quality (14–16). However, the choice of health facilities in the central region was more for public sector health facilities as compared with the northern region. The reason for this trend may be the higher number of public sector health facilities enrolled in the central region. Another explanation could be that consumers may be traveling

<table>
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<tr>
<th>Table 1 Distribution and association of SHPI beneficiaries’ choice between public/private sector health facilities</th>
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<td><strong>Variables</strong></td>
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<td><strong>Overall</strong></td>
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<td><strong>Treatment groups</strong></td>
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<td>Surgical</td>
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<td>Obstetrics/Gynaecological</td>
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<tr>
<td>Medical</td>
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<td><strong>Age groups (yr)</strong></td>
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<td><strong>Cost groups (US$)</strong></td>
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<td><strong>Geographic location of health facilities</strong></td>
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*P significant at < 0.01.

SHPI = Social Health Protection Initiative.
from other parts of the Province to the central region to seek treatment from tertiary care hospitals. The provincial capital is located in the central region and has 3 tertiary care public sector hospitals, which were all enrolled under SHPI. Moreover, beneficiaries are covered for the cost of travelling for treatment. This might have created an incentive for the beneficiaries to receive treatments in large and specialized tertiary care hospitals.

This study used census data for the use of health facilities. The results can be generalized to the lowest socioeconomic population in Khyber Pakhtunkhwa Province. However, the results cannot be extrapolated in terms of gender-based application because the data obtained from the SHPI Project Office were not disaggregated by gender.

**Conclusion**

SHPI beneficiaries have lesser odds of visiting a public sector health facility over a private facility for surgical and obstetrics/gynaecological health services. However, there is more likelihood for the utilization of public sector health facilities with increasing age and cost. It is evident from the study that demand-side financing empowers the consumers to exercise their choices in the selection of health facilities across the sectors. A qualitative study might be needed to understand, in-depth, the reasons for increased private sector utilization by the consumers of SHPI for surgical and obstetrics/gynaecological services.

**Table 2. Multivariable logistic regression analysis of SHPI beneficiaries for the choice of public sector health facilities (n = 36 915)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>aOR</th>
<th>95% CI</th>
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<tr>
<td><strong>Treatment groups</strong></td>
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<tr>
<td>Surgical</td>
<td>0.12</td>
<td>0.10–0.16</td>
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<tr>
<td>Obstetrics/Gynaecological</td>
<td>0.11</td>
<td>0.09–0.14</td>
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<tr>
<td>Medical</td>
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<td>Reference group</td>
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<tr>
<td><strong>Age groups (yr)</strong></td>
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<td>18–35</td>
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<td>36–49</td>
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<td>Reference group</td>
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<td><strong>Cost groups (US$)</strong></td>
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<td>9.89</td>
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<td>1–48</td>
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<tr>
<td><strong>Geographic location of health facilities</strong></td>
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<tr>
<td>Central region</td>
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<td>Southern region</td>
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<td>Northern region</td>
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<tr>
<td>Nagelkerke R²</td>
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aOR = adjusted odds ratio; CI = confidence interval; SHPI = Social Health Protection Initiative.

**Acknowledgement**

We would like to thank Mr. Abdul Latif and Dr. Junaid Ahmad for their valuable suggestions to improve this manuscript.

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**Competing interests:** None declared.

**Choix des établissements de santé par les usagers appartenant au groupe socio-économique le plus bas dans le cadre d’un nouveau programme de financement de la santé axé sur la demande mis en œuvre au Pakistan**

**Résumé**

**Contexte:** L’initiative de protection sociale de la santé (Social Health Protection initiative, SHPI) a été initialement mise en place au Pakistan dans la province de Khyber Pakhtunkhwa. Son objectif était de fournir au groupe socio-économique le plus bas de la population des services des soins hospitaliers, dont l’accès serait autrement financièrement difficile. Il s’agit de l’un des projets phares du gouvernement provincial visant à contribuer à la réalisation des objectifs de développement durable des Nations Unies et à la mise en place de la couverture sanitaire universelle.

**Objectifs:** Évaluer le choix des établissements de santé par les personnes inscrites à l’initiative de protection sociale de la santé et les facteurs qui déterminent ce choix entre les établissements du secteur public et ceux du secteur privé.

**Méthodes:** Nous avons utilisé les données secondaires des services de santé dispensés de février 2016 à septembre 2017 dans le cadre de l’initiative de protection sociale de la santé. Une variable de résultat de substitution
References


Assessing risk behaviours in the Iranian general population: results from the Iranian Mental Health Survey

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Abstract

Background: The Islamic Republic of Iran is a majority Muslim country, with a culturally low acceptance of high-risk behaviours.

Aims: To investigate co-occurrence of risk behaviours in the Iranian general population.

Methods: This was a cross-sectional study. Data were obtained from a random subsample of 3508 participants in the Iranian Mental Health Survey conducted in 2011 who completed a self-administered questionnaire about risk behaviours. The latent class analysis was performed on 7 behaviours consisting of cigarette smoking, alcohol consumption, opium use, use of other illicit drugs, having multiple sexual partners, imprisonment, and running away from home. Unordered multinomial logistic regression was performed to examine characteristics of participants in the latent classes.

Results: In the past 12 months, the rates of cigarette smoking, alcohol consumption, opium use, and use of other illicit drugs were 19.4%, 6.3%, 4.4%, and 4.2%, respectively. Three classes were identified: 1, a large class with low prevalence of risk behaviours [89.2%; 95% confidence interval (CI): 88.2–90.2%]; 2, high prevalence of all risk behaviours except drug use (6.1%; 95% CI: 5.3–6.9%); and 3, high prevalence of all risk behaviours (4.7%; 95% CI: 4.1–5.5%). Men and individuals with psychiatric disorders were over-represented in both classes 2 and 3.

Conclusion: Alcohol consumers and opium users were at risk of other risky behaviours.

Keywords: epidemiology, latent class analysis, comorbidity, opioid-related disorders, cannabis.

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Introduction

Illicit drug use generally occurs with other risk behaviours and together, they contribute to several medical and psychological morbidities (1,2), socioeconomic adversity (3), and even a high rate of mortality (4). The Islamic Republic of Iran has a Muslim majority population. Consumption of alcohol and extramarital sexual relationships are culturally unacceptable for most of the population and illegal. While opium has been the main drug of use in the country for decades, the use of other illicit drugs is stigmatized (5). Nevertheless, the use of synthetic drugs in the country has been on the rise (6).

Few epidemiological studies have investigated the prevalence and correlates of high-risk behaviours in the Islamic Republic of Iran, and these studies have focused on a specific population at a provincial level. For instance, several studies have investigated high-risk behaviours among university students, and 2.5–77% of the students were assigned to a high-risk group with a high probability of illicit drug use (7,8). To the best of our knowledge, there has been no national epidemiological assessment of risk behaviours in the general Iranian population. Improving estimates of these behaviours in the population and their correlation patterns has important implications for identifying at-risk population groups and improving targeted preventive and healthcare policies for those who are most at risk.

One of the major challenges in estimating the prevalence of risk behaviours in population surveys is the respondents’ reluctance to disclose these behaviours because of stigma, social-desirability response bias, and in some cases, concerns regarding the legal ramifications of such disclosures. In the past research, several approaches have been used to improve reporting of high-risk behaviours in population surveys (9). One of the methods attempted to improve respondents’ privacy by administering self-report questionnaires that allowed the respondents to answer sensitive questions without disclosing their responses to the interviewer (10).

In the current study, we aimed to describe the prevalence of risk behaviours in the general population using data drawn from the Iranian Mental Health Survey.
(IranMHS) (11). More specifically, we aimed to identify the most at-risk groups using latent class analysis (LCA). This method was applied in prior research for defining patterns of substance use and other risk behaviours in several national surveys in the United States of America (12) and the United Kingdom of Great Britain and Northern Ireland (13) as well as in the Iranian high school and university students (11). We aimed to classify the Iranian general population according to the pattern of 7 risk behaviours by LCA and to characterize the classes with regard to other variables.

**Methods**

**Study design and population**

Data on risk behaviours were derived from a random subsample of the IranMHS. IranMHS was conducted in 2011 on a representative sample of the Iranian population aged 15–64 years. The primary aim of the IranMHS was to assess the prevalence of psychiatric disorders, outpatient and inpatient service utilization, and the cost of mental illnesses among Iranians aged 15–64 years. The details of the design and protocol of the survey are published elsewhere (14).

**Measurements**

Data on sociodemographic characteristics and psychiatric diagnoses were collected through face-to-face interviews. Psychiatric diagnoses were ascertained using Composite International Diagnosis Interview version 2.1, CIDI 2.1, a structured diagnostic interview based on Diagnostic and Statistical Manual, 4th edition (15). Several psychiatric disorders were assessed in the IranMHS: major depressive disorder, dysthymia, bipolar I disorder, panic disorder (with and without agoraphobia), agoraphobia without panic, obsessive–compulsive disorder, social phobia, post-traumatic stress disorder, and alcohol and other substance use disorders. The life-threatening events were drawn from screening questions of the post-traumatic disorder section (K section) of Composite International Diagnostic Interview 2.1, which provides a comprehensive list of stressful life events. The participants were asked if they had a life-threatening stressful event in their lifetime and whether the stress was sustained in the 12 months prior to the interviews.

**Data collection**

All questions were answered using paper and pencil. Along with data collected through face-to-face interviews to assess psychiatric disorders in this national survey, a self-administered questionnaire for risk behaviours was randomly administered to half of the respondents, with a response rate of 76%. This questionnaire included: frequency of cigarette smoking; alcohol consumption; use of opium or sukhteh (opium dross), shireh (condensed extract of opium dross), heroin or crack of heroin (16), cannabis, methamphetamine, ecstasy, methylphenidate without a prescription, medicinal opioids without a prescription (methadone/buprenorphine, tramadol, codeine preparations), and benzodiazepines without a prescription; number of sexual partners in the past 12 months; and history of imprisonment and running away from home.

The self-administered questionnaire was placed in the middle of the interview package. The interviewers helped respondents with a low level of education to read the questions but were not allowed to see their responses. For those who were illiterate, the questions were answered through an interview. The participants were instructed to put the completed questionnaires into a ballot-type box. Interviewers assured the respondents that the box would be sent directly to the survey headquarters and that the interviewer would not know their responses. After recruiting all participants in each province, the closed boxes were sent to the survey centre and opened by the supervisors. The self-report questionnaires did not include the name and identity of the respondents and were linked to the main survey only through an alphanumeric code. The survey protocol was approved by the Ethics Committee of Tehran University of Medical Sciences (no. IR.TUMS.REC.1394.1900). All ethical issues including obtaining informed consent and establishing confidentiality during the interview were considered carefully by the research team.

**Statistical analysis**

We calculated prevalence estimates and 95% confidence intervals (CIs) for use of substances and other risk behaviours. The prevalence of risk behaviours was estimated using the same survey weight utilized in the IranMHS (14). It was a joint product of the inverse probability of unit selection into the sample (w1), nonresponse weights (w2), and post-stratification weights (w3). We used LCA to categorize individuals into distinct classes based on their responses to questions regarding the 7 risk behaviours: (1) smoking a cigarette at least once a month in the past 12 months; (2) alcohol consumption in the past 12 months; (3) opium use in the past 12 months; (4) use of any other illicit drugs in the past 12 months, including cannabis, shireh, heroin or crack of heroin, methamphetamine, and ecstasy; (5) having > 1 sexual partner in the past 12 months; (6) imprisonment; and (7) running away from home. Since opium has traditionally been used in the Islamic Republic of Iran for centuries and is considered to have a low-risk profile and less stigma than other illicit drugs (17), we separated opium use from other illicit drugs for this analysis.

The LCA model produced 2 sets of parameters: (1) prevalence of latent classes in the population; and (2) item response probabilities for each class, which was the likelihood of particular responses to particular questions, conditional to membership in a specific latent class. We ran the model with 15 000 iterations and 100 repetitions for each analysis to ensure reliability of the results. The Bayesian Information Criterion (BIC) and the Akaike’s Information Criterion (AIC) were used to identify the model with the best fit. Interpretability and parsimony were also considered in the choice of model. After selecting
the final model, the probability of class membership was regressed on demographic characteristics, stressful life-threatening events, and diagnosis of psychiatric disorders to identify the correlates of risk behaviour in this population. Odds ratios and 95% CIs were calculated compared to a baseline class generated through LCA. All analyses were performed using R programming language version 2.14.2 and STAT version 15 (Stata Corp., College Station, Texas, United States of America).

For the estimation of latent class and latent class regression models, we used the polytomous variable LCA package of R statistical programming (18). For comparison of classes in the LCA model, class membership was considered as a nominal variable. An unordered multinomial logistic regression was performed to determine the correlates of membership to each of the 3 classes. In this regression model, the low-risk class was considered as the reference group.

**Results**

A total of 3508 individuals (1546 male and 1962 female) completed the self-report questionnaire, with a response rate of 76.7%. The mean (standard deviation) age of the participants was 32.78 (11.90) years. The majority were married (70%) and lived in urban areas (55.9%). Only 7.3% of the respondents were illiterate.

The prevalence of risk behaviours according to the self-administered questionnaire are presented in Table 1. Prevalence of cigarette smoking, alcohol consumption, and opium use at least once in the past 12 months was 19.4%, 6.3%, and 4.4%, respectively. Use of other illicit drugs, mainly consisting of opioids other than opium and cannabis, was reported by 4.2% of the participants. There was no significant difference in reporting substance use among those who completed the questionnaire themselves and those whose questionnaire was completed or seen by the interviewer. There was a large overlap between the use of opium and its derivatives, alcohol, and other illicit drugs (Figure 1). The prevalence of having > 1 sexual partner in the past 12 months was 4.0%, lifetime imprisonment was 3% and lifetime running away from home was 2.5% (Table 1).

Table 2 presents the fit indices for the 1- to 6-class LCA models. The 3-class model had the smallest values of AIC and BIC and provided an interpretable model. Table 3 presents the probability of the risk behaviours for participants assigned to each of the 3 classes. Class 1 comprised 89.2% of the sample, followed by 6.1% in class 2 and 4.7% in class 3. Class 1 had the lowest probability for all risk behaviours and was labelled the low-risk class. Individuals in class 2 showed a high probability for all risk behaviours except for the use of opium and other illicit drugs. The main substance used in this class was alcohol. As such, this class was labelled non-drug-using high-risk class. Class 3 consisted of individuals with a high probability of all 7 high-risk behaviours and was labelled the high-risk class.

Compared to participants in class 1, those in class 2 were more likely to be male, have a psychiatric disorder, and be exposed to stressful life-threatening events, but less likely to belong to a high socioeconomic group (Table 4). Compared to participants in class 1, those in class 3 were more likely to be male, older, and have a psychiatric disorder, but less likely to have higher education.

**Discussion**

We estimated risk behaviours in the Iranian population using a self-administered measure and explored patterns of risk behaviours using the LCA method. Opioids were the most common illicit drugs used and opium was the most commonly used illicit opioid. A 3-class model was found to provide the best fit for describing patterns of risk behaviours. Our findings suggest that ~89% of the population could be classified as low risk. Other than smoking cigarettes, the prevalence of the risk behaviours was close to zero in this class. The analyses identified 2 high-risk groups. (1) The non-drug-using high risk class had substantial prevalence of almost all risk behaviours, except use of opium and other illicit drugs. Alcohol consumption was also prevalent in this class. (2) The high-risk class comprised participants with a high prevalence of all risk behaviours, especially opium and illicit drug use. The 2 high-risk groups were distinguishable by their use of opium and other illicit drugs. However, both groups did not differ substantially for other risk behaviours.

Although several studies have investigated the pattern of substance use and risk behaviours, there were inconsistencies in the risk behaviours of interest among the studies. Smoking, binge drinking, illicit drug or polysubstance use, emotional distress, unhealthy diet, lack of appropriate physical activity, and insufficient sleep, all together or in groups, were considered as high-risk behaviours in different studies (19–21). The inconsistency between the target population and the risk behaviours of interest makes it difficult to compare the results of the current study with past research. Most of the available research with the same methodology has been conducted in western countries that have different legal, social, and cultural perspectives regarding alcohol and marijuana use. Most studies that have applied the LCA method to classify individuals based on their risk behaviours have focused on substance use. In most of these studies, a large class of individuals with a low prevalence of substance use and a small group of polydrug users were identified (13,19,21,22). Similar to the current study, < 5% of the participants in a national survey of secondary school students had multiple risk behaviours including polydrug use and emotional distress (21). Another LCA based on a large number of adolescents from 25 European countries identified 4 substance use classes: a large group of nonusers, 2 groups of alcohol and concurrent alcohol and marijuana users, and a small group of polysubstance users (22). Similarly, a study of British adults identified 3 latent classes: a large class with no polydrug use, and 2 small groups with moderate and high prevalence of
Table 1: Weighted percentage of substance use and other risk behaviours using the self-administered questionnaire in an Iranian general population sample aged 15–64 years

<table>
<thead>
<tr>
<th>Substance/Activity</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
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<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
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<tbody>
<tr>
<td><strong>Use in the past 12 months (number of respondents)</strong></td>
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<tr>
<td>Cigarettes (3498)</td>
<td>19.4 (17.7–21.1)</td>
<td>9.7 (8.4–10.9)</td>
<td>33.5 (30.5–36.4)</td>
<td>18.2 (15.9–20.5)</td>
<td>5.3 (4.0–6.6)</td>
<td>1.1 (0.5–1.6)</td>
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<tr>
<td>≥ 10 cigarettes/day (3407)</td>
<td>7.2 (6.2–8.4)</td>
<td>—</td>
<td>14.3 (12.2–16.6)</td>
<td>—</td>
<td>0.4 (0.2–0.8)</td>
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<tr>
<td>Hookah/pipe/Chibouk (3479)</td>
<td>20.4 (18.6–22.2)</td>
<td>2.0 (1.4–2.6)</td>
<td>29.9 (26.9–32.9)</td>
<td>2.7 (1.6–3.8)</td>
<td>10.9 (9.1–12.7)</td>
<td>1.3 (0.8–1.8)</td>
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<tr>
<td>Codeine–containing medicines (3481)</td>
<td>49.3 (47.1–51.5)</td>
<td>1.8 (1.3–2.4)</td>
<td>44.9 (41.6–48.1)</td>
<td>1.2 (0.5–1.9)</td>
<td>53.8 (51.0–56.5)</td>
<td>2.5 (1.7–3.2)</td>
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<td>Benzodiazepines (3486)</td>
<td>10.7 (9.4–12.1)</td>
<td>1.5 (1.0–2.1)</td>
<td>10.8 (8.9–12.8)</td>
<td>1.6 (0.7–2.4)</td>
<td>10.6 (8.8–12.4)</td>
<td>1.5 (0.8–2.1)</td>
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<td>Ritalin (3457)</td>
<td>0.2 (0.0–0.3)</td>
<td>0.02 (0.0–0.07)</td>
<td>0.2 (0.0–0.5)</td>
<td>0.05 (0.0–0.1)</td>
<td>0.1 (0.0–0.3)</td>
<td>0</td>
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<tr>
<td>Prescribed methadone/buprenorphine (3429)</td>
<td>0.9 (0.5–1.2)</td>
<td>0.4 (0.2–0.7)</td>
<td>1.7 (1.0–2.4)</td>
<td>0.9 (0.3–1.4)</td>
<td>0.07 (0.0–0.2)</td>
<td>0.03 (0.0–0.08)</td>
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<tr>
<td>Alcohol (3446)</td>
<td>6.3 (5.2–7.4)</td>
<td>0.06 (0.0–0.1)</td>
<td>11.0 (9.0–13.0)</td>
<td>0.1 (0.0–0.3)</td>
<td>1.6 (0.8–2.3)</td>
<td>0</td>
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<td>≥ 5 drinks of alcohol in succession (61)</td>
<td>2.4 (1.7–3.2)</td>
<td>—</td>
<td>4.4 (3.2–6.0)</td>
<td>—</td>
<td>0.3 (0.1–0.8)</td>
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<tr>
<td>Cannabis (3437)</td>
<td>1.3 (0.8–1.8)</td>
<td>0.4 (0.1–0.8)</td>
<td>2.4 (1.4–3.4)</td>
<td>0.9 (0.2–1.6)</td>
<td>0.2 (0.0–0.3)</td>
<td>0</td>
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<tr>
<td>Illicit opioids (3425)</td>
<td>4.8 (4.0–5.7)</td>
<td>1.3 (0.9–1.9)</td>
<td>8.7 (7.2–10.5)</td>
<td>2.6 (1.8–3.8)</td>
<td>0.8 (0.6–1.3)</td>
<td>0.07 (0.0–0.2)</td>
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<td>Opium/opium dross (3439)</td>
<td>4.4 (3.6–5.3)</td>
<td>1.2 (0.7–1.7)</td>
<td>7.9 (6.4–9.5)</td>
<td>2.3 (1.4–3.3)</td>
<td>0.8 (0.4–1.1)</td>
<td>0.05 (0.0–0.1)</td>
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<tr>
<td>Shireh (3440)</td>
<td>2.3 (1.7–2.9)</td>
<td>0.3 (0.1–0.5)</td>
<td>4.2 (3.0–5.3)</td>
<td>0.6 (0.2–0.9)</td>
<td>0.4 (0.2–0.7)</td>
<td>0.02 (0.0–0.06)</td>
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<td>Heroin/crack of heroin (3434)</td>
<td>0.6 (0.1–1.1)</td>
<td>0.1 (0.0–0.3)</td>
<td>1.1 (0.6–2.1)</td>
<td>0.6 (0.2–1.4)</td>
<td>0.1 (0.0–0.3)</td>
<td>0.02 (0.003–0.02)</td>
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<tr>
<td>Illicit stimulants (3433)</td>
<td>0.8 (0.5–1.4)</td>
<td>0.1 (0.0–0.3)</td>
<td>1.4 (0.8–2.4)</td>
<td>0.2 (0.0–0.8)</td>
<td>0.3 (0.6–1.4)</td>
<td>0</td>
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<tr>
<td>Methamphetamine (3439)</td>
<td>0.7 (0.3–1.1)</td>
<td>0.1 (0.0–0.3)</td>
<td>1.4 (0.6–2.2)</td>
<td>0.2 (0.0–0.5)</td>
<td>0.06 (0.0–0.1)</td>
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<td>Ecstasy (3450)</td>
<td>0.3 (0.0–0.7)</td>
<td>0</td>
<td>0.4 (0–0.9)</td>
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<td>0.2 (0.0–0.7)</td>
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<tr>
<td>Any substance use (3408)</td>
<td>10.3 (9.0–11.7)</td>
<td>1.7 (1.2–2.4)</td>
<td>17.8 (15.5–20.3)</td>
<td>3.3 (2.3–4.6)</td>
<td>3.7 (1.9–3.9)</td>
<td>0.07 (0.0–0.2)</td>
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<td>Any illicit drug use (3445)</td>
<td>5.5 (4.7–6.5)</td>
<td>1.6 (1.2–2.3)</td>
<td>9.9 (8.2–11.8)</td>
<td>3.2 (2.2–4.5)</td>
<td>1.2 (0.7–2.0)</td>
<td>0.07 (0.0–0.2)</td>
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<td><strong>Other risk behaviours (no. of respondents)</strong></td>
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<td>&gt;1 partner in the past 12 months (2630)</td>
<td>4.0 (3.1–5.3)</td>
<td>—</td>
<td>7.3 (5.5–9.6)</td>
<td>—</td>
<td>0.5 (0.2–1.1)</td>
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<tr>
<td>Imprisonment in lifetime (3420)</td>
<td>3.0 (2.4–3.8)</td>
<td>—</td>
<td>5.7 (4.5–7.2)</td>
<td>—</td>
<td>0.3 (0.2–0.8)</td>
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<tr>
<td>Running away from home in the lifetime (3414)</td>
<td>2.5 (1.9–3.2)</td>
<td>—</td>
<td>4.2 (3.1–5.7)</td>
<td>—</td>
<td>0.7 (0.4–1.2)</td>
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</table>

*Not prescribed by a physician or used more than the recommended dose.

*Not prescribed and supervised by a physician.

Condensed extract of opium dross.

*Condensed extract of opium dross.

*Any substance use includes alcohol, cannabis, illicit opioids, and illicit stimulants.

*Any illicit drug use includes alcohol, cannabis, illicit opioids, and illicit stimulants.

CI = confidence interval.
polydrug use (13). The probability of smoking, hazardous alcohol consumption, and mental health problems was higher in the latter 2 groups.

One of the different findings in our study compared with others around the world was that alcohol consumers were not classified in the large low-risk class, and presented with a high rate of other risky behaviours. This may have been due to the cultural and legal prohibitions against consumption of alcohol, making it similar to other illicit substances in the Islamic Republic of Iran. These associations are concerning given the recent reports showing a rise in alcohol consumption and its associated health consequences in this population (23).

Our study showed that those who engaged in risk behaviours were more likely men and had higher odds of psychiatric disorders. More than 90% of the high-risk class were male, and nearly 60% of them had been diagnosed with ≥ 1 psychiatric disorder in the past 12 months. A review of epidemiological studies in the Islamic Republic of Iran showed that cigarette smoking, alcohol consumption and illicit drug use were significantly more common in men than women (24). The strong association of psychiatric disorders with high-risk behaviours has also been noted previously (25).

It is noteworthy that opium use, which has traditionally been used for centuries in the Islamic Republic of Iran (26), was associated with the high-risk class. It suggests a new pattern of opium consumption, which appeared in combination with other risk behaviours including other illicit drug use. Earlier research has suggested lower social stigma, lower rate of criminal justice involvement, and psychiatric illness in those who use opium compared to other illicit drugs (5). However, there is some evidence that this pattern may be changing. Recent studies from some Iranian provinces have identified a higher crime rate and prevalence of psychiatric comorbidity in occasional opium users as well as individuals with opium dependence, compared to the non-opium-using population (27). Our findings suggest an increase in polysubstance use among Iranian opium users, which echoes evidence of the increasing trend of polydrug use in other countries (28,29).

Some people had a high probability of certain risk behaviours that could put them at a greater risk of negative health consequences. Multiple sexual partners in combination with other risk behaviours, such as stimulant drug use, could increase the risk of unsafe

---

**Table 2** Summary of fit indices for the LCA model with 1 to 6 classes

<table>
<thead>
<tr>
<th>Model</th>
<th>No. of parameters</th>
<th>Log likelihood</th>
<th>BIC</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-class</td>
<td>7</td>
<td>-4438.6</td>
<td>8934.4</td>
<td>8891.3</td>
</tr>
<tr>
<td>2-class</td>
<td>15</td>
<td>-3822.1</td>
<td>7766.6</td>
<td>7674.2</td>
</tr>
<tr>
<td>3-class</td>
<td>23</td>
<td>-3779.1</td>
<td>7745.9</td>
<td>7604.1</td>
</tr>
<tr>
<td>4-class</td>
<td>31</td>
<td>-3766.3</td>
<td>7785.6</td>
<td>7594.6</td>
</tr>
<tr>
<td>5-class</td>
<td>39</td>
<td>-3755.9</td>
<td>7828.7</td>
<td>7588.3</td>
</tr>
<tr>
<td>6-class</td>
<td>47</td>
<td>-3752.8</td>
<td>7899.3</td>
<td>7599.4</td>
</tr>
</tbody>
</table>

AIC = Akaike’s Information Criterion; BIC = Bayesian Information Criterion; LCA = latent class analysis.

---

**Table 3** Prevalence of risk behaviour classes and probability of observed risk behaviours conditional on class membership in the Iranian general population aged 15–64 years

<table>
<thead>
<tr>
<th>Class 1 (low risk)</th>
<th>Class 2 (non-drug-using high risk)</th>
<th>Class 3 (high risk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class prevalence</td>
<td>0.892</td>
<td>0.001</td>
</tr>
<tr>
<td>Smoking at least once a month in past 12 months</td>
<td>0.0532</td>
<td>0.4381</td>
</tr>
<tr>
<td>Alcohol consumption, past 12 months</td>
<td>0.0081</td>
<td>0.3304</td>
</tr>
<tr>
<td>Opium use, past 12 months</td>
<td>0.0061</td>
<td>0.0000</td>
</tr>
<tr>
<td>Any illicit drug use, other than opium a, past 12 months</td>
<td>0.0046</td>
<td>0.0543</td>
</tr>
<tr>
<td>&gt; 1 sexual partner, past 12 months</td>
<td>0.0093</td>
<td>0.1564</td>
</tr>
<tr>
<td>Imprisonment during lifetime</td>
<td>0.0040</td>
<td>0.1507</td>
</tr>
<tr>
<td>Running away from home during lifetime</td>
<td>0.0073</td>
<td>0.1036</td>
</tr>
</tbody>
</table>

The variables with a high prevalence in each class are shown in bold.

a Includes cannabis, shireh (condensed extract of opium dross), heroin or crack of heroin, methamphetamine, ecstasy.
### Table 4: Correlates of risk behaviours: unordered multinomial logistic regression with the low-risk class as the reference group

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total n (%)</th>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
<th>Class 2 compared to class 1</th>
<th>Class 3 compared to class 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1962 (55.9)</td>
<td>97.7</td>
<td>1.9</td>
<td>0.4</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>Male</td>
<td>1546 (44.1)</td>
<td>78.3</td>
<td>12.7</td>
<td>9.0</td>
<td>12.58</td>
<td>8.19–19.33</td>
</tr>
<tr>
<td><strong>Age groups, yr</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-19</td>
<td>446 (12.7)</td>
<td>92.4</td>
<td>7.0</td>
<td>0.6</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>20-29</td>
<td>1163 (33.2)</td>
<td>86.0</td>
<td>9.5</td>
<td>4.5</td>
<td>1.57</td>
<td>0.89–2.79</td>
</tr>
<tr>
<td>30-39</td>
<td>948 (27.0)</td>
<td>86.9</td>
<td>6.5</td>
<td>6.6</td>
<td>1.11</td>
<td>0.57–2.17</td>
</tr>
<tr>
<td>40-49</td>
<td>559 (15.9)</td>
<td>89.2</td>
<td>4.0</td>
<td>6.8</td>
<td>0.61</td>
<td>0.27–1.31</td>
</tr>
<tr>
<td>50-59</td>
<td>293 (8.4)</td>
<td>87.7</td>
<td>6.9</td>
<td>5.4</td>
<td>1.17</td>
<td>0.51–2.65</td>
</tr>
<tr>
<td>60-64</td>
<td>99 (2.8)</td>
<td>85.7</td>
<td>12.9</td>
<td>1.4</td>
<td>1.26</td>
<td>0.43–3.67</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separated/divorced/widowed</td>
<td>139 (4.0)</td>
<td>86.5</td>
<td>9.9</td>
<td>3.6</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>Never married</td>
<td>913 (26.0)</td>
<td>88.5</td>
<td>6.2</td>
<td>5.3</td>
<td>0.91</td>
<td>0.29–2.84</td>
</tr>
<tr>
<td>Married</td>
<td>2454 (70)</td>
<td>93.5</td>
<td>2.2</td>
<td>4.3</td>
<td>0.69</td>
<td>0.23–2.03</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 9 years</td>
<td>1649 (47.0)</td>
<td>87.4</td>
<td>6.1</td>
<td>6.5</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>9-12 years</td>
<td>1313 (37.5)</td>
<td>87.9</td>
<td>8.1</td>
<td>4.0</td>
<td>1.04</td>
<td>0.73–1.49</td>
</tr>
<tr>
<td>&gt; 12 years</td>
<td>544 (15.5)</td>
<td>89.3</td>
<td>7.8</td>
<td>2.9</td>
<td>0.73</td>
<td>0.45–1.2</td>
</tr>
<tr>
<td><strong>Socioeconomic status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>922 (26.8)</td>
<td>87.3</td>
<td>4.7</td>
<td>8.0</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>Middle</td>
<td>1459 (42.4)</td>
<td>87.9</td>
<td>8.0</td>
<td>4.1</td>
<td>0.86</td>
<td>0.60–1.23</td>
</tr>
<tr>
<td>High</td>
<td>1062 (30.8)</td>
<td>88.4</td>
<td>8.1</td>
<td>3.5</td>
<td>0.56</td>
<td>0.35–0.90</td>
</tr>
<tr>
<td><strong>Place of residence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>1548 (44.1)</td>
<td>87.8</td>
<td>6.7</td>
<td>5.5</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>Urban</td>
<td>1960 (55.9)</td>
<td>88.1</td>
<td>7.5</td>
<td>4.4</td>
<td>1.09</td>
<td>0.79–1.52</td>
</tr>
<tr>
<td><strong>Sustained stress due to life-threatening events</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>3018 (86.0)</td>
<td>89.4</td>
<td>6.3</td>
<td>4.3</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>Yes</td>
<td>490 (14.0)</td>
<td>79.1</td>
<td>13.6</td>
<td>7.3</td>
<td>1.76</td>
<td>1.23–2.33</td>
</tr>
<tr>
<td><strong>Psychiatric disorder</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>2622 (75.0)</td>
<td>90.9</td>
<td>6.1</td>
<td>3.0</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>Yes</td>
<td>874 (25.0)</td>
<td>78.6</td>
<td>11.2</td>
<td>10.2</td>
<td>2.41</td>
<td>1.73–3.35</td>
</tr>
</tbody>
</table>

*Items in bold font are significant: *P* < 0.05*
sex and sexually transmitted diseases. The association between illicit drug use, high-risk sexual behaviours, and sexually transmitted and blood-borne infections in Iranian drug users is well documented \((2,30,31)\). The substantial percentage of the general population in either of 2 high-risk groups raises the necessity of providing population-wide preventive interventions \((32)\), as well as screening and therapeutic measures for the population with treatment needs \((33)\).

This study was the first Iranian national study to classify individuals according to their substance use and other risk behaviours. A limitation of our study was the cultural barrier in asking such sensitive questions, especially on sexual relationships. Although we used a self-administered questionnaire to assist the reporting of risk behaviours, social and cultural barriers in responding to sensitive questions, especially regarding sexual behaviour, remained a limitation of our study. We also sought to reduce the impact of such barriers by limiting the number of questions regarding sexual partners and placing this question at the end of the questionnaire. However, future innovative methods are needed to improve recording these highly sensitive behaviours. Expansion of mHealth, triangulation of different data collection methods, and unintrusive means of assessing risk behaviours may provide new avenues for such assessments \((34)\).

**Conclusion**

The present study revealed that the majority of the population did not report high-risk behaviours. However, in the minority, most of the risk behaviours occurred together. Both alcohol consumption and opium use place individuals in this community at elevated risk for other risky behaviours. A substantial percentage of the general population was classified into either of the 2 high-risk groups, which raises the necessity of providing population-wide preventive interventions as well as screening and therapeutic measures for the population with treatment needs. All high-risk behaviours should be addressed in primary prevention efforts.

**Acknowledgement**

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References


Spatiotemporal variation and socioeconomic factors of financial hardships of out-of-pocket health expenditure in Pakistan

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Abstract

Background: Financial hardships of out-of-pocket health expenditure (OPHE) is a growing concern for health policy makers in many low and middle-income countries. Spatiotemporal variation between Pakistan’s four provinces over 2001-2015 is discussed, which would help comparing existing health services delivery and financial risk protection plans.

Aims: In this paper, we estimate financial hardship of OPHE in Pakistan.

Methods: We use the data sets of the household integrated economic surveys 2001-02, 2005-06, 2010-11 and 2015-16. We estimate OPHE share in household total and non-subsistence expenditure, catastrophic headcount at the threshold of OPHE ≥ 10% of total expenditure or OPHE ≥ 25% of non-subsistence expenditure. We estimate impoverishment of OPHE using national poverty lines. Finally, we explore socioeconomic factors of financial hardships of OPHE.

Results: Over the years, catastrophic headcount and impoverishment of OPHE had decreased at national level (~1.3% points) and in the provinces of Sindh (~7.8% points) and Khyber Pukhtoonkhawa (KPK), (~2.8% points). The province of KPK and the year 2005-06 witnessed the highest incidence of financial catastrophe (26.89% points) and impoverishment (4.8% points) of OPHE. Households in rural areas, in the middle and rich quintiles and those headed by a male were more likely to encounter financial catastrophe and impoverishment due to OPHE.

Conclusion: Inter-provincial variation in financial hardships of OPHE provide aide to provincial level priority setting. The high impact of OPHE in the non-poor, in rural areas, and in KPK calls for enhanced targeting of financial risk protection plans.

Keywords: out-of-pocket health expenditure, interrupted time series analysis, spatial analysis, financial catastrophe, Pakistan

Introduction

Historical background

Health care financing is an area of low priority in health policy formulation and analysis in Pakistan. The country is not included in the Universal Health Coverage Study Series group: low- and middle-income countries (LMICs) that are implementing major reforms to achieve universal health care (1). In contrast with other countries in the region (Bangladesh 1996–97, India 1997, Nepal 1997, Sri Lanka 1995), Pakistan only produced its first national health accounts in 2008 (2). Public expenditure reviews and health care financing analyses are rarely carried out (3). During the 2000s, Pakistan ignored many global and regional efforts to track progress on financial risk protection. For instance, in the World Health Organization (WHO) study on financial catastrophe in 59 countries, Bangladesh and Sri Lanka were included from south Asia (4). In the research collaboration on financial hardships of out-of-pocket health expenditure (OPHE) in 11 Asian countries, Bangladesh, India, Nepal, and Sri Lanka participated from the south Asian region (5,6). In the second round of the WHO study, the number of countries increased from 59 to 89, still excluding Pakistan (7). In the section on financial hardships of OPHE, one of the background papers of the 2010 World Health Report included Bangladesh, India, Nepal and Sri Lanka from south Asia (8). The WHO and World Bank joint project on universal health coverage case studies from 13 LMICs included Bangladesh and India (9).

As a backdrop to the fact that financial risk protection and universal health coverage have been included in the United Nations Agenda 2030, since 2015, analyses of financial hardships of OPHE have been common for all United Nations Member States, including Pakistan (10–13). The purpose of such efforts is comparison across countries. Pakistan has significant ethnic/linguistic diversity across provinces (Table 1) and the health sector is a provincial matter, thus, evidence on financial risk protection should include subnational and time trend analysis.

Health care financing trends

Health care financing in Pakistan is predominately private out-of-pocket with some improvement over the years (Figure 1). For example, during 2001–2015, the share
of public health expenditure increased from 23% to 34% of the total health expenditure. This was accompanied by a decrease in the share of OPHE in current health expenditure: 68% (2005) to 58% (2015) (2).

Currently, 2 large-scale financial risk protection schemes are operating in the country managed by the provincial government of Khyber Pakhtunkhwa (KPK) and the federal government (14,15). These schemes target the population living below the poverty line and provide coverage for inpatient care with an enrolment of 2.6 million and 6.9 million families respectively. Independent sources, however, report a coverage of 0–3% for these programmes (Table 1).

Aims

The existing literature on the financial hardships from OPHE in Pakistan is limited to a few grey reports that used very old (2003–2004) cross-sectional datasets (16,17). Multi-country analysis provides a national-level estimate of financial hardship in Pakistan but ignores subnational analysis, time trends and socioeconomic determinants of financial hardship of OPHE (10–13).

In this study, we track progress on financial risk protection over the period 2001–2016. We explore whether the economic growth of the country, a decline in the incidence of poverty (Table 2) and an improvement in the texture of health care financing has contained the financial hardships of OPHE. We provide subnational-level analysis due to the ethnic/cultural diversity of the provinces (Table 1) and the fact that since 2010, the health sector has been a provincial matter. We hypothesize that financial hardship from OPHE has decreased at national and provincial levels. Lastly, we explore the influence of socioeconomic factors on OPHE and its financial hardships on households.

Table 1 Socioeconomic and demographic characteristics of the provinces of Pakistan

<table>
<thead>
<tr>
<th>Feature</th>
<th>Sindh</th>
<th>Baluchistan</th>
<th>KPK</th>
<th>Punjab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area, km² (% of total)</td>
<td>140 914 (17.7%)</td>
<td>347 190 (43.6%)</td>
<td>74 521 (4.4%)</td>
<td>205 345 (25.8%)</td>
</tr>
<tr>
<td>Population, thousands (% of total)</td>
<td>47 886 (23%)</td>
<td>12 344 (6)</td>
<td>30 523 (15)</td>
<td>110 012 (53)</td>
</tr>
<tr>
<td>Rural share in total population (%)</td>
<td>48%</td>
<td>72.5%</td>
<td>81.2%</td>
<td>63.3%</td>
</tr>
<tr>
<td>Language spoken (% of province)</td>
<td>Sindhi (59.7%) Urdu (21.0%)</td>
<td>Balochi (54.8%) Pashto (29.6%)</td>
<td>Pashto (73.9%) Hindko (3.9%)</td>
<td>Punjabi (75.2%) Saraiki (17.4%)</td>
</tr>
<tr>
<td>Literacy rate (%)</td>
<td>62.2</td>
<td>55.5</td>
<td>55.3</td>
<td>64.7</td>
</tr>
<tr>
<td>Life expectancy (years)</td>
<td>67.2</td>
<td>67</td>
<td>68.8</td>
<td>66.3</td>
</tr>
<tr>
<td>Under 5 mortality rate (deaths per 1000 live births)</td>
<td>77</td>
<td>78</td>
<td>64</td>
<td>85</td>
</tr>
<tr>
<td>Maternal mortality ratio (deaths per 100 000 live births)</td>
<td>314</td>
<td>785</td>
<td>275</td>
<td>227</td>
</tr>
<tr>
<td>Share in national income (%)</td>
<td>30</td>
<td>3</td>
<td>13</td>
<td>55</td>
</tr>
<tr>
<td>Share in industries (%)</td>
<td>28</td>
<td>3</td>
<td>11</td>
<td>58</td>
</tr>
<tr>
<td>Share in foreign remittance (%)</td>
<td>1.5</td>
<td>1.1</td>
<td>27.5</td>
<td>59.9</td>
</tr>
<tr>
<td>Sehut Sahult programme coverage (%)</td>
<td>Women</td>
<td>0.1</td>
<td>0.1</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>Men</td>
<td>0</td>
<td>0.1</td>
<td>0.1</td>
</tr>
</tbody>
</table>

*Pakistan Demographic and Health Survey. Islamabad: Institute of Population Studies and DHS program ICF 2007; 2019
*KPK = Khyber Pakhtunkhwa.
**Methods**

**Data sources and description**

We use data sets of 4 rounds (i.e. 2001–02, \( n = 16182 \); 2005–06, \( n = 15444 \); 2010–11, \( n = 16341 \); and 2015–16, \( n = 24238 \)) of the Household Integrated Economic Survey conducted by the Pakistan Bureau of Statistics of the Government of Pakistan (links available at: [https://www.pbs.gov.pk/plsm-publications](https://www.pbs.gov.pk/plsm-publications)). It captures a detailed profile of income and expenditure of the population at the household level. The survey uses 2-stage cluster sampling and the sample size is representative at national and provincial levels in all rounds.

Total expenditure of the household in the Household Integrated Economic Survey covers approximately 155 questions using recalls of 2 weeks, 1 month and 1 year.

The yearly total expenditure of the household is the sum of fortnightly expenditures (multiplied by 26), monthly expenditures (multiplied by 12) and yearly expenditures. Non-subsistence expenditure of the household is the total expenditure of the household less subsistence expenditure. We define subsistence expenditure as the expenditure on food items, utilities and fuel, laundry and personal care. To estimate yearly expenditure, we multiply expenditure on 2-week and 4-week recall by a factor of 26 and 12 respectively.

Yearly recall for OPHE was reported as an aggregate at household level. It includes expenditure on medical products and services and excludes health insurance premiums. The recall period for OPHE remained the same over 2001–16, but the questions on OPHE differed. In 2001–02, there were 4 items on OPHE: medicines and appliances, doctors’ fees, hospitalization and dental and ophthalmic care (available via: [https://www.pbs.gov.pk/plsm-publications](https://www.pbs.gov.pk/plsm-publications)). The Household Integrated Economic Survey of 2005–06 and 2010–11 had 2 items on OPHE: medicines and other over-the-counter products and doctors’ fees, and expenditure on hospitalization and all other types of care (Pakistan Bureau of Statistics, 2005–2010). In the Household Integrated Economic Survey 2015–16, there were 34 items on OPHE divided into 3 sections: section 1 had 12 items on over-the-counter purchase, section 2 had 10 items on ambulatory care. Section 3 had 12 items on hospitalization.

For 2001–02, 2005–06, 2010–11 and 2015–16, 89.66%, 99.22%, 99.28% and 99.93% of the sample respectively reported non-zero OPHE. After cleaning the data, the combined sample was 68872 households.

**Analytical approach**

We estimate OPHE in Pakistan rupees (PKR) 2015–16 constant prices. Using the methods of O’Donnell et al., we analysed the absolute and relative financial hardship from OPHE, i.e. impoverishment and financial catastrophe (18).

A financial catastrophe occurs to a household if their OPHE exceeds a certain threshold (proportion) of their income or expenditure. If \( OPHE \) is the out-of-pocket health payment of the \( i \)th household and \( X_i \) is their total (non-subsistence) expenditure, then the \( i \)th household encounters a financial catastrophe (\( E_i \)) if the share of \( OPHE \) in \( X_i \) exceeds the threshold value \( Z \), i.e. \( \langle \) equation \( \rangle \)

\[
E_i = \frac{OPHE_i}{X_i} \geq Z
\]

where \( z \) represents the point where spending on health could create financial hardships for the household.

Due to substantial informal sector and non-market transactions in LMICs, household expenditure is a better proxy of household economic status than household income (18). We used 2 types of household expenditure to estimate financial catastrophe: household total expenditure and non-subsistence expenditure. The argument in favour of using non-subsistence expenditure is that subsistence expenditure is usually non-discretionary and household total expenditure net of subsistence expenditure provides a better understating of the catastrophic impact of OPHE (18). We used 2 threshold values of \( z \) to estimate financial catastrophe, OPHE exceeding 10% of the total expenditure (\( CH_{10} \)) and OPHE exceeding 25% of non-subsistence expenditure (\( CH_{25} \)) (18). The catastrophic headcount (\( CH \)) is the proportion of households that had encountered financial catastrophe, i.e.

\[
CH = \frac{1}{N} \sum_{i=1}^{N} E_i
\]

| Table 2: Socioeconomic and demographic transition in Pakistan 2000–2016 |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Population (million)*      | 146                         | 164                         | 183                         | 199                         |
| Rural share in population (%)* | 52.9                       | 50.4                       | 47.9                       | 45.6                       |
| GDP per capita (US$)*      | 495                         | 837                         | 1165                        | 1368                        |
| GDP annual growth rate (%)* | 3.6                         | 6.5                         | 2.8                         | 4.7                         |
| Share of agriculture in GDP (%)* | 24.1                       | 21.6                       | 21.7                       | 19.9                       |
| GINI index*                | 30.4                        | 32.7                        | 29.8                        | 33.5                        |


For the GINI index, we used data sets of 4 rounds (i.e. 2001–02, \( = 15444 \); 2005–06, \( = 16341 \); and 2015–16, \( = 24238 \)) of the Household Integrated Economic Survey conducted by the Pakistan Bureau of Statistics of the Government of Pakistan (links available at: [https://www.pbs.gov.pk/plsm-publications](https://www.pbs.gov.pk/plsm-publications)). It captures a detailed profile of income and expenditure of the population at the household level. The survey uses 2-stage cluster sampling and the sample size is representative at national and provincial levels in all rounds.
To analyse the distributional aspect of OPHE and catastrophic incidence, we estimated concentration indices (CI) of CH<sub>imp</sub> and CH<sub>res</sub>. We used convenient regression methods to compute the concentration indices (18).

\[ 2\delta^2 \left( \frac{c_i}{\mu} \right) = \alpha + \beta r_i + \epsilon_i \]

In this equation, \( c_i \) is OPHE of the \( i \)th household, \( \mu \) is the mean of OPHE, \( \delta \) is the variance of frictional rank and \( r_i \) is the fractional rank of the household by their total expenditure or non-subsistence expenditure (18).

We estimated the effect of OPHE on poverty headcount (H<sub>imp</sub>) as the difference between poverty headcount gross of total expenditure and poverty headcount of total expenditure net of OPHE.

\[ H_{\text{imp}} = \text{Poverty headcount}_{\text{gross}} - \text{Poverty headcount}_{\text{net}} \]

Where poverty headcount is:

\[ \text{Poverty headcount}_{\text{gross}} = \frac{\sum N_i s_i p_i}{\sum N_i s_i} \]

\( p_i^{\text{gross}} \) is 1 if the household expenditure is > poverty line; \( s_i \) is the size of the household and \( N \) is the number of households. Poverty headcount<sub>net</sub> can be estimated by the same analogy (18).

We used the official national poverty line of the government of Pakistan, which uses the basic development needs approach (19). The poverty lines were available for the years 2005–06, 2010–11 and 2015–16. For 2001–02, we deflated the poverty line of 2005–06 to 2001–02 using consumer price indices (20). In addition to headcount, we estimated catastrophic overshoot and normalized poverty gap (Supplementary Tables 1,2), i.e. the amount a household falls short of the catastrophic threshold or poverty line respectively (18).

Finally, we analysed the influences of the socioeconomic and demographic features of the household on financial hardship of OPHE. We used the Probit regression on each binary outcome (CH<sub>imp</sub>, CH<sub>res</sub>, denoted by \( Y \) in the equation below) and including the vector of 9 covariates: gender, age, schooling, marital status of the head of the household, household size, rural households, quintiles, provinces and year of survey.

\[ P(Y_i = 1|X_i) = \Phi(\beta_0 + \beta_1 \text{Gender} + \beta_2 \text{Age} + \beta_3 \text{Schooling} + \beta_4 \text{Marital Status} + \beta_5 \text{HHsize} + \beta_6 \text{Rural} + \beta_7 \text{Quintiles} + \beta_8 \text{Province} + \beta_9 \text{Year} + \epsilon) \]

Where \( \Phi \) is the non-linear function of \( X \). We accounted for population-adjusted survey sampling weights and clustering at the level of primary sampling units in our analyses. We used the same set of socioeconomic factors as determinants of OPHE (2015–16 prices) using multiple linear regression. In this case, we transformed OPHE to the natural logarithm due to its positively skewed distribution. We estimated standard errors of all variables and these can be provided on request. We used STATA, version 15.1, and MS Excel, 2013, for all analyses.

### Results

Across all years, OPHE at 2015–16 constant prices was highest in 2015–16 in KPK province, in the rural areas and...
in the richest quintiles (Table 3). The disparity in OPHE among the provinces was highest in 2005–06 (KPK PKR 15 325 and Baluchistan PKR 5168).

The share of OPHE in the household total and non-subsistence expenditure slightly decreased over the period of the analysis (Figure 2).

At national level, CH$_{10}$ and CH$_{25}$ had generally decreased, yet this trend was inconsistent. In 2005–06, CH$_{10}$ and CH$_{25}$ had increased from in 2001–02, while in 2010–11 it had decreased. Nationally, the incidence of CH was lowest in 2010–11 and highest in 2005–06. Among the provinces, CH$_{10}$ and CH$_{25}$ were highest in KPK and lowest in Baluchistan. However, in 2 provinces, Punjab and Baluchistan, CH$_{10}$ had increased over the years while CH$_{25}$ had increased in Baluchistan.

CH$_{10}$ and CH$_{25}$ had followed similar trends except that in Baluchistan CH$_{10}$ had increased and CH$_{25}$ had decreased between 2015–16 and 2001–02.

The incidence of financial catastrophe had generally moved away from the rich over the years towards the poor: more of the poor population were encountering CH than the rich population except in Baluchistan where, by 2015, proportionately more non-poor encountered CH than poor. The values of CI were generally more inequitable (pro-poor) for CH$_{25}$ then CH$_{10}$. Unlike the incidence of catastrophic headcount: that was lowest, i.e. more inequitable, in 2010–11 than other years.

Impoverishment from OPHE slightly decreased in 2015–16 compared with in 2001–02 (Table 5). In Punjab and Baluchistan, H$_{imp}$ had increased in 2015–16 compared with in 2001–02. Comparing the years, at the national level and in Punjab, H$_{imp}$ was highest in 2005–06 and

**Table 4**  
Catastrophic headcount (CH) of household out-of-pocket (OOP) health expenditure

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OOP exceeding 10% of total expenditure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>9.6 (0.1)</td>
<td>13.8 (–0.1)</td>
<td>5.9 (–0.0)</td>
<td>8.24 (0.0)</td>
<td>4.2 (–0.2)</td>
</tr>
<tr>
<td>Punjab</td>
<td>9.2 (0.2)</td>
<td>15.8 (–0.1)</td>
<td>7.1 (–0.0)</td>
<td>10.8 (0.0)</td>
<td>6.6 (–0.3)</td>
</tr>
<tr>
<td>Sindh</td>
<td>10.9 (–0.0)</td>
<td>7.3 (–0.2)</td>
<td>1.4 (–0.1)</td>
<td>3.0 (–0.1)</td>
<td>–3.6 (–0.2)</td>
</tr>
<tr>
<td>KPK</td>
<td>11.5 (0.2)</td>
<td>21.1 (0.0)</td>
<td>10.9 (0.1)</td>
<td>8.6 (0.1)</td>
<td>9.6 (–0.2)</td>
</tr>
<tr>
<td>Baluchistan</td>
<td>3.6 (–0.1)</td>
<td>1.8 (0.1)</td>
<td>0.5 (–0.1)</td>
<td>4.5 (0.3)</td>
<td>–1.8 (0.2)</td>
</tr>
<tr>
<td>OOP exceeding 25% of non-food expenditure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>9.5 (0.0)</td>
<td>15.5 (–0.1)</td>
<td>9.9 (–0.2)</td>
<td>6.0 (–0.1)</td>
<td>6.0 (–0.2)</td>
</tr>
<tr>
<td>Punjab</td>
<td>7.6 (0.2)</td>
<td>16.5 (–0.1)</td>
<td>11.2 (–0.2)</td>
<td>7.8 (–0.1)</td>
<td>9.0 (–0.3)</td>
</tr>
<tr>
<td>Sindh</td>
<td>9.7 (–0.2)</td>
<td>9.0 (–0.3)</td>
<td>3.1 (–0.4)</td>
<td>2.9 (–0.2)</td>
<td>–0.7 (–0.1)</td>
</tr>
<tr>
<td>KPK</td>
<td>16.8 (0.1)</td>
<td>26.9 (–0.1)</td>
<td>19.8 (–0.1)</td>
<td>5.9 (–0.0)</td>
<td>10.1 (–0.1)</td>
</tr>
<tr>
<td>Baluchistan</td>
<td>9.4 (–0.2)</td>
<td>2.4 (0.0)</td>
<td>0.7 (–0.5)</td>
<td>2.0 (0.3)</td>
<td>–7.0 (–0.2)</td>
</tr>
</tbody>
</table>

Table shows proportion of households (% points) that have encountered financial catastrophe from OPHE. Concentration indices of CH are provided in parenthesis. All estimates account for sampling weights (adjusted for the respective year population estimates) and clustering at the level of primary sampling units.

KPK = Khyber Pakhtunkhwa.
lowest in 2010–11. For all years and across all provinces and at national level, $H_{imp}$ was highest in KPK in 2005–06 (4.8%) and lowest in Baluchistan in 2005–06 (1.23%). While generally a decrease in poverty corresponded with a decrease in OPHE impoverishment, there were a few exceptions. Between 2015–16 and 2010–11, with the exception of KPK, the poverty headcount had decreased yet the OPHE impoverishment had increased. Between 2005–06 and 2001–02, Baluchistan was the only case where the poverty headcount had increased but the impoverishment of OPHE had decreased (Table 5).

Figure 3 provides the estimates of $CH_{op}$, $CH_{ip}$ and $H_{imp}$ for population. Here the proportion of the population affected by financial catastrophe is generally higher than that impoverished due to OPHE. Financial catastrophe affected more people in 2005–06 and in Punjab province.

Analysis of socioeconomic and demographic factors revealed that: a household in a rural area, in KPK and in 2005–06; and a household with 1–4 members, and the head of the household is male, very young or very old, with fewer years of schooling and unmarried were more likely to encounter $CH_{op}$, $CH_{ip}$ or $H_{imp}$ then their respective reference groups (Table 6).

### Discussion

We found a small decrease in the financial catastrophe and impoverishment of OPHE in 2001–2015. We verified that national-level estimates of these are not consistent across all provinces. Nationally, the incidence of financial catastrophe of OPHE decreased but in 2 provinces, the trends were reversed. Our findings are robust, using national survey data with a population-representative sample and common methods of tracking progress on financial risk protection (18). Our approach using basic development needs and subsistence expenditure in estimating impoverishment and catastrophe of OPHE respectively draws from consequentialist ethics that poverty is multidimensional and food is just one aspect of it (19,20). We could not analyse the financial hardship of OPHE in the context of disease patterns, demographic features and use of health services because the unit of analysis for OPHE in the Household Integrated Economic Survey is the household. Comparison across years needs careful interpretation due to the difference in the number of items on OPHE in the Household Integrated Economic Surveys.

Xu et al. and Wagstaff et al. found a positive relationship between catastrophic incidence and Gini

### Table 5 Impoverishment from out-of-pocket health expenditure in Pakistan, 2001–2016

<table>
<thead>
<tr>
<th>Items</th>
<th>2001–02</th>
<th>2005–06</th>
<th>2010–11</th>
<th>2015–16</th>
<th>Change over time (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>B–A</td>
</tr>
<tr>
<td>National</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-payment</td>
<td>66.3</td>
<td>68.2</td>
<td>60.7</td>
<td>48.2</td>
<td>2.0</td>
</tr>
<tr>
<td>Post-payment</td>
<td>69.4</td>
<td>71.7</td>
<td>63.4</td>
<td>51.3</td>
<td>2.2</td>
</tr>
<tr>
<td>Absolute difference</td>
<td>3.2</td>
<td>3.4</td>
<td>2.7</td>
<td>3.1</td>
<td>0.3</td>
</tr>
<tr>
<td>Punjab</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-payment</td>
<td>62.9</td>
<td>67.6</td>
<td>61.5</td>
<td>46.8</td>
<td>4.7</td>
</tr>
<tr>
<td>Post-payment</td>
<td>66.1</td>
<td>71.3</td>
<td>64.4</td>
<td>50.3</td>
<td>3.6</td>
</tr>
<tr>
<td>Absolute difference</td>
<td>3.2</td>
<td>3.8</td>
<td>2.8</td>
<td>3.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Sindh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-payment</td>
<td>66.3</td>
<td>63.5</td>
<td>55.5</td>
<td>47.3</td>
<td>5.2</td>
</tr>
<tr>
<td>Post-payment</td>
<td>69.3</td>
<td>65.8</td>
<td>57.0</td>
<td>49.3</td>
<td>6.0</td>
</tr>
<tr>
<td>Absolute difference</td>
<td>3.9</td>
<td>3.3</td>
<td>1.5</td>
<td>3.1</td>
<td>0.2</td>
</tr>
<tr>
<td>KPK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-payment</td>
<td>76.6</td>
<td>72.1</td>
<td>64.2</td>
<td>48.7</td>
<td>7.9</td>
</tr>
<tr>
<td>Post-payment</td>
<td>80.5</td>
<td>76.9</td>
<td>68.9</td>
<td>51.6</td>
<td>7.3</td>
</tr>
<tr>
<td>Absolute difference</td>
<td>3.9</td>
<td>3.8</td>
<td>2.8</td>
<td>3.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Baluchistan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-payment</td>
<td>74.5</td>
<td>85.0</td>
<td>64.5</td>
<td>63.8</td>
<td>10.6</td>
</tr>
<tr>
<td>Post-payment</td>
<td>76.0</td>
<td>86.3</td>
<td>66.0</td>
<td>66.7</td>
<td>10.7</td>
</tr>
<tr>
<td>Absolute difference</td>
<td>1.5</td>
<td>1.3</td>
<td>1.7</td>
<td>1.9</td>
<td>0.8</td>
</tr>
<tr>
<td>National poverty line</td>
<td>1226</td>
<td>1278</td>
<td>1333</td>
<td>1250</td>
<td>-</td>
</tr>
<tr>
<td>PKR (US$) per person/ month</td>
<td>(16.57)</td>
<td>(21.47)</td>
<td>(27.38)</td>
<td>(30.96)</td>
<td>-</td>
</tr>
</tbody>
</table>

The official poverty line is on a per person per month basis while in the analysis a per person per year poverty line is used. Population estimates are interpolated between the 1998 census and the 2017 census. In the analyses, the monthly poverty line is converted to annual estimates.
Table 6 Social and demographic effects of financial hardships of out-of-pocket health expenditure (OPHE) (N = 69872)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>OPHE Frequency (%)</th>
<th>OPHE log Coefficient</th>
<th>CH&lt;sub&gt;10&lt;/sub&gt; Predicted probability</th>
<th>CH&lt;sub&gt;25&lt;/sub&gt; Predicted probability</th>
<th>H&lt;sub&gt;imp&lt;/sub&gt; Predicted probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female head</td>
<td>8.21</td>
<td>–</td>
<td>6.58</td>
<td>8.40</td>
<td>2.59</td>
</tr>
<tr>
<td>Male head</td>
<td>91.79</td>
<td>0.10</td>
<td>8.11</td>
<td>8.74</td>
<td>2.96</td>
</tr>
<tr>
<td>Age of head (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 25</td>
<td>4.82</td>
<td>0.06</td>
<td>**</td>
<td>10.02</td>
<td>**</td>
</tr>
<tr>
<td>26–35</td>
<td>20.51</td>
<td>–0.03</td>
<td>**</td>
<td>9.46</td>
<td>**</td>
</tr>
<tr>
<td>36–45</td>
<td>28.09</td>
<td>–0.11</td>
<td>**</td>
<td>7.40</td>
<td>**</td>
</tr>
<tr>
<td>46–55</td>
<td>23.20</td>
<td>–</td>
<td>**</td>
<td>7.88</td>
<td>**</td>
</tr>
<tr>
<td>56–65</td>
<td>15.44</td>
<td>0.12</td>
<td>**</td>
<td>9.09</td>
<td>**</td>
</tr>
<tr>
<td>65+</td>
<td>7.93</td>
<td>0.24</td>
<td>**</td>
<td>11.46</td>
<td>**</td>
</tr>
<tr>
<td>Education of head</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No schooling</td>
<td>43.41</td>
<td>0.02</td>
<td>**</td>
<td>9.96</td>
<td>**</td>
</tr>
<tr>
<td>Primary</td>
<td>15.83</td>
<td>0.02</td>
<td>**</td>
<td>9.09</td>
<td>**</td>
</tr>
<tr>
<td>High school</td>
<td>25.17</td>
<td>–0.02</td>
<td>**</td>
<td>7.69</td>
<td>**</td>
</tr>
<tr>
<td>Intermediate/ college</td>
<td>5.95</td>
<td>–</td>
<td>**</td>
<td>6.37</td>
<td>**</td>
</tr>
<tr>
<td>Graduate &amp; above</td>
<td>9.64</td>
<td>0.06</td>
<td>**</td>
<td>5.04</td>
<td>1.72</td>
</tr>
<tr>
<td>Head unmarried</td>
<td>9.88</td>
<td>–</td>
<td>**</td>
<td>9.14</td>
<td>2.93</td>
</tr>
<tr>
<td>Head currently married</td>
<td>90.12</td>
<td>0.05</td>
<td>**</td>
<td>8.65</td>
<td>2.92</td>
</tr>
<tr>
<td>Household size</td>
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<tr>
<td>1–4</td>
<td>22.98</td>
<td>–</td>
<td>9.44</td>
<td>11.91</td>
<td>3.80</td>
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<tr>
<td>5–6</td>
<td>29.39</td>
<td>0.25</td>
<td>**</td>
<td>8.33</td>
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<td>7–9</td>
<td>31.25</td>
<td>0.47</td>
<td>**</td>
<td>7.61</td>
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</tr>
<tr>
<td>10+</td>
<td>16.37</td>
<td>0.84</td>
<td>**</td>
<td>7.18</td>
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<td>Residence</td>
<td></td>
<td></td>
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<tr>
<td>Urban</td>
<td>37.45</td>
<td>–</td>
<td>7.25</td>
<td>7.77</td>
<td>3.06</td>
</tr>
<tr>
<td>Rural</td>
<td>62.55</td>
<td>0.02</td>
<td>**</td>
<td>9.25</td>
<td>2.84</td>
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<td>Quintile</td>
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</tr>
<tr>
<td>1</td>
<td>16.46</td>
<td>–</td>
<td>7.56</td>
<td>10.90</td>
<td>**</td>
</tr>
<tr>
<td>2</td>
<td>18.61</td>
<td>0.28</td>
<td>**</td>
<td>9.10</td>
<td>**</td>
</tr>
<tr>
<td>3</td>
<td>20.38</td>
<td>0.46</td>
<td>**</td>
<td>8.65</td>
<td>**</td>
</tr>
<tr>
<td>4</td>
<td>21.21</td>
<td>0.66</td>
<td>**</td>
<td>7.96</td>
<td>**</td>
</tr>
<tr>
<td>5</td>
<td>23.34</td>
<td>1.05</td>
<td>**</td>
<td>7.15</td>
<td>1.85</td>
</tr>
<tr>
<td>Province</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Punjab</td>
<td>42.87</td>
<td>–0.35</td>
<td>**</td>
<td>9.43</td>
<td>**</td>
</tr>
<tr>
<td>Sindh</td>
<td>25.19</td>
<td>–0.24</td>
<td>**</td>
<td>5.28</td>
<td>5.89</td>
</tr>
<tr>
<td>KPK</td>
<td>19.50</td>
<td>–</td>
<td>**</td>
<td>11.49</td>
<td>**</td>
</tr>
<tr>
<td>Baluchistan</td>
<td>12.43</td>
<td>–0.58</td>
<td>**</td>
<td>2.63</td>
<td>**</td>
</tr>
<tr>
<td>Year</td>
<td></td>
<td></td>
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<tr>
<td>2001–02</td>
<td>20.68</td>
<td>–</td>
<td>9.03</td>
<td>9.73</td>
<td>3.31</td>
</tr>
<tr>
<td>2005–06</td>
<td>21.92</td>
<td>0.31</td>
<td>**</td>
<td>12.25</td>
<td>13.80</td>
</tr>
<tr>
<td>2010–11</td>
<td>23.16</td>
<td>0.31</td>
<td>**</td>
<td>8.87</td>
<td>**</td>
</tr>
<tr>
<td>2015–16</td>
<td>14.25</td>
<td>0.36</td>
<td>**</td>
<td>4.66</td>
<td>**</td>
</tr>
</tbody>
</table>

Predicted probabilities in columns 4–6 are obtained from Probit regression while coefficient (in column 3) are obtained from multiple linear regression on log of OPHE.

All estimates account for population weights and survey sampling.

For Probit regression, the dependent variable is binary taking value 1 if a household had encountered a catastrophe CH<sub>10</sub>, CH<sub>25</sub> or impoverished (H<sub>imp</sub>) due to OOP health payments.

Level of significance: ** = 1%, *** = 5%, and ** = 10%.

KPK = Khyber Pakhtunkhwa.

Index of inequality (7,12). In the context of HIC, Van Ourti et al., using European Panel data (1994–2001), found that achieving income growth and social inequalities will only reconcile if income distribution remains equitable (21). Van Doorslaer et al. associated low levels of public financing of health with higher incidences of financial
hardship from OPHE (6). Wagner et al. found that functioning a public sector contributes to better health and lower levels of financial hardships from OPHE (22). Our findings confirm both of these phenomena; for example, in 2005–06 the GDP growth rate and income-related inequalities (GINI Index) were highest (Table 2). Coupled with the lowest share of the public in total health expenditure, the incidence of financial hardship was highest in 2005–06. These trends were reversed in 2010–11: lowest GDP growth rate, lowest income-related inequalities, highest share of the public in total health care expenditure and lowest incidence of financial hardship.

The declining trend for financial catastrophe in our analysis contrasts with analyses from India (2003–2010) and the Islamic Republic of Iran (1993/94–2011/12), where the incidence of financial catastrophe had increased (24,32).

The high incidence of financial hardships from OPHE in KPK is similar to the findings of earlier research in 2004–05 (23). The majority of the population lives in rural and mountainous areas where access is poor and this delays care seeking, complicating the illness and escalating the costs of treatment. Another aspect to consider could be better health-seeking behaviour in KPK (23); among all the provinces, life expectancy at birth is highest in KPK and under-5 mortality is lowest (Table 1).

Our findings have particular relevance to the existing financial risk protection schemes that target families living below the poverty line although they do indicate that the non-poor are almost equally affected by the financial hardships of OPHE. To strengthen our argument in favour of the non-poor, we distributed CH 10 and CH 25 by adult equivalent total expenditure (AETE) quintiles (Table 7) but no clear direction emerged in the catastrophic incidence and AETE quintiles. The incidence of financial catastrophe (CH 25) in 2005–06 in households in KPK in the middle (30.99) and the poorest quintiles (31.63) are almost identical and are the highest across all years and provinces. Other examples include a high incidence of financial catastrophe in the middle quintiles of KPK in 2001–02, Punjab in 2010–11 (CH 10) and Baluchistan in 2015–16 (Table 7).

Some of our findings conflict with common trends reported in previous research. For example, we found that small-sized households and households headed by a male are positive predictors of financial hardship while other studies have reported this to be true of families headed by females and large households (24–27). In the case of small-sized household, our findings are consistent with Van Minh (34); for male-headed households, we agree with the findings of Kumar et al. and Lu et al. (28,29).

Methodological consideration for comparison across the literature includes: features of the data, for example recall period; number of items of OPHE and unit of data collection; and methods of estimating financial hardship, for example, threshold of financial catastrophe and poverty line in impoverishment. The literature on survey design indicates that by increasing the recall period the reported expenditure decreases consistently (30,31). The recall period in the Household Integrated Economic Survey is similar to the recall period of OPHE in expenditure surveys used in analyses from the Islamic Republic of Iran, India and China (28,32). Due to the difference in frequencies of need for outpatient and inpatient care, separate recall periods for outpatient (2–4 weeks) and inpatient (1 year) care are more appropriate, such as were used in studies from Rwanda, India, Bangladesh and Vietnam (26,29,33,34). Lu et al. found that a lower level of disintegration of OPHE items creates negative reporting bias (29). We speculate an increase in the incidence of financial hardships from OPHE in 2015–16 for this factor.

Due to differences in the catastrophic thresholds, poverty lines and years of analysis, our estimates at national level need careful comparison with current research. For example, we used the national poverty line [PKR 2333 (US$ 27.38) per capita per month] while the WHO report used the poverty line (US$ 2 a day, i.e. PKR 5112 per capita per month) (10). In the catastrophic
analysis, we used non-subsistence expenditure whereas other research commonly used non-food expenditure (10–12).

**Conclusion**

Our analysis provides some directions towards reviewing existing policies and practices; specifically:

- evaluate the impact of the financial risk protection scheme on financial hardship of OPHE;
- revisit the methods of data collection on the OPHE section of the Household Integrated Economic Survey, especially the recall period and number of items;
- explore factors of high incidence of financial hardship of OPHE in the province of KPK and in rural areas.

We expect that variation in financial hardship among provinces and in different years will assist the national and provincial governments in their priority-setting in the health sector in Pakistan.

**Acknowledgement**

Authors would like to thank Professor Eddy Van Doorslaer, Erasmus University for his comments.

**Funding:** None.

**Competing interests:** None declared.

**Variation spatio-temporelle et facteurs socio-économiques des difficultés financières dues aux dépenses de santé à la charge des patients au Pakistan**

**Résumé**

**Contexte:** Les difficultés financières liées aux dépenses de santé à la charge des patients constituent une préoccupation croissante pour les responsables de la santé publique dans de nombreux pays à revenu faible et intermédiaire. La variation spatio-temporelle entre les quatre provinces du Pakistan entre 2001 et 2015 fait l'objet d'un examen, ce qui aiderait à comparer la prestation des services de santé existants et les plans de protection contre les risques financiers.
The spatial and temporal differences and the socio-economic factors of the financial difficulties arising from private expenditure on health in Pakistan

Ahmed Muhammad Malik, Eقبال أعظم، عامر خان، فيصل رفاق، كنزا شودري

The spatial and temporal differences and the socio-economic factors of the financial difficulties arising from private expenditure on health in Pakistan during the period 2001-2016. This study aimed to estimate the financial difficulties resulting from private expenditure on health in the four regions of Pakistan during the period 2015-2000.

Objectifs : Dans le présent document, nous estimons les difficultés financières liées aux dépenses de santé à la charge des patients du Pakistan.


Résultats : Au fil des années, la proportion de ménages ayant subi une catastrophe financière et l'appauvrissement résultant des dépenses de santé à la charge des patients ont diminué au niveau national (-1,3 point de pourcentage) et dans les provinces du Sindh (-7,8 points de pourcentage). La province du Khyber Pakhtunkhwa et la période 2005-2006 ont connu la plus forte incidence de catastrophe financière (26,89 points de pourcentage) et d'appauvrissement (4,8 points de pourcentage) résultant des dépenses de santé à la charge des patients. Les ménages des zones rurales, les ménages des quintiles moyens et riches et les ménages dirigés par un homme étaient plus susceptibles de subir une catastrophe financière et de s'appauvrir en raison des dépenses de santé à la charge des patients.

Conclusion : Les variations interprovinciales des difficultés financières liées aux dépenses de santé à la charge des patients aident à définir les priorités au niveau provincial. L'impact élevé des dépenses de santé à la charge des patients dans les zones non pauvres, rurales et dans la province du Khyber Pakhtunkhwa appelle à un meilleur ciblage des plans de protection contre les risques financiers.

Methods:

Objectifs: We estimate the financial difficulties arising from private expenditure on health in Pakistan. 

Methods: The integrated economic household surveys are used for the periods 2001-2002, 2005-2006, 2010-2011 and 2015-2016. Estimates are made for the proportion of households with financial difficulties resulting from private expenditure on health at the national level (−1.3 percentage points) and in the provinces of Sindh (−7.8 percentage points). The province of Khyber Pakhtunkhwa and the period 2005-2006 had the highest incidence of financial catastrophe (26.89 percentage points) and poverty (4.8 percentage points) resulting from health expenditure. Households in rural areas, households in the middle and high quintiles, and households headed by a man were more susceptible to catastrophic poverty and poverty resulting from private expenditure on health.

Conclusion: The inter-provincial variations in financial difficulties arising from private expenditure on health help to define the priorities at the provincial level. The high impact of health expenditure in non-poor, rural areas and in the province of Khyber Pakhtunkhwa calls for better targeting of risk protection plans.
References


Cost of premature mortality attributable to smoking in the Middle East and North Africa

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Abstract

Background: Tobacco smoking is a leading cause of premature mortality, incurring substantial economic costs.

Aims: To estimate the rate and cost of premature mortality attributable to smoking in the 24 Middle East and North Africa (MENA) countries in 2015.

Methods: Smoking attributable fractions were estimated. Twenty-four smoking-related diseases were included in the analysis. For each country, the total number of deaths by disease, age, and gender among individuals aged ≥ 15 years were derived from a World Health Organization database. Human capital approach was used in calculating cost of premature mortality.

Results: Smoking was responsible for 465 285 deaths in MENA countries, resulting in 7 122 706 years of potential life lost, or an average of 15.23 years lost per smoking-related death. Of the total 465 285 smoking-related deaths, 412 415 (88.6%) occurred in men, accounting for 37% of all deaths from the diseases considered in this analysis among men. The total mortality cost attributable to smoking was estimated at US$ 29.7 billion in 2015 (0.76% of MENA’s gross domestic product). Turkey was the country most affected by the tobacco epidemic, representing 41% of smoking-related mortality cost in the whole region, followed by Saudi Arabia (8.76%) and Egypt (7.88%).

Conclusion: Smoking is an important preventable cause of premature mortality in MENA countries. Substantial decline in smoking-attributable deaths and significant economic cost saving can be achieved in this region through more effective tobacco control policies.

Keywords: cost, MENA, premature mortality, smoking attributable fraction, smoking

Introduction

Tobacco smoking has been established as an important risk factor for many types of diseases, such as cardiovascular diseases, cancer, chronic obstructive pulmonary disease (COPD), lower and upper respiratory tract infections, and asthma (1). Tobacco smoking is recognized as the leading preventable cause of death (2), and was responsible for ~6.4 million deaths (11.5% of global deaths) in 2015, ranking it among the 5 leading risk factors for disability-adjusted life years loss in 109 countries (3).

The economic impact of tobacco smoking is substantial, especially in terms of premature mortality. The total economic cost of smoking was estimated at US$ 1436 billion, which accounted for 1.8% of the world’s annual gross domestic product (GDP) in 2012 (3). Globally, the cost of premature mortality due to smoking was estimated at US$ 657 billion in 2012, representing 51% of the total cost of smoking (3).

The Middle East and North Africa (MENA) is a diverse region consisting of high-, middle- and low-income countries. The population of the MENA region is at least 750 million or 10% of the world’s population (4). The definition of MENA is controversial and variable, with many overlapping regions. In terms of World Health Organization (WHO) regions, most countries in MENA are member states of the Eastern Mediterranean Region, except for Algeria and Mauritania, which are members of the African Region and Turkey, which belongs to the European Region.

Despite the decline in smoking prevalence in several high-income countries, the prevalence in many MENA countries remains high and is increasing (5). The prevalence of smoking in the MENA Region ranged from an average of 50% among men and 5% among women. Surprisingly, > 50% of young people have initiated smoking before age 10 years (5). Lack of political commitment to tobacco control and tobacco industry tactics are considered the major challenges in reducing the tobacco epidemic in the MENA Region.

Due to population ageing and marked demographic and socioeconomic transitions, several diseases currently pose a major challenge to healthcare systems in the MENA Region. In 2012, > 800 000 new cancer cases and 360 000 cancer deaths were estimated (6). Furthermore, cancer mortality in the MENA Region is expected to increase...
dramatically with the rate of 181% over the next 15 years (7). In addition, cardiovascular diseases are the leading cause of death in the WHO Eastern Mediterranean Region, causing 1.4 million deaths (34.1% of all deaths in the Region) in 2015 (8). Lower respiratory tract infections (LRTIs) resulted in 191,14 deaths and 11 million disability-adjusted life years in the Eastern Mediterranean Region, which is higher than global rates, making it the third leading cause of deaths (9).

The objectives of this study were to estimate the rate of premature mortality, years of potential life lost (YPLL), and cost of premature mortality attributable to smoking in MENA countries in 2015. Such information clearly depicts the number of deaths that could be prevented as well as the cost that could be saved by more effective tobacco control policies. The findings can provide clear economic evidence for governments in the MENA Region to respond effectively to the tobacco epidemic by strengthening their existing tobacco control policies and regulations.

**Methods**

**Study design**

This was a descriptive, prevalence-based, cost-of-illness study. Smoking-attributable fractions (SAFs) were calculated to estimate the number of premature mortality attributable to smoking. To estimate the cost of premature mortality attributable to smoking (10), we used the human capital method (HCM). HCM is commonly used to estimate indirect cost due to productivity loss. Under this method, the cost of productivity loss was estimated by multiplying the total period of absence from work due to ill health, disability or premature mortality by the wage rate of the absent person. For cost of premature mortality, the productivity loss was valued in terms of the present value of expected future earnings throughout the remaining years of life expectancy at time of premature death.

**Study settings**

We adopted the widest definition of MENA by including the countries as stated by the World Bank (ii) plus Afghanistan and Pakistan. Turkey was also included as it shares many characteristics with the listed countries and is often included in the Middle East. Somalia and Sudan were included according to the definition by The Joint United Nations Programme on HIV/AIDS (UNAIDS) and United Nations Children’s Fund (UNICEF) (12), and Mauritania was included according to the definition by United Nations High Commissioner for Refugees (UNHCR) (13). Thus, our analysis extended to 24 countries (Table 1). Palestine was not included in this analysis due to the unavailability of relevant data.

**Smoking-associated diseases**

Sixteen types of cancer that showed a causal relationship with tobacco consumption in large epidemiological studies were included in this analysis (1,14,15). These included malignancies of the lip and oral cavity, nasal cavity, pharynx, oesophagus, stomach, colorectum, liver (not including cancers secondary to hepatitis B, hepatitis C or alcohol consumption), pancreas, lungs and trachea, breast, uterine cervix, ovaries, kidneys, urinary bladder and larynx, and leukaemia (1). Four cardiovascular diseases [ischaemic heart disease (IHD), rheumatic heart disease, hypertensive heart disease, and stroke] along with 3 respiratory diseases (asthma, LRTI and COPD) and diabetes mellitus were included in the analysis due to a causal relationship between smoking and their etiology (1).

**Estimation of SAF**

SAF for each disease (i) was calculated by the following formula (10):

\[
SAF_i(\%) = \frac{P \times (RR_i-1)}{1+P \times (RR_i-1)} \times 100
\]

where 
- \(P\) is the prevalence of current smoking of any tobacco product for each country (aged ≥ 15 years), and
- \(RR_i\) is relative risk of smoking for disease \(i\) (1,2,~24) included in this analysis.

Prevalence of current smoking (cigarettes, cigars, water pipe, etc.) among individuals aged ≥ 15 years was obtained from various sources (16–21) (Table 1). Prevalence in 2010 or a few years before was adopted for estimating SAF, to capture the accumulated hazard of smoking. This is because incidences of diseases observed in 2015 reflect past exposure to smoking. If we were unable to find the prevalence rate for 2010, we used the closest available estimates.

The RRs of tobacco-smoking-related diseases were obtained from recent, well-designed meta-analyses (1,14,15,22–24) (Table 2). It should be noted that LRTI is a term that usually includes pneumonia and bronchitis. In this study, RR for bronchitis (24) was used to represent LRTI.

**Estimation of mortality attributable to smoking (MAS)**

The total numbers of deaths in 2015 (aged ≥ 15 years) from each disease by sex and age were derived from a WHO database (25) and multiplied by the corresponding SAF to estimate the number of premature mortality attributable to smoking for disease \(i\) (MAS) in 2015.

**Estimation of mortality cost attributable to smoking (MCAS)**

Based on HCM, premature mortality cost attributable to smoking for disease \(i\) according to sex \(k\) (MCAS\(_{ik}\)) was calculated as follows:

\[
MCAS_{ik} = \sum_{j=1}^{n} (MAS_{ijk} \times PVLE_{jk})
\]

where
- \(MAS_{ijk}\) = SAF\(_i\) × Tdeath\(_{jk}\)
- \(SAF_{ik}\) = smoking attributable fraction of death from disease \(i\) and sex \(k\) (1 or 2)

\(PVLE_{jk}\) is the number of deaths that could be prevented if smoking were eliminated.
Results

The number of premature deaths, cost, and YPLL attributable to smoking for each disease are presented in Table 3. Of the total 2126739 deaths that occurred from 24 diseases in MENA in 2015, smoking was responsible for 465285 deaths – 412415 for men (88.6%) and 52870 for women (11.4%). This accounted for 22% (37.2% among men and 5.2% among women) of all deaths occurring from the diseases considered in this analysis, resulting in 7122706 YPLL – 6306254 years in men and 816452 years in women. The average years of life lost per each smoking-related death in MENA was 15.23 years. The total MCAS was valued at US$ 29729.7 million. This represents 0.76% of MENA’s total GDP in 2015.

The greatest association was seen between smoking and trachea, bronchus and lung cancer (71.3%), followed by laryngeal cancer (62.1%), and pharyngeal cancer (48.2%) (Table 3). The highest MAS was from IHD (173351 deaths in men and 19479 in women); stroke (68920 deaths in men and 10164 in women); COPD (43135 deaths in men and 6117 in women); and trachea, bronchus and lung cancers (38335 deaths in men and 3500 in women). The top 3 diseases attributable to MCAS were IHD (US$ 11430.4 million), followed by lung cancer (US$ 4572.2 million).

Ethical approval

Ethical approval was not required for this study since it did not include human subjects.

Table 1 Prevalence of smoking, population size, and GDP per capita among MENA countries

<table>
<thead>
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<tbody>
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<td></td>
<td></td>
<td></td>
<td>Male</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>Afghanistan</td>
<td>32.5</td>
<td>627 (27)</td>
<td>22.9</td>
<td>2010 (20)</td>
</tr>
<tr>
<td>Algeria</td>
<td>39.7</td>
<td>451 (27)</td>
<td>27.0</td>
<td>2010 (16)</td>
</tr>
<tr>
<td>Bahrain</td>
<td>1.4</td>
<td>2406 (27)</td>
<td>35.0</td>
<td>2010 (16)</td>
</tr>
<tr>
<td>Djibouti</td>
<td>0.9</td>
<td>1788 (27)</td>
<td>24.8</td>
<td>2017 (17)</td>
</tr>
<tr>
<td>Egypt</td>
<td>91.5</td>
<td>3731 (27)</td>
<td>42.7</td>
<td>2010 (16)</td>
</tr>
<tr>
<td>Islamic Republic of Iran</td>
<td>79</td>
<td>4723 (27)</td>
<td>22.2</td>
<td>2010 (16)</td>
</tr>
<tr>
<td>Iraq</td>
<td>36.4</td>
<td>4869 (27)</td>
<td>27.0</td>
<td>2006 (16)</td>
</tr>
<tr>
<td>Jordan</td>
<td>7.6</td>
<td>5506 (27)</td>
<td>62.7</td>
<td>2010 (16, 19)</td>
</tr>
<tr>
<td>Kuwait</td>
<td>3.9</td>
<td>27885 (27)</td>
<td>42.3</td>
<td>2006 (16, 17)</td>
</tr>
<tr>
<td>Lebanon</td>
<td>5.9</td>
<td>11178 (27)</td>
<td>41.6</td>
<td>2010 (16)</td>
</tr>
<tr>
<td>Libya</td>
<td>6.3</td>
<td>2813 (27)</td>
<td>50.0</td>
<td>2009 (16)</td>
</tr>
<tr>
<td>Mauritania</td>
<td>4.1</td>
<td>1307 (27)</td>
<td>38.6</td>
<td>2010 (16)</td>
</tr>
<tr>
<td>Morocco</td>
<td>34.4</td>
<td>2965 (27)</td>
<td>41.7</td>
<td>2010 (16)</td>
</tr>
<tr>
<td>Oman</td>
<td>4.5</td>
<td>18485 (27)</td>
<td>18.0</td>
<td>2010 (16)</td>
</tr>
<tr>
<td>Pakistan</td>
<td>189.0</td>
<td>1425 (27)</td>
<td>37.9</td>
<td>2010 (16)</td>
</tr>
<tr>
<td>Qatar</td>
<td>2.2</td>
<td>67537 (27)</td>
<td>21.3</td>
<td>2013 (17)</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>31.5</td>
<td>21095 (27)</td>
<td>25.9</td>
<td>2010 (16)</td>
</tr>
<tr>
<td>Somalia</td>
<td>10.8</td>
<td>426 (28)</td>
<td>19.7</td>
<td>2013 (20)</td>
</tr>
<tr>
<td>Sudan</td>
<td>40.2</td>
<td>2119 (27)</td>
<td>23.8</td>
<td>2010 (17)</td>
</tr>
<tr>
<td>Syrian Arab Republic</td>
<td>18.5</td>
<td>1821 (29)</td>
<td>56.9</td>
<td>2006 (16, 21)</td>
</tr>
<tr>
<td>Tunisia</td>
<td>11.3</td>
<td>3884 (27)</td>
<td>65.4</td>
<td>2017 (17)</td>
</tr>
<tr>
<td>Turkey</td>
<td>78.7</td>
<td>10915 (27)</td>
<td>45.9</td>
<td>2010 (16)</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>9.2</td>
<td>37361 (27)</td>
<td>36.8</td>
<td>2017 (17)</td>
</tr>
<tr>
<td>Yemen</td>
<td>26.8</td>
<td>1334 (27)</td>
<td>21.0</td>
<td>2013 (16)</td>
</tr>
</tbody>
</table>

GDP = gross domestic product; MENA = Middle East and North Africa.
Table 4 presents the total number of premature deaths, cost, and YPLL attributable to smoking for each country. The highest SAF was observed in Lebanon and Turkey (33%) followed by Jordan (32%), Syrian Arab Republic (31%), United Arab Emirates (UAE) (30%), and Kuwait and Tunisia (29%). The highest MAS was found in Pakistan (134,130), followed by Turkey (87,173), and Egypt (55,606). The highest MCAS was found in Turkey (approximately US$12.2 billion) which accounted for ~41% of total MCAS in MENA, followed by Saudi Arabia (approximately US$2.6 billion), Egypt (approximately US$2.3 billion), Pakistan (approximately US$2.3 billion), and UAE (approximately US$1.7 billion). The costs incurred by these 5 countries accounted for 71% of total MCAS in MENA in 2015. MCAS incurred by men was 6 times greater than incurred by women. MCAS accounted for 1.85% of GDP in Lebanon, 1.68% in Turkey and 1.32% in Tunisia.

Discussion

The findings of this study found that smoking was responsible for 465,285 deaths, resulting in 7.12 million YPLL in the MENA Region during 2015. This accounted for 22% of all deaths from 24 diseases in the Region. This estimation is in line, but slightly higher, with a recent study in the United States of America, which found that ~18% of deaths were attributable to smoking (30). In contrast to that study, which found that SAF in men was higher in women (20.6% vs 15.1%), but similar to a study in the Association of Southeast Asian Nation (ASEAN) countries (31), we found that SAF among men was higher than in women (37.2% vs 5.2%). This could be explained by the low prevalence of smoking among women in MENA and ASEAN countries.

In our study, the SAF for all cancer types was estimated at 24.5%, which is comparable to the global estimate of 22% (36) but lower than that in Asian countries (30.5%) (31). This is probably due to the higher prevalence of smoking in ASEAN countries. When comparing across diseases, similar to the global estimate (32), we found that the highest SAF was in lung cancer (71%). We found that SAFs for IHD and stroke were estimated at 22.2% and 18.8%, respectively. These estimates are higher than the global estimates, which found that ~12% and ~7% of IHD and stroke was attributable to smoking (32). This is possibly due to the different sources of RRs used in the SAF calculation. More updated RRs were used in our study.
### Table 3: Mortality, mortality cost, and YPLL attributable to smoking by diseases (in 2015)

<table>
<thead>
<tr>
<th>Disease</th>
<th>MAS (SAF %)</th>
<th>MCAS ($ Million)</th>
<th>YPLL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>Total</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----</td>
<td>----</td>
<td>-------</td>
</tr>
<tr>
<td>Bladder cancer</td>
<td>6832 (39.9)</td>
<td>300 (7.7)</td>
<td>7132 (34.0)</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>5 (55.6)</td>
<td>154 (0.3)</td>
<td>159 (0.3)</td>
</tr>
<tr>
<td>Uterine cervix cancer</td>
<td>NA</td>
<td>290 (3.2)</td>
<td>290 (3.2)</td>
</tr>
<tr>
<td>Colon and rectum cancers</td>
<td>890 (4.7)</td>
<td>1246 (3.7)</td>
<td>84.6</td>
</tr>
<tr>
<td>Oesophagus cancer</td>
<td>3343 (31.7)</td>
<td>493 (5.6)</td>
<td>3836 (19.9)</td>
</tr>
<tr>
<td>Kidney cancer</td>
<td>4409 (68.1)</td>
<td>239 (23.2)</td>
<td>4638 (62.1)</td>
</tr>
<tr>
<td>Larynx cancer</td>
<td>313 (46.1)</td>
<td>448 (8.3)</td>
<td>376 (9.9)</td>
</tr>
<tr>
<td>Lip and oral cavity cancers</td>
<td>258 (17.0)</td>
<td>21 (1.8)</td>
<td>279 (10.3)</td>
</tr>
<tr>
<td>Myeloid leukaemia</td>
<td>2739 (22.8)</td>
<td>53 (0.6)</td>
<td>2792 (13.7)</td>
</tr>
<tr>
<td>Nasal and sinus cancers</td>
<td>63 (2.4)</td>
<td>42 (3.7)</td>
<td>673 (18.1)</td>
</tr>
<tr>
<td>Ovary cancer</td>
<td>NA</td>
<td>600 (5.1)</td>
<td>600 (5.1)</td>
</tr>
<tr>
<td>Pancreas cancer</td>
<td>1538 (21.3)</td>
<td>200 (4.2)</td>
<td>1738 (4.5)</td>
</tr>
<tr>
<td>Pharynx cancer</td>
<td>1968 (67.2)</td>
<td>276 (60.0)</td>
<td>2244 (48.2)</td>
</tr>
<tr>
<td>Stomach cancer</td>
<td>4139 (19.8)</td>
<td>362 (2.9)</td>
<td>4501 (13.5)</td>
</tr>
<tr>
<td>Trachea and lung cancers*</td>
<td>38335 (79.5)</td>
<td>3500 (33.4)</td>
<td>41835 (71.3)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>17475 (24.5)</td>
<td>3309 (3.6)</td>
<td>20784 (12.9)</td>
</tr>
<tr>
<td>Hypertensive heart disease</td>
<td>7776 (24.5)</td>
<td>1898 (64.7)</td>
<td>9675 (13.1)</td>
</tr>
<tr>
<td>Ischaemic heart disease</td>
<td>173351 (36.7)</td>
<td>19479 (4.9)</td>
<td>193830 (22.2)</td>
</tr>
<tr>
<td>Rheumatic heart disease</td>
<td>311 (29.7)</td>
<td>414 (3.3)</td>
<td>3525 (15.8)</td>
</tr>
<tr>
<td>Stroke</td>
<td>68920 (33.7)</td>
<td>1064 (4.7)</td>
<td>79084 (18.8)</td>
</tr>
<tr>
<td>Asthma</td>
<td>2909 (17.2)</td>
<td>386 (2.6)</td>
<td>3397 (10.4)</td>
</tr>
<tr>
<td>COPD</td>
<td>4335 (52.5)</td>
<td>617 (12.3)</td>
<td>4952 (37.4)</td>
</tr>
<tr>
<td>LRTI</td>
<td>26403 (44.9)</td>
<td>3570 (8.3)</td>
<td>3973 (9.4)</td>
</tr>
<tr>
<td>Total</td>
<td>412415 (37.2)</td>
<td>52870 (5.2)</td>
<td>465285 (21.9)</td>
</tr>
</tbody>
</table>

*Includes trachea, bronchus, and lung cancer. MAS= Mortality Attributable to Smoking, MCAS= Mortality Cost Attributable to Smoking, YPLL= Years of Potential Life Lost, M= Male, F= Female, COPD= Chronic Obstructive Pulmonary Disease, LRTI= Lower Respiratory Tract Infection, NA= Not Applicable

Round up in calculations.
Table 4: Mortality, mortality cost, and YPLL attributable to smoking by countries (in 2015)

<table>
<thead>
<tr>
<th>Country</th>
<th>MAS (SAF %)</th>
<th>Total</th>
<th>MCAS ($ Million)</th>
<th>MCAS as % of the total in MENA</th>
<th>MCAS as % of National GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>Total</td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>9702 (28)</td>
<td>1318 (3)</td>
<td>11 020 (15)</td>
<td>24 965</td>
<td>189 884</td>
</tr>
<tr>
<td>Algeria</td>
<td>15 686 (31)</td>
<td>1576 (3)</td>
<td>17 262 (18)</td>
<td>287 709</td>
<td>313 045</td>
</tr>
<tr>
<td>Bahrain</td>
<td>381 (35)</td>
<td>54 (7)</td>
<td>435 (23)</td>
<td>763</td>
<td>763</td>
</tr>
<tr>
<td>Djibouti</td>
<td>289 (28)</td>
<td>25 (2)</td>
<td>314 (15)</td>
<td>5279</td>
<td>5279</td>
</tr>
<tr>
<td>Egypt</td>
<td>53 858 (40)</td>
<td>1748 (1)</td>
<td>55 606 (20)</td>
<td>747 451</td>
<td>23 366</td>
</tr>
<tr>
<td>Islamic Republic of Iran</td>
<td>30 021 (26)</td>
<td>1292 (1)</td>
<td>31 313 (14)</td>
<td>389 072</td>
<td>17 405</td>
</tr>
<tr>
<td>Iraq</td>
<td>11 112 (31)</td>
<td>1586 (5)</td>
<td>12 698 (18)</td>
<td>163 725</td>
<td>23 572</td>
</tr>
<tr>
<td>Jordan</td>
<td>4256 (48)</td>
<td>668 (10)</td>
<td>4924 (32)</td>
<td>66 047</td>
<td>10 395</td>
</tr>
<tr>
<td>Kuwait</td>
<td>1483 (41)</td>
<td>123 (6)</td>
<td>1606 (29)</td>
<td>26 841</td>
<td>2005</td>
</tr>
<tr>
<td>Lebanon</td>
<td>5275 (41)</td>
<td>2656 (24)</td>
<td>7931 (33)</td>
<td>69 195</td>
<td>37 326</td>
</tr>
<tr>
<td>Libya</td>
<td>4360 (46)</td>
<td>101 (i)</td>
<td>4461 (26)</td>
<td>63 836</td>
<td>136</td>
</tr>
<tr>
<td>Mauritania</td>
<td>1536 (40)</td>
<td>294 (6)</td>
<td>1830 (21)</td>
<td>22 858</td>
<td>4008</td>
</tr>
<tr>
<td>Morocco</td>
<td>20 738 (41)</td>
<td>1339 (2)</td>
<td>22 077 (20)</td>
<td>290 484</td>
<td>18 328</td>
</tr>
<tr>
<td>Oman</td>
<td>794 (22)</td>
<td>26 (1)</td>
<td>820 (14)</td>
<td>26 841</td>
<td>2005</td>
</tr>
<tr>
<td>Pakistan</td>
<td>122 170 (39)</td>
<td>11 960 (4)</td>
<td>134 130 (23)</td>
<td>1 817 755</td>
<td>170 609</td>
</tr>
<tr>
<td>Qatar</td>
<td>262 (25)</td>
<td>3 (1)</td>
<td>265 (18)</td>
<td>5840</td>
<td>73</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>87 413 (50)</td>
<td>1063 (5)</td>
<td>9804 (19)</td>
<td>134 282</td>
<td>18 328</td>
</tr>
<tr>
<td>Somalia</td>
<td>1961 (24)</td>
<td>290 (3)</td>
<td>2151 (13)</td>
<td>30 812</td>
<td>7000</td>
</tr>
<tr>
<td>Sudan</td>
<td>13 994 (28)</td>
<td>1380 (3)</td>
<td>15 374 (15)</td>
<td>270 768</td>
<td>20 496</td>
</tr>
<tr>
<td>Syrian Arab Republic</td>
<td>12 475 (51)</td>
<td>3784 (16)</td>
<td>16 259 (31)</td>
<td>217 662</td>
<td>57 953</td>
</tr>
<tr>
<td>Tunisia</td>
<td>12 619 (51)</td>
<td>3784 (16)</td>
<td>16 259 (31)</td>
<td>217 662</td>
<td>57 953</td>
</tr>
<tr>
<td>Turkey</td>
<td>68 936 (47)</td>
<td>18 237 (16)</td>
<td>87 173 (33)</td>
<td>1 113 527</td>
<td>290 983</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>25 31 (37)</td>
<td>34 (2)</td>
<td>2569 (30)</td>
<td>64 141</td>
<td>745</td>
</tr>
<tr>
<td>Yemen</td>
<td>9231 (26)</td>
<td>3036 (6)</td>
<td>12 267 (18)</td>
<td>203 960</td>
<td>53 708</td>
</tr>
<tr>
<td>Total</td>
<td>412 45 (37)</td>
<td>52 870 (5)</td>
<td>465 285 (22)</td>
<td>6 306 254</td>
<td>816 452</td>
</tr>
</tbody>
</table>

F = female; GDP = gross domestic product; M = male; MAS = mortality attributable to smoking; MCAS = mortality cost attributable to smoking; UAE = United Arab Emirates; YPLL = years of potential life lost.
This could also be because death from cardiovascular
diseases was more likely to occur among adults aged
30–44 years, and that age group is large in MENA
countries. Similarly, SAF of LRTIs in the MENA Region
was 29%, which is higher than global estimates of 12% (32).
Additionally, the MAS, MCAS and YPLL from IHD and
stroke were high in the MENA Region, not only because
of the high SAFs but also the high absolute mortality for
IHD and stroke.

In our study, MCAS in the MENA Region was
estimated at US$29.7 billion, which represented 0.76% of
GDP in 2015. This is lower than the global estimates, in
which mortality costs were US$657 billion (2012 value),
representing ~0.90% of global GDP (3), but higher than
in China, where mortality costs were US$22 billion and
represented 0.50% of national GDP (3). If the definition
of MENA by the World Bank (exclude Afghanistan,
Pakistan, Mauritania, Turkey, Somalia, and Sudan) was
adopted, the total cost was equal to US$14.65 billion.

MAS varied by country due to the differences
in population size, background risk of diseases, and
prevalence of smoking in each country. Similarly, MCAS
also varied by country due to the differences in life
expectancy and income rates. We found that SAF was
highest in Lebanon and Turkey (33%), Jordan (32%) and
Syrian Arab Republic (31%). The lowest SAFs were found
in Somalia (13%), Oman and Islamic Republic of Iran (14%).
This can be explained by the variation in the prevalence
of smoking in each country. However, we found that MCAS
was highest in Turkey (41% of MCAS in MENA Region),
Saudi Arabia and Egypt. It should be noted that not only
MAS but also income contributed to the highest MCAS.

The income of the countries in the MENA Region varied
widely. In terms of YPLL, life expectancy in the MENA
Region was shorter than in other parts of the world due
to long-lasting conflicts and natural disasters, which
cause substantial increases in death rates and shorter
lifespan estimations. This could have led to the low YPLL
estimation in our study. A similar impact was found for
MCAS, which might be lower estimates when compared
to other parts of the world where life expectancy is longer.

It should be noted that our analysis included mortality
in the population aged ≥15 years. The reason for this
was that ~50% of smokers in the MENA Region started
smoking before age 10 years (5) due to the ease of access
to tobacco products and lack of legislation to prohibit
smoking before adulthood.

In this study, information on GDP per capita was
derived from the IMF. Compared to the World Bank data,
most of the estimates were similar (difference is less
than ±10%). Nevertheless, it should be noted that IMF
estimates were slightly lower for Djibouti, Libya and
Yemen but higher for Oman and Jordan.

Although this study was the first attempt to estimate
MAS, MCAS and YPLL in the MENA Region, the
estimates might have some limitations, which should
be noted. First, this study did not incorporate smoking
intensity and former smokers into SAF estimation
due to the unavailability of such information. Second,
this analysis included only deaths caused by active
smoking and not those caused by second-hand smoking
exposure. Therefore, it might have underestimated
the number of deaths caused by tobacco use. Third,
owing to data scarcity, the RRs used to calculate SAF
were mainly specific to cigarette smoking. This could
have underestimated the final results because previous
evidence indicates that water pipe smoking results in
greater nicotine yield and other toxicants, and may result
in greater harm than cigarette smoking (34). Additionally,
RRs used in this study were based on international
records and depended on studies carried out outside
the MENA Region in countries with different smoking
patterns and profiles. Fourth, although our estimates
were based on 24 diseases currently established by the
US Surgeon General Report as caused by smoking, it was
recently found that smoking is significantly associated
with other diseases as well (35). Fifth, this cost estimation
was only based on premature mortality using human
capital approach which in reality undervalues mortality
costs for housewives, self-employed personnel, children,
and any workforce outside the formal sector. Additionally,
HCM undervalues mortality costs in settings where
labour market imperfections exist as the official income
does not reflect employees’ true opportunity cost of
time, especially in developing countries. Furthermore,
the direct health expenditure attributable to tobacco
use was not estimated as data were scarce to estimate
the health costs of treating tobacco-related diseases.
Also, productivity loss such as disability, absenteeism
and presenteeism were not included. It should also be
noted that in this estimation, we did not apply income
growth in calculating present value of lifetime earnings
as the fluctuation of income in MENA countries may
have resulted in a biased estimation of income growth.
Nevertheless, income growth should be taken into
account when the reliable data are available.

Conclusion

Smoking is a leading preventable risk factor for mortali-
ty in MENA countries, resulting in 465 286 deaths or ac-
counting for 22% of total deaths from 24 diseases in 2015.
The cost of premature mortality attributable to smoking
in the region is substantial. This analysis suggests that
dramatic declines in smoking-attributable deaths, in-
crease in life-years saved, and significant reduction in
mortality costs can be achieved by reducing smoking
prevalence. More effort on smoking control should be a
policy priority and further efforts are needed towards the
implementation and enforcement of effective and com-
prehensive tobacco control strategies and policies in the
MENA Region.
Coût de la mortalité prématurée imputable au tabagisme dans la Région Moyen-Orient et Afrique du Nord

Résumé

Contexte : Le tabagisme est l’une des principales causes de mortalité prématurée et entraîne des coûts économiques considérables.


Méthodes : Les fractions attribuables au tabagisme ont été estimées. Vingt-quatre maladies liées au tabagisme ont été incluses dans l’analyse. Pour chaque pays, le nombre total de décès par maladie, par âge et par sexe chez les personnes âgées de 15 ans et plus a été obtenu à partir d’une base de données de l'Organisation mondiale de la Santé. L’approche du capital humain a été utilisée pour calculer le coût de la mortalité prématurée.

Résultats : Le tabagisme était responsable de 465 285 décès dans les pays de la Région Moyen-Orient et Afrique du Nord, ce qui représente 7 122 706 années potentielles de vie perdues, soit une moyenne de 15,23 années perdues par décès lié au tabagisme. Sur le nombre total de décès imputables au tabagisme, 412 415 (88,6 %) sont survenus chez des hommes, soit 37% de tous les décès dus aux maladies considérées dans cette analyse chez les hommes. Le coût total de la mortalité attribuable au tabagisme a été estimé à 29,7 milliards de dollars des États-Unis d'Amérique (US) en 2015 (0,76% du produit intérieur brut de la Région Moyen-Orient et Afrique du Nord). La Turquie était le pays le plus touché par l'épidémie de tabagisme, représentant 41% du coût de la mortalité liée au tabagisme dans l'ensemble de la Région, suivie par l'Arabie saoudite (8,76 %) et l'Égypte (7,88 %).

Conclusion : Le tabagisme est une cause importante et évitable de mortalité prématurée dans les pays de la Région Moyen-orient et Afrique du Nord. Il est possible de réduire considérablement le nombre de décès imputables au tabagisme et de réaliser d'importantes économies dans cette région grâce à des politiques de lutte antitabac plus efficaces.
References


Familial Mediterranean fever research activity in the Arab world: the need for regional and international collaborations

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Abstract

Background: Familial Mediterranean fever (FMF) is an autoinflammatory, multisystem disease affecting the populations of the Mediterranean basin.

Aims: The aim of this study was to assess the research input of Arab countries on FMF between 2004 and 2019.

Methods: The Medline database (PubMed) was accessed for FMF-related publications. The number of publications was normalized to average: population size, GDP and number of physicians for every country. VOSviewer was used to create a co-occurrence bibliographic map.

Results: Between 2004 and 2019, 69 articles relating to FMF were published in the Arab world, accounting for 0.03% of the total number of publications originating in Arab countries, and 3.60% of all articles relating to FMF worldwide. After normalizing to average population size, GDP and number of physicians, Lebanon ranked first with 4.44, 0.64 and 1.99 publications per million persons respectively. Moderate positive correlations were found between number of publications and average population size (r = 0.385) and average number of physicians (r = 0.513). Half of the articles were published in journals ranked Q1 and Q2. An abundance of keywords relating to genetics hint at a main focus on the genetic aspect of the disease.

Conclusion: The low number of publications could be a result of the absence of research funding and the political and military instability in the Arab world. Given that many articles were published in high quality journals, Arab countries should focus on providing a clinical aspect to their studies and working on regional and international collaborations.

Keywords: familial Mediterranean fever, genetics, bibliometric analysis, health economics, Arab world

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Introduction

Familial Mediterranean fever (FMF) is an autoinflammatory multisystem disease, inherited in an autosomal recessive pattern. The genetic mutation of the disease is located on the short arm of chromosome 16, on the MEFV gene. The MEFV gene encodes pyrin, a protein generally expressed in myeloid cells, which regulates IL-1beta processing and apoptosis. A mutation in the pyrin protein seemingly results in uncontrolled inflammation (1).

The condition is characterized by episodes of fever and serositis and recurrent peritonitis, arthritis, pleuritis or erysipelas-like skin disease. Amyloidosis, which could lead to chronic renal failure, is the most devastating complication (2,3). There are 2 phenotypes of FMF: FMF type 1 is characterized by all the symptoms cited above, and can eventually result in amyloidosis, while FMF type 2 is identified by amyloidosis as the initial clinical manifestation in an otherwise asymptomatic person (4). Colchicine has been the treatment of choice for this disease since 1972 (5).

Familial Mediterranean fever affects the populations located on the Mediterranean basin. It is virtually limited to Armenians, Turks, Arabs and non-Ashkenazi Jews (2). However, some cases have been described in European countries, including Italy, France, Spain, Portugal and Greece (6). Turkey is presumed the country with the highest number of FMF patients worldwide, with a prevalence ranging from 1:400 to 1:1000. With a population of around 70 million, Turkey is predicted to have more than 100 000 patients with FMF (7,8). Armenia has a prevalence of approximately 1:500, and with a population of 3 million, the overall number of patients is presumed at 6000. Furthermore, 1 in 5 healthy individuals in Armenia are heterozygous carriers of one of the several mutations that can affect the MEFV gene (8,9). Countries in the Middle East such as Lebanon and Jordan have considerable numbers of FMF patients, but the exact numbers are unknown. A report on the frequencies of MEFV mutations in these 2 populations revealed the severity of 1 specific mutation (M694V) and 3 novel mutations in the Lebanese group only (10). In the Syrian Arab Republic, the frequency of carriers is approximately 1:57, and the M694V mutation is the most common in FMF patients but not in healthy carriers. The severity of the disease and the development of amyloidosis is...
presumably associated with this specific mutation (11). Additionally, FMF is the leading cause of periodic fever in the Maghreb, affecting Algerians, Moroccans and Tunisians. The frequency of carriers among the Arab Maghrebian population is, however, significantly inferior to the Turkish, Armenian, and non-Ashkenazi Jewish populations, being estimated at only 1% (12).

The aim of this study is to assess the research input of Arab countries on FMF since this disease characteristically affects this region. In addition, this study focuses on evaluating the collaborations between regional organizations as well as the abandoned research areas in this field, which could warrant further appraisal.

Methods

Analysis

A bibliometric analysis analyses quantitatively the number of publications in a certain area of research, collaboration between authors and number of citations to assess research output (13).

Database and search strategy

The Medline database was accessed for FMF-related publications. Publications from this database are indexed on PubMed, the largest biomedical archive (14). PubMed uses MeSH (medical subheadings) terms: each article is given certain MeSH terms depending on the subject or area of study. The search strategy used for FMF included the “Familial Mediterranean Fever” MeSH term, which also included publications with other FMF synonyms such as “Benign Paroxysmal Peritonitis”, “Familial Mediterranean Fever, Autosomal Recessive”, “Familial Paroxysmal Polyserositis”, “Mediterranean Fever, Familial”, “Periodic Disease”, “Periodic Disease, Wolff’s”, “Periodic Peritonitis”, “Polyserositis, Familial Paroxysmal”, “Polyserositis, Recurrent”, “Recurrent Polyserositis”, “Wolff Periodic Disease” and “Wolff’s Periodic Disease”. In addition to this MeSH term, the author’s affiliation was used in the search strategy to determine the country of publication.

All 22 Arab countries were included in the search strategy: Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates and Yemen. The time frame of the study was fixed between 2004 and 2019 to highlight the latest advances and publications in the last 16 years. In fact, research output before 2004 was low and sparse and did not deserve inclusion in the search strategy.

An example of the search strategy used to obtain the number of publications in Qatar, using Boolean operator “AND” is: “Familial Mediterranean Fever” [MeSH Terms] AND “2004” [Date – Publication] : “2019” [Date – Publication] AND “Qatar” [Affiliation]. In the case of Lebanon, all cities in the United States of America named Lebanon were removed, and in the case of Palestine, West Bank and Gaza Strip were used in the author’s affiliation. Additionally, countries with a high prevalence of FMF such as Turkey and Israel, and those with a higher publication input such as the United States of America were included in this study as control groups (15).

Socioeconomic assessment of publications

Comparison of the number of publications between countries cannot be assessed without proper normalization of the results. For instance, countries with a higher population and gross domestic product (GDP) are expected to have a higher research output. Therefore, the average GDP (2004–2018) and average population (2004–2019) were calculated for each of the countries cited earlier (16,17). An additional index was used in this study: the number of physicians in the population. Mean number of physicians per 1000 population were retrieved from the World Data Bank between 2004 and 2018 (18). The ratio was multiplied by the average population during this period. Thus, we obtained the number of physicians in each country. Effectively, the rationale for using this index was founded on the idea that an increase in the physician workforce in a certain area would lead to a greater biomedical research output.

Subsequently, this allowed us to normalize our findings by dividing the number of publications for each Arab country by its own average GDP, population size and number of physicians. Linear regression was executed using SPSS (2013) to assess the relationship (R²) between the above 3 socioeconomic factors and the number of publications.

Visualization of bibliographic networks

In order to assess collaborations between Arab country organizations and authors as well as MeSH and author keyword analysis, data were imported to VOSviewer, a software program that builds bibliographic networks. Collaborations of authors and organizations were evaluated by the program. In addition, co-occurrence of keywords was analysed, resulting in a bibliographic map of the most relevant keywords. Colours in the map define clusters of keywords and lines define the strength of relationships between the keywords. Such maps highlight the primary focus on specific topics and fields of science.

Assessment of quality

Quality assessment can be evaluated by several factors: journal impact factor, journal h-index and journal quartiles. We chose to consider the journal quartiles (Q1, Q2, Q3, Q4) as a quality index, especially since they show the ranking of a journal worldwide (19). Hence, top quartile journals (Q1) are usually of higher quality and have an international audience. Other metrics such as the impact factor do not impart the ranking of a journal and numbers can be variably interpreted.
Results
From 2004 to 2019, 69 articles relating to FMF originated from Arab countries, i.e. in only 0.03% of the total publications in the Arab world, and 3.60% of all FMF-related articles worldwide. Among the Arab countries, Lebanon (with 25 publications) and Egypt (with 18 publications) were the only 2 with a double digit FMF-related article count, accounting for more than half of the total number (62.3%). Conversely, 11 Arab countries failed to publish any articles focusing on FMF in the 16-year period under study. The Syrian Arab Republic and Lebanon had the highest percentage of FMF-related articles to total publications between 2004 and 2019, with 0.35% and 0.12% respectively. This lack of FMF-related articles in the Arab world is further demonstrated when compared to non-Arab countries such as Israel, Turkey and the United States of America, which completely outscored the Arab world and published 162, 699 and 109 FMF-related documents respectively between 2004 and 2019 (Table 1).

The average population size, average GDP, and mean number of physicians in Arab countries are shown in Table 2. The number of publications was normalized according to these variables in order to remove any bias when comparing between different countries. In fact, after normalization, Lebanon still proved to be the most efficient country in terms of number of publications, with 4.44 per million population, while Qatar came in second with a total of 1.02 publications per million persons. These relatively small countries proved to be the most productive in terms of publications per million persons when compared to larger publishers such as Egypt, Saudi Arabia and Tunisia. In fact, Tunisia and Saudi Arabia had the 2 lowest non-null numbers of publications per million persons, with values of 0.09 and 0.14 respectively.

Average GDP is a widely used variable to assess and compare national economies. The economic performance of the countries had to be taken into consideration as most research work requires funding (21). By normalizing

Table 1. Distribution of publications on familial Mediterranean fever (FMF) for the Arab countries and selected non-Arab countries (2004–2019)

<table>
<thead>
<tr>
<th>Country</th>
<th>Total no. of publications</th>
<th>Publications on FMF No.</th>
<th>% of totala</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>4 345</td>
<td>1</td>
<td>0.02</td>
</tr>
<tr>
<td>Bahrain</td>
<td>1 582</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Comoros</td>
<td>42</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Djibouti</td>
<td>101</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Egypt</td>
<td>57 976</td>
<td>18</td>
<td>0.03</td>
</tr>
<tr>
<td>Iraq</td>
<td>4 885</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Jordan</td>
<td>11 841</td>
<td>6</td>
<td>0.05</td>
</tr>
<tr>
<td>Kuwait</td>
<td>6 071</td>
<td>1</td>
<td>0.02</td>
</tr>
<tr>
<td>Lebanon</td>
<td>20 283</td>
<td>25</td>
<td>0.12</td>
</tr>
<tr>
<td>Libya</td>
<td>1 047</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Mauritania</td>
<td>120</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Morocco</td>
<td>8 085</td>
<td>5</td>
<td>0.06</td>
</tr>
<tr>
<td>Oman</td>
<td>5 201</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Palestineb</td>
<td>1 126</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Qatar</td>
<td>9 168</td>
<td>2</td>
<td>0.02</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>56 357</td>
<td>4</td>
<td>0.01</td>
</tr>
<tr>
<td>Somalia</td>
<td>111</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Sudan</td>
<td>3 295</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Syrian Arab Republic</td>
<td>1 438</td>
<td>5</td>
<td>0.35</td>
</tr>
<tr>
<td>Tunisia</td>
<td>15 505</td>
<td>1</td>
<td>0.01</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>8 176</td>
<td>1</td>
<td>0.01</td>
</tr>
<tr>
<td>Yemen</td>
<td>1 271</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Total (Arab countries)</td>
<td>218 026</td>
<td>69</td>
<td>0.03</td>
</tr>
<tr>
<td>Israel</td>
<td>218 753</td>
<td>162</td>
<td>0.07</td>
</tr>
<tr>
<td>Turkey</td>
<td>237 490</td>
<td>699</td>
<td>0.29</td>
</tr>
<tr>
<td>United States of America</td>
<td>4 732 225</td>
<td>109</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

aPercentage of the total number of publication for each country in the study period.
bWest Bank and Gaza.

cWest Bank and Gaza.

Table 2. Distribution of average population, gross domestic product (GDP) and mean number of physicians in the Arab countries (2004–2019)

<table>
<thead>
<tr>
<th>Country</th>
<th>Average population</th>
<th>Average GDP (billion US$)</th>
<th>Mean no. physicians (thousand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>37 359 438</td>
<td>160.65</td>
<td>54.59</td>
</tr>
<tr>
<td>Bahrain</td>
<td>1 249 091</td>
<td>27.05</td>
<td>1.59</td>
</tr>
<tr>
<td>Comoros</td>
<td>718 660</td>
<td>0.94</td>
<td>0.05</td>
</tr>
<tr>
<td>Djibouti</td>
<td>866 421</td>
<td>1.59</td>
<td>0.18</td>
</tr>
<tr>
<td>Egypt</td>
<td>86 266 141</td>
<td>215.90</td>
<td>140.63</td>
</tr>
<tr>
<td>Iraq</td>
<td>32 084 985</td>
<td>151.16</td>
<td>23.84</td>
</tr>
<tr>
<td>Jordan</td>
<td>7 885 521</td>
<td>28.09</td>
<td>17.43</td>
</tr>
<tr>
<td>Kuwait</td>
<td>3 234 030</td>
<td>125.03</td>
<td>6.90</td>
</tr>
<tr>
<td>Lebanon</td>
<td>5 626 327</td>
<td>38.89</td>
<td>12.57</td>
</tr>
<tr>
<td>Libya</td>
<td>6 245 227</td>
<td>52.76</td>
<td>11.58</td>
</tr>
<tr>
<td>Mauritania</td>
<td>3 683 546</td>
<td>4.23</td>
<td>0.54</td>
</tr>
<tr>
<td>Morocco</td>
<td>33 134 513</td>
<td>91.13</td>
<td>22.06</td>
</tr>
<tr>
<td>Oman</td>
<td>3 538 838</td>
<td>59.49</td>
<td>6.78</td>
</tr>
<tr>
<td>Palestineb</td>
<td>4 205 124</td>
<td>9.64</td>
<td>–</td>
</tr>
<tr>
<td>Qatar</td>
<td>1 962 132</td>
<td>122.42</td>
<td>4.73</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>28 763 301</td>
<td>569.45</td>
<td>64.17</td>
</tr>
<tr>
<td>Somalia</td>
<td>12 636 382</td>
<td>4.22b</td>
<td>0.36</td>
</tr>
<tr>
<td>Sudan</td>
<td>36 084 250</td>
<td>63.26</td>
<td>10.90</td>
</tr>
<tr>
<td>Syrian Arab Republic</td>
<td>19 046 416</td>
<td>31.92c</td>
<td>25.83</td>
</tr>
<tr>
<td>Tunisia</td>
<td>10 812 039</td>
<td>41.23</td>
<td>12.96</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>7 980 982</td>
<td>312.86</td>
<td>14.34</td>
</tr>
<tr>
<td>Yemen</td>
<td>24 224 626</td>
<td>28.89</td>
<td>9.10</td>
</tr>
</tbody>
</table>

bWest Bank and Gaza.

Somalia data only available from 2013 to 2018.

cSyrian Arab Republic data only available from 2004 to 2007.
the number of publications to the average GDP, we obtained the number of publications per billion US$ for each country. Lebanon and Jordan surpassed other larger and wealthier countries, with values of 0.64 and 0.21 respectively. Saudi Arabia and Kuwait were the last 2 countries with non-null publication numbers per billion US$, with a value of 0.01 each.

Finally, Lebanon again managed to come first in terms of number of publications per 1000 physicians, with an average of 1.99, followed by Qatar with 0.42. Saudi Arabia had the lowest number of publications per 1000 physicians with an average of only 0.06 in the 16-year period (Table 3).

Linear regression indicated a rather moderate, positive correlation between number of publications and average population size ($r = 0.385$), as well as between number of publications and average number of physicians ($r = 0.513$). However, a weak positive correlation was also found between number of publications and average GDP in the Arab countries ($r = 0.116$).

When FMF-related publications were categorized according to journal rankings, it was found that the majority were published in Q3 ranked journals (43.94%), according to journal rankings, it was found that the majority were published in Q3 ranked journals (43.94%), and the least published in Q4 journals (6.06%); however, 50.00% were published journals ranked in Q1 (15.15%) and Q2 (34.85%).

According to the bibliographic map of the co-occurring MeSH keywords (Figure 1), most articles contained keywords such as “familial Mediterranean fever”, “mutation”, “humans”, “cytoskeletal proteins”, “pyrin”, and “genotypes”, suggesting a main focus on the genetic and cellular aspect of FMF. Three main “clusters” (colours) classify the keywords into groups in which they seem to be present together.

In the Arab world, many researchers from various organizations made their interest in FMF clear by either authoring or co-authoring publications related to the issue. However, out of 284 authors, only 5 showed significant co-authorship, with a minimum threshold of 5 documents per author. In addition, researchers from different organizations co-authored a maximum of 2 documents in only 4 out of 104 organizations and 3 of these originated from a single country, Lebanon (Table 4).

An increase in the number of publications related to FMF was seen during 2013–2015, but this increasing trend diminished in the following years, with the Arab world displaying less interest in FMF-related publications until the end of our study period (Table 5).

### Table 3: Distribution of publications on familial Mediterranean fever in the Arab countries (2004–2019)

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of publications</th>
<th>Per million population</th>
<th>Per billion US$ GDP</th>
<th>Per 1000 physicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>0.03</td>
<td>0.01</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Bahrain</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Comoros</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Djibouti</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Egypt</td>
<td>0.21</td>
<td>0.08</td>
<td>0.13</td>
<td></td>
</tr>
<tr>
<td>Iraq</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Jordan</td>
<td>0.76</td>
<td>0.21</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td>Kuwait</td>
<td>0.31</td>
<td>0.01</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>Lebanon</td>
<td>4.44</td>
<td>0.64</td>
<td>1.99</td>
<td></td>
</tr>
<tr>
<td>Libya</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Mauritania</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Morocco</td>
<td>0.15</td>
<td>0.05</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>Oman</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Palestinea</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Qatar</td>
<td>1.02</td>
<td>0.02</td>
<td>0.42</td>
<td></td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>0.14</td>
<td>0.01</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Somalia</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Sudan</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Syria</td>
<td>0.26</td>
<td>0.16</td>
<td>0.19</td>
<td></td>
</tr>
<tr>
<td>Tunisia</td>
<td>0.09</td>
<td>0.02</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>0.13</td>
<td>0.00</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Yemen</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

*a West Bank and Gaza.

### Discussion

The countries of the Arab world published 189 medical articles per million persons between 2007 and 2016. Qatar, Tunisia, Lebanon, and Kuwait were the only Arab countries to exceed the world average in terms of papers per million people (22). For FMF in particular, half of the Arab countries did not publish any articles during 2004–2019. Lebanon recorded the highest total number of publications on FMF (23) as well as the highest number per million persons (4.44), highest number in relation to GDP (0.64) and highest number per thousand physicians (1.99) over the 16-years of the study. However, the Syrian Arab Republic is the country that recorded the highest percentage of FMF articles out of all its published articles.

Along with other health care providers and researchers, physicians are at the core of the research process. In fact, greater numbers of physicians in a country can be a valuable indicator of this workforce’s contribution in the biomedical scientific community. A novel parameter was introduced in this study: calculating the number of published articles per 1000 physicians (24). This allowed us to evaluate the rate of publications in proportion to the physicians’ workforce, rather than the entire population. This parameter might be able to give a better insight on the publication rate since the number of physicians might vary from country to country differently from population size. This is because the number of physicians is affected by variables such as the country’s financial and political stability and level of education. In this study, a moderate positive correlation was observed between the number of publications and the number of physicians. The average GDP and the population size had weaker correlations with the number of FMF publications. In contrast,
looking at psoriasis-related articles from the Arab world, the strongest correlation was found between number of publications and population size, while for stroke, the strongest correlation was found between number of published articles and average GDP (23,25).

During most years, the total number of publications fluctuated between 4 and 7, reaching a peak of 12 articles in 2015. The calculated annual mean for the number of publications issuing from the 22 countries of the Arab world is 4.31. This means that the annual number of publications per country only amounts to 0.20. In fact, the Arab world released 3.60% of the total FMF related articles worldwide. This number, which is achieved by 22 countries, is much lower than the 36.52% contribution made by Turkey alone to FMF research articles. According to several studies, the Arab world falls behind other regions in many medical research fields, for instance ophthalmology and mental health research, since they only publish about a quarter of the volume of other countries (22,26,27). However, the Arab world’s contribution in some other fields like urology/nephrology is relatively important (28). It is essential to keep in mind that, although the number of publications released in the Arab world is relatively low, they were published in rather high quality journals. Actually, 50.00% of the articles were published in Q1 and Q2 ranked journals.

All of the articles included in this study covered the genetic and immunological aspect of FMF, giving emphasis to the mutated \textit{MEFV} gene and 64.18% focused on the biochemistry and molecular biology of FMF. In fact, the most common MeSH and author keywords found in the 69 articles of this study were “mutation”, “pyrin”, “cytoskeletal proteins”, “genotype”, “genetic predisposition to disease”, “phenotype”, and “gene frequency”. All of these keywords pertain to genetics and cellular biology. This shows that most of the published articles fall into the biological and biochemical field rather than the clinical one. In fact, there is a lack of clinical follow-up concerning FMF in the Arab region, which is why clinical trials and clinical research should be implemented in this region to tackle the issues of diagnosis, prognosis and treatment, and give a clinical impact to their findings. Other less commonly studied aspects of FMF include amyloidosis, arthritis and

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**Table 4 Distribution of co-authored documents (> five documents on familial Mediterranean fever) from the Arab world (2004–2019)**

<table>
<thead>
<tr>
<th>Source</th>
<th>No. co-authored documents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organization</strong></td>
<td></td>
</tr>
<tr>
<td>Department of Medical Genetics, National Institute of Health, Rabat, Morocco</td>
<td>2</td>
</tr>
<tr>
<td>Department of Pathology and Laboratory Medicine, American University of Beirut Medical Center, Beirut, Lebanon</td>
<td>2</td>
</tr>
<tr>
<td>Division of Rheumatology, Department of Internal Medicine, American University of Beirut Medical Center, Beirut, Lebanon</td>
<td>2</td>
</tr>
<tr>
<td>Unité de Genétique Médicale, Faculté de Médecine, Université Saint Joseph, Beirut, Lebanon</td>
<td>2</td>
</tr>
<tr>
<td><strong>Author</strong></td>
<td></td>
</tr>
<tr>
<td>Chouery, Eliane</td>
<td>8</td>
</tr>
<tr>
<td>Delague, Valérie</td>
<td>6</td>
</tr>
<tr>
<td>Medlej-Hashim, Myrna</td>
<td>11</td>
</tr>
<tr>
<td>Mégarbané, André</td>
<td>9</td>
</tr>
<tr>
<td>Salem, Nabiha</td>
<td>5</td>
</tr>
</tbody>
</table>
treatment with colchicine; arthritis is a common and significant feature of the disease, renal amyloidosis is one of its most severe complications and colchicine is the primary treatment (29–31).

Genetic and immunological studies are conducted in advanced laboratories and need substantial funding. Nevertheless, Arab countries spend only 0.15% of their GDP on scientific research, which is significantly lower than the world average of 1.4% (32). This could be due to the political instability in the Arab region, where money is spent on military equipment rather than scientific research. In the absence of financial support, safety and peace, development and research are very challenging. Over recent years, the Arab world has faced hunger, economic insecurity, human insecurity, military intervention and occupation (33). It witnessed 15% of the world’s conflicts between 1948 and 2017, experienced 62% of the total terrorist attacks in 2005, and accounted for 55% of the world’s refugees in 2017 (34).

The main limitation of this study was the use of a single database (PubMed) to retrieve the released articles. Additionally, other references and variables such as the funding per article and the type of article could prove to be useful in assessing the research nature and costs per country.

Conclusion
Arab societies are among the populations most prone to FMF, however, their research input in this field only reaches 3.60% of the total number of FMF-related articles worldwide; half of the Arab countries published no relevant research throughout the 16 years of the study. The low number of publications could be resultant on the political instability in this region as well as the absence of research funding. Nonetheless, articles were published in rather high quality journals, which shows a certain potential in this region for publishing quality research that could help their own, and other, health care systems. To achieve this goal, Arab countries should not...
Activités de recherche sur la fièvre méditerranéenne familiale dans le monde arabe : la nécessité des collaborations régionales et internationales

Résumé

Contexte : La fièvre méditerranéenne familiale (FMF) est une maladie auto-inflammatoire multisystémique touchant les populations du bassin méditerranéen.

Objectifs : L’objectif de la présente étude était d’évaluer la contribution des pays arabes à la recherche sur la FMF entre 2004 et 2019.

Méthodes : La base de données Medline (PubMed) a été consultée pour accéder aux publications concernant la FMF. Le nombre de publications a été normalisé à la moyenne pour la taille de la population, du PIB et du nombre de médecins pour chaque pays. VOSViewer a été utilisé pour créer une carte bibliographique de co-occurrence.

Résultats : Entre 2004 et 2019, 69 articles concernant la FMF ont été publiés dans le monde arabe, ce qui représente 0,03 % du nombre total de publications en provenance des pays arabes, et 3,60 % de tous les articles relatifs à la FMF dans le monde. Après normalisation en fonction de la taille moyenne de la population, du PIB et du nombre de médecins, le Liban s’est classé premier avec respectivement 4,44, 0,64 et 1,99 publications pour un million de personnes. Des corrélations positives modérées ont été observées entre le nombre de publications et la taille moyenne de la population (r = 0,385) et le nombre moyen de médecins (r = 0,513). La moitié des articles ont été publiés dans des revues classées Q1 et Q2. un grand nombre de mots-clés relatifs à la génétique indique que l’accent est mis sur l’aspect génétique de la maladie.

Conclusion : Le faible nombre de publications pourrait être dû à l’absence de financement de la recherche et à l’instabilité politique et militaire dans le monde arabe. Étant donné que de nombreux articles ont été publiés dans des revues de grande qualité, les pays arabes devraient s’attaquer à donner un aspect clinique à leurs études et à établir des collaborations régionales et internationales.

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Résultats : Entre 2004 et 2019, 69 articles concernant la FMF ont été publiés dans le monde arabe, ce qui représente 0,03 % du nombre total de publications en provenance des pays arabes, et 3,60 % de tous les articles relatifs à la FMF dans le monde. Après normalisation en fonction de la taille moyenne de la population, du PIB et du nombre de médecins, le Liban s’est classé premier avec respectivement 4,44, 0,64 et 1,99 publications pour un million de personnes. Des corrélations positives modérées ont été observées entre le nombre de publications et la taille moyenne de la population (r = 0,385) et le nombre moyen de médecins (r = 0,513). La moitié des articles ont été publiés dans des revues classées Q1 et Q2. un grand nombre de mots-clés relatifs à la génétique indique que l’accent est mis sur l’aspect génétique de la maladie.

Conclusion : Le faible nombre de publications pourrait être dû à l’absence de financement de la recherche et à l’instabilité politique et militaire dans le monde arabe. Étant donné que de nombreux articles ont été publiés dans des revues de grande qualité, les pays arabes devraient s’attaquer à donner un aspect clinique à leurs études et à établir des collaborations régionales et internationales.

Activités de recherche sur la fièvre méditerranéenne familiale dans le monde arabe : la nécessité des collaborations régionales et internationales

Résumé

Contexte : La fièvre méditerranéenne familiale (FMF) est une maladie auto-inflammatoire multisystémique touchant les populations du bassin méditerranéen.

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References


Discontinuation of hormonal contraception in Oman: prevalence and reasons

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Abstract

Background: Discontinuation of hormonal contraceptives is an important contributor to unmet need of contraception.

Aims: To determine the discontinuation rate and the reasons for discontinuation of hormonal contraception among Omani women.

Methods: This was a 2-stage sampling, multicentre, retrospective cohort study conducted in 2018 at primary health care centres in Muscat Region, Oman. It included newly registered users of hormonal contraceptives in birth spacing clinics from January to December 2016 and the course of care over the following 12 months. A telephone interview was conducted to complement some of the missing data. The contraceptive methods available were combined oral contraceptives, progestosterone only pills and injectable depot medroxyprogesterone acetate.

Results: We included 404 women and 87.8% were breast-feeding. By the end of the first year, (268; 66.3%) women discontinued their contraceptive method. More than half (55.2% 148/268) of the discontinuation was attributed to adverse effects and the most prevalent was menstrual abnormality (102/268; 38.1%). Only 5.6% (15/268) discontinued contraception because they desired pregnancy. Partners and logistics of availability and access played a minimal role in discontinuation. Age and number of children did not influence the discontinuation rate.

Conclusion: This study improves our knowledge about the rate of discontinuation of hormonal contraception and its related factors in Oman, which can be used for population-specific counselling. Future research should study the contraception behaviour of breast-feeding women to assess when and why they discontinue their contraceptive methods.

Keywords: breast-feeding, hormonal contraception, menstruation disturbances, Oman, treatment discontinuation

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Introduction

Family planning is an important contributor to reducing mortality and morbidity in mothers, neonatal infants and children under 5 years of age (1,2). Global improvements in several aspects related to family planning have resulted in increased contraceptive use and have reduced the unmet need for family planning (2,3).

Discontinuation of contraception is an important contributor to the unmet need of contraception (4). The prevalence of contraceptive discontinuation varies worldwide. It is reported to be as high as 81% in Brazil and as low as 24% in the United States of America (USA) (5). Discontinuation of hormonal contraceptives within 1 year of use is a particular concern as they are generally effective and safe when used in accordance with medical eligibility criteria (6,7). Discontinuation of contraception can take different forms, such as switching the method or abandonment altogether (8). Like the use of contraception, its discontinuation is multifactorial (8–10). Such factors include women’s age, education, socioeconomic status and number of children (8,11,12). The reported reasons for discontinuation of contraception include adverse effects, the logistics of availability and access, partner’s preference, and method failure (5,13). The discontinuation of hormonal contraceptives due to adverse effects ranges from 24% in Spain to 57% in Brazil (4,5,8,14).

In Oman, contraceptive services have been incorporated under primary health care since 1994 (15,16). Contraception is provided free of charge to all Omani women through self-referral to contraception clinics at local health centres (17,18). Although several studies have explored contraceptive choices of women in Oman, there have been no studies on discontinuation of contraception, especially the hormonal type.

The primary objectives of this study were to determine the rate of discontinuation and the reasons for discontinuation of hormonal contraception among Omani women. The secondary objectives were to assess the prevalence of adverse effects of hormonal contraception reported by users and their contribution to discontinuation.
Methods

Study design

This was a 2-stage multicentre, descriptive cohort study conducted in 2018 at primary healthcare centres in Muscat Governorate, Oman. It included newly registered users of hormonal contraceptives in the birth spacing clinics between 1 January and 31 December 2016, and the course of care over the following 12 months was recorded. In 2018, there were 29 local health centres in Muscat Governorate, and 21 had a dedicated birth spacing clinic offering contraception services. There were 3 forms of hormonal contraception available at that time. The oral forms included: progestogen only pill (POP) of levonorgestrel 0.15 mg or norethindrone 0.35 mg, and combined oral contraceptive (COC) containing levonorgestrel 0.15 mg and ethinylestradiol 0.03 mg. The injectable contraceptive was depot medroxyprogesterone acetate (DMPA) 150 mg.

Study population

The sample included Omani women aged 15–49 years registered as new clients in the birth spacing clinics in 2016. Non-Omani women (who married Omani men), women using nonhormonal contraceptives and women who declined participation were excluded.

Estimation of sample size

According to Oman National Center for Statistics and Information, there were 139,394 women of reproductive age (15–49 years) in Muscat Region in 2016; 28.4% of the total population of 490,525 (19). It was estimated that the rate of contraception use among women was 41.3% (19). The calculated sample size was 384 (based on 95% confidence level, 5% margin of error, and 50% anticipated prevalence of contraceptive discontinuation). Two-stage sampling was conducted to randomly select samples from the 29 local health centres in Muscat Region. In the first stage, a simple random sample of 12 local health centres (clusters) was selected using a lottery method. In the second stage, a simple random subsample was used to select the participants within each of these 12 centres. The investigators opted to increase the sample size to 500 to accommodate nonresponders (opt-out or incomplete data). Computer-generated randomization was used for each contraceptive clinic in these 12 local health centres, and the registered file numbers for new clients in 2016 were entered in a separate Excel sheet. A corresponding list of random numbers was created electronically by Excel and arranged in ascending sequence. The top 41 or 42 of each list were chosen to be included in the study to constitute the sample of 500 clients.

Data collection

A 40-variable data collection sheet was constructed. The variables were factors that could play a role in discontinuation of contraception as described previously (7, 20, 21). The first section of the data collection sheet included variables related to sociodemographic data and menstrual, obstetric, gynaecological and medical history. The second part focused on contraception behaviour, including method used, duration of use, changes in baseline health, history of adverse effects, attitudes and satisfaction with the method, and factors contributing to discontinuation (20). The data sheet was piloted on 20 clients to evaluate its applicability and feasibility. Some modifications were made based on the data available for collection and the feedback provided by clients. The data were collected from the registry of the birth spacing clinic and electronic medical records over the first year of follow-up. A telephone interview was conducted with the clients to assess their satisfaction with the contraceptive method used and to supplement any missing data that were not available from the records. All the interviews were conducted by 2 researchers and all the clients in the cohort were approached.

Statistical analysis

Descriptive statistical analysis was performed using SPSS version 23. Frequencies and percentages were used for categorical variables. The χ² test was used for testing the association between categorical variables. P ≤ 0.05 was considered statistically significant. Odds ratios (ORs) and 95% confidence intervals (CIs) were used to assess the effect of age, educational level and number of children on discontinuation of hormonal contraceptives.

Ethical approval

The study was approved by the Research and Ethics Committee of the Directorate General of Health Services, of Muscat Governorate, Ministry of Health, Oman, with the reference number MH-DGPS-MG-7/2019.

Results

Study population

Of the identified 500 new contraception users, 82 were excluded because they were not reachable by phone (n = 82) or they declined to give consent (n = 14). We included 404 women, which translated into 80.8% response rate. Three hundred and fifty-five (87.87%) were breast feeding when they started contraception and 285 (70.54%) were new to the contraceptive method. The most prevalent hormonal contraceptive choice was DMPA (187; 46.29%), followed by POP (140; 34.65%) and COC was the least prevalent (77; 19.06%). The sociodemographic characteristics of the sample and the method of hormonal contraception used are shown in Table 1.

Choice of contraceptive method

When women were asked about the main reason for choosing their method of contraception, 106 (26.26%) answered that they were influenced by a previous bad experience with another method or reports of bad experiences from other women. That was the main motivator for 31 (40.3%) COC and 58 (41.43%) POP users. Eighty-five
(45.45%) of the DMPA users chose the method because they could not remember to take a daily pill. Twenty-eight (6.98%) women chose their method due to rapid return of fertility after discontinuation. Fifty-six (13.86%) women choose their method because they thought it provided more reliable contraception compared to other methods.

**Prevalence of contraceptive discontinuation**

By the end of the first year, more than half of the women in the study (268; 66.34%) discontinued their contraceptive method: switching to another contraceptive method (86; 32.09%); ceasing to use contraception all together (182; 67.91%); or failure of the contraceptive method, resulting in pregnancy (1; 0.25%).

**Method-specific discontinuation rate**

One hundred and thirty-two of 140 (94.29%) POP, 101/187 (54.01%) DMPA and 35/77 (45.45%) COC users discontinued contraception within 12 months (P = 0.0001). Most of these women decided to discontinue contraception within the first 6 months: 77% of POP, 65% of DMPA and 63% of COC users.

**Risk of discontinuation by demographic factors**

There was no association between discontinuation of contraception and age (P = 0.895). When comparing women aged ≤ 30 with those > 30 years, the difference was insignificant (P = 0.98) and age had no effect (OR: 1.01; 95% CI: 0.66–1.53). Around 74% of clients with university level education and 70% of those who finished secondary school discontinued contraception. Only 36% of clients who were able to only read and write discontinued contraception, which was a significant difference (P < 0.001). We grouped together those who had no or limited education into 1 group (n = 82) and those who had a secondary school or higher education in another group (n = 322) and compared the discontinuation risk (37/82 and 231/322). Educated women had almost 3 times the chance to discontinue their hormonal contraception compared to those with no or limited education (OR: 3.09; 95% CI: 1.88–5.08). All except 2 women had children. The 2 nulliparous women were both using COC and discontinued contraception within the first 6 months. One desired pregnancy and the other discontinued on the advice of her healthcare provider to switch contraception. Among the parous women, there was no difference in discontinuation rate between clients who had 1–3 or those who had > 3 children (P = 0.98). To confirm this, the OR for high parity (> 3 children) in relation to discontinuation of hormonal contraceptives was insignificant (OR: 1.14 95% CI: 0.73–1.76).

**Reasons for contraceptive discontinuation**

More than half (55.22% 148/268) of the discontinuation was attributed to adverse effects of the contraceptive method and only 5.60% (15/268) of women discontinued contraception because they desired pregnancy. Eighty-six (32%) discontinued contraception on the advice of her
healthcare provider to switch the contraception. Other reasons for discontinuation such as logistics, husband’s death, divorce, preference for a natural method and contraceptive failure had small percentages (7%). Mood changes were reported by 25%, 21% and 26% of clients who used COC, POP and DMPA, respectively. COC users were more likely to discontinue because of this adverse effect. Seventy-five percent of clients who discontinued because of mood changes did so within the first 6 months.

**Discontinuation due to different adverse effects**

Sixteen percent (65/404) of women gained weight but most of these (75.4%; 49/65) gained < 5 kg. One woman using COC gained > 10 kg. Table 2 shows the prevalence of adverse effects and their contribution to discontinuation of contraception.

**Contraception counselling and advice regarding adverse effects**

The majority (82%) of clients felt they were adequately counselled about possible adverse effects of the contraceptive method prior to initiation. Most women who experienced adverse effects (70%) reported them to their healthcare provider. Only 5.6% of those who reported adverse effects did not receive any management advice.

**Satisfaction with method of contraception**

When women were asked whether they were satisfied overall with their contraceptive method, most of those who discontinued contraception (58.96%; 158/268) were unsatisfied. When compared to women who continued the method, only 2% (3/136) were unsatisfied (P = 0.00).

#### Table 2 Prevalence of side effects and discontinuation rate among different hormonal method users

<table>
<thead>
<tr>
<th>Method Adverse effect</th>
<th>All methods users n = 404</th>
<th>All methods discontinued</th>
<th>COC users n = 77</th>
<th>COC discontinued</th>
<th>POP users n = 140</th>
<th>POP discontinued</th>
<th>DMPA users n = 187</th>
<th>DMPA discontinued</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight gain</td>
<td>67 (16.58%)</td>
<td>7 (1.73%)</td>
<td>8 (10.39%)</td>
<td>1 (1.30%)</td>
<td>18 (12.88%)</td>
<td>3 (2.14%)</td>
<td>41 (21.93%)</td>
<td>3 (1.60%)</td>
</tr>
<tr>
<td>Headache</td>
<td>20 (4.95%)</td>
<td>6 (1.49%)</td>
<td>14 (18.18%)</td>
<td>0 (0.00%)</td>
<td>21 (15.00%)</td>
<td>5 (3.57%)</td>
<td>37 (19.79%)</td>
<td>1 (0.53%)</td>
</tr>
<tr>
<td>Sexual dysfunction</td>
<td>7 (1.73%)</td>
<td>0 (0.00%)</td>
<td>1 (1.30%)</td>
<td>0 (0.00%)</td>
<td>2 (1.43%)</td>
<td>0 (0.00%)</td>
<td>4 (2.14%)</td>
<td>0 (0.00%)</td>
</tr>
<tr>
<td>Mood changes</td>
<td>97 (24.01%)</td>
<td>20 (4.95%)</td>
<td>19 (26.88%)</td>
<td>9 (11.69%)</td>
<td>29 (20.71%)</td>
<td>6 (4.29%)</td>
<td>49 (26.20%)</td>
<td>5 (2.67%)</td>
</tr>
<tr>
<td>GI symptoms</td>
<td>24 (5.94%)</td>
<td>8 (1.98%)</td>
<td>2 (2.60%)</td>
<td>1 (1.30%)</td>
<td>14 (10.0%)</td>
<td>7 (5.0%)</td>
<td>8 (4.27%)</td>
<td>0 (0.00%)</td>
</tr>
<tr>
<td>Venous thromboembolism</td>
<td>1 (0.02%)</td>
<td>1 (0.25%)</td>
<td>0 (0.00%)</td>
<td>0 (0.00%)</td>
<td>0 (0.00%)</td>
<td>0.53% (1)</td>
<td>1 (0.53%)</td>
<td>0.53% (1)</td>
</tr>
<tr>
<td>Menstrual abnormalities</td>
<td>212 (52.48%)</td>
<td>102 (25.25%)</td>
<td>16 (20.78%)</td>
<td>5 (6.49%)</td>
<td>59 (42.14%)</td>
<td>30 (21.43%)</td>
<td>137 (73.26%)</td>
<td>67 (35.82%)</td>
</tr>
</tbody>
</table>

COC = combined oral contraceptive; DMPA = depo medroxyprogesterone acetate; POP = progestogen-only pill.

#### Discussion

This study showed that women in Oman preferred to use progestogen-only contraceptives; 46% used DMPA and 34% used POP. This was expected since 87.9% of the women in the study initiated contraception while breastfeeding. The medical eligibility criteria of the WHO and the local standard procedures have a preference for progestogen-only contraceptives during breastfeeding (19). This is due to widespread concern about COC decreasing milk volume, altering its content, and passage of the hormonal content to the infant. This belief is strongly held by healthcare professionals and contraceptive users. This is still debated, as 2 systematic reviews failed to give a clear verdict of whether COC has a negative effect on milk volume and composition or child growth (22, 23).

The most represented age group for all methods of contraception in our study was 25–30 years (31%). The women in our study were older than the women in a French study who were predominantly aged 20–25 years (3). This might be because our women were all married, whereas the French study included women using contraception who were sexually active regardless of their type of relationship (3).

Avoidance of a negative experience was a significant motivator in choosing a contraceptive method. A bad experience of the client herself or her friends or relatives played an important part in choosing contraceptive method. This highlights the importance of precontraception counselling and explaining that adverse effects can vary among women and the same woman can have a different experience with the same method (24).

The rate of discontinuation of hormonal contraception within the first year in our study was 66.8%, which is higher than the rate in Germany (30%), Senegal (34%), Italy...
factors such as husband’s disapproval, loss of sexual nonavailability of the method. Partnership-related factors such as husband’s disapproval, loss of sexual function or divorce have contributed a small percentage (0.38%). In our study, only 1 woman discontinued DMPA because her husband changed his mind about her using contraception. Studies from Africa have highlighted the partners’ role in discontinuation of contraception because they associate contraception with infidelity and refuse it (4). This can lead to women being secretive about contraception, which hinders compliance and seeking help for adverse effects (4). Previous studies in Oman have described the importance of husbands’ approval for women’s use of contraception from religious and social aspects (20,30). Our study indicates that once husbands’ approval for contraception has been granted, it is unlikely to be retracted.

The second most common reason for discontinuation of hormonal contraception is healthcare providers’ advice to switch method. This contributed to almost one third of the total discontinuation in our study. Most healthcare providers advise women to change contraceptive method for the following reasons: development of unfavourable health risk such as hypertension, diabetes or impaired glucose tolerance, malignancy, depression or headache; belief that some contraceptives are more effective than others; and if the method is not available during follow-up. The advice to switch or discontinue contraceptive methods is part of the armamentarium to manage adverse effects (18). For POP, healthcare providers advise women to switch method beyond the period of exclusive breastfeeding (18).

It is reassuring to see that the logistics of availability and access to contraception have contributed minimally (0.75%) to discontinuation. This is due to the way contraceptive services are structured to be easily accessible in terms of distance, free of charge and supplied sufficiently through local health centres (18). However, other studies have reported that availability, cost of contraception and travel, and distance are significant contributors to discontinuation (14,24).

Our results agree with most studies in this field that the commonest adverse effect leading to discontinuation of hormonal contraception is change in menstrual bleeding, including breakthrough, heavy or prolonged bleeding, and amenorrhea (7,8,10,14). This contributed 25% of the discontinuation in our study. Other adverse effects resulting in discontinuation are weight gain, mood changes, headache, gastrointestinal symptoms, sexual dysfunction and thromboembolism. The frequency of thromboembolism was 0.25%, which is < 0.5% reported in an Italian study (7). The literature and several guidelines advocate progestogen-only contraceptives for women at risk of thromboembolism (18). However, there is evidence that although intrauterine and oral progestogens are not associated with an increased thromboembolism risk, injectable progestogens including DMPA are associated with 2.6 times the risk of thromboembolism between users and nonusers (33). Gastrointestinal symptoms including nausea, vomiting and bloating contributed about 2% of the discontinuation and they were reported more by POP users (10%), which is similar to rates in other studies (7,12).
It is difficult to substantiate the effects of hormonal contraceptives on sexual function from the literature. The evidence is inconsistent and the pathophysiological basis of these effects is poorly understood (34). In our study, only 7 clients (17%) reported that the method affected their sexual satisfaction negatively but none of them reported it as a direct reason for their discontinuation. This might be a true finding or biased considering the unease of discussing such a private matter with a researcher.

Counselling regarding adverse effects of contraceptives has been linked to lower discontinuation rate (13,14,35). In our study, 82% of women felt they were adequately counselled about the adverse effects of the contraceptive method before they started. This is similar to another study of American women, in which 86% felt they were adequately informed about their contraceptive methods and the adverse effects (5). However, this high rate of adequate counselling and high discontinuation rate might be because the counselling was suboptimal in terms of quality or comprehensiveness (35). Another reason could be that the women retained little of what they were counselled about. A possible third reason is that counselling alone is not enough to improve tolerance of adverse effects, and the mere occurrence of adverse effects is sufficient for women to decide to discontinue contraception, regardless of how adequate the information is about adverse effects (14).

This study is one of few to address discontinuation of hormonal contraception in the Gulf Region and is believed to be the first in Oman. It had a randomized design and adequate sample size. It provides some insights on factors that influence women's decision to discontinue contraception. Women in Oman share many religious and social values with women in other Arab states. So, it is likely that the results of this study can be generalized to other women in urban areas of other Gulf or Arab states.

The study had some limitations. This was a retrospective study with inherent disadvantages, including recall bias of participants and limited number of documented facts in the health records of the birth spacing clinic. Selection bias was also a limitation as 19.2% of the selected clients were excluded. The main reason was that the contact telephone numbers were those of husbands or a male family members who might not have been reachable. Also, most were mobile numbers that tend to be changed more often compared to landlines. The study sample was all from Muscat Region, which is considered an urban area, and this might limit the applicability of the findings to rural areas.

**Conclusion**

This study improves our knowledge of the rate of discontinuation of hormonal contraception and the causative factors in Oman, which can be used for population-specific counselling. It also provides reassurance regarding the frequency of some of the important adverse effects of these methods. Unlike in other populations, women in Oman are not reporting logistic difficulties in accessing or continuing their contraception. Breastfeeding women are the main users of hormonal contraception and POP is the main method. Therefore, it is important to look specifically into this group of women more closely in a prospective manner to assess further when and why they discontinue contraception and address their needs.

**Funding:** None.

**Competing interests:** None declared.

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**Arrêt de la contraception hormonale à Oman : prévalence et raisons**

**Résumé**

**Contexte :** L'arrêt des contraceptifs hormonaux représente une part importante des besoins non satisfaits en matière de contraception.

**Objectifs :** Déterminer le taux d'arrêt et les raisons de l'arrêt de la contraception hormonale chez les femmes omanaises.

**Méthodes :** Il s'agissait d'une étude rétrospective de cohorte multicentrique, en deux étapes, menée en 2018 dans des centres de soins de santé primaires de la région de Mascate (Oman). Elles portent sur les utilisa
trices de contraceptifs hormonaux récemment inscrites dans les cliniques de planification familiale de janvier à décembre 2016 et sur le déroulement des soins au cours des 12 mois suivants. Un entretien téléphonique a été mené pour compléter certaines données manquantes. Les méthodes contraceptives disponibles étaient les contraceptifs oraux combinés, les pilules à base de progestérone seule et l'acétate de médroxyprogestérone en injection retard.

**Résultats :** Nous avons inclus 404 femmes et 87,8 % d'entre elles étaient allaitantes. À la fin de la première année, 268 femmes (66,3 %) avaient cessé d'utiliser leur méthode de contraception. Plus de la moitié (148/268 ; 55,2 %) des arrêts de contraception ont été attribués à des effets indésirables, les plus fréquents étant les anomalies menstruelles (102/268 ; 38,1 %). Seules 5,6 % des femmes (15/268) ont abandonné la contraception parce qu'elles désiraient une grossesse. Les partenaires et la logistique liée à la disponibilité des méthodes de contraception et leur acces
sibilité n'ont joué qu'un rôle minime dans l'arrêt de la contraception. L'âge des enfants et leur nombre n'ont pas influencé le taux d'arrêt.

**Conclusion :** La présente étude améliore nos connaissances sur le taux d'arrêt de la contraception hormonale et ses facteurs connexes à Oman, lesquelles peuvent être utilisées pour fournir des conseils spécifiques à la population. Les recherches futures devraient étudier les comportements en matière de contraception des femmes allaitantes afin de déterminer quand et pourquoi elles abandonnent leurs méthodes contraceptives.
References


The effects of the COVID-19 pandemic on quality of life: a survey of mildly disabled multiple sclerosis patients

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Abstract

Background: Almost everyone’s health-related quality of life (HQoL) can be affected by a huge health problem like the COVID-19 pandemic.

Aims: We assessed the short-term impact of the COVID-19 pandemic on HQoL in multiple sclerosis (MS) patients in Tabriz, Islamic Republic of Iran.

Methods: A printed version of the MS-specific HQoL questionnaire was completed by patients at the neurology department at the university hospital in Tabriz and the scores before and during the pandemic (2019 and 2020) were compared.

Results: We recruited 50 patients for this study. Although the overall physical (69.29 + SD 16.59, to 68.40 + SD 20.95) and mental health (67.36 + SD 19.02 to 66.76 + SD 22.70) composite scores decreased slightly in the second stage, however, this change was not statistically significant (P = 0.67, P = 0.83). The severity of MS was associated with changes in mental and physical health composites.

Conclusions: The effect of the pandemic on the HQoL of mildly disabled MS patients was not statistically significant.

Keywords: multiple sclerosis, quality of life, COVID-19 pandemic, health-related quality of life


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Introduction

The coronavirus disease 2019 (COVID-19) pandemic, as the greatest challenge since World War II (1), is a major concern globally in 2020. Multiple sclerosis (MS) itself, is not a risk factor for contracting severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (2), but some disease-modifying drugs may reduce the ability of the immune system to respond to an infection, which can make MS patients more susceptible to the disease (3,4).

A study of the evaluation of health-related quality of life (HQoL) reported a significant increase in pain/discomfort and anxiety/depression factors of the EuroQol-5D instrument in a general Chinese population (5). Another study assessing quality of life (QoL) in cancer patients during the COVID-19 pandemic found that QoL was distinctly affected (6). A QoL survey among 158 Italian patients confirmed the impact of the COVID-19 pandemic on the risk of anxiety/depression in patients with primary antibody deficiencies (7).

Previous studies have indicated that social and family circumstances and physical disability of disease can impact patients’ QoL (8–11). Adding other stressors such as disease outbreaks may affect patients’ QoL due to fear of the effects of infectious disease on the existing illness and fear of the consequences of changing treatment. The goal of this study was to evaluate the short-term impact of COVID-19 pandemic on HQoL in a sample of MS patients.

Methods

Study design and ethical issues

This cross-sectional study was carried out during October 2019–June 2020. Patients were recruited via the neurology department at the university hospital in Tabriz, Islamic Republic of Iran. All of the patients involved in the study gave detailed informed consent before each stage of completing the questionnaire and the study did not impose a financial burden on patients. Adult patients with a definitive diagnosis of relapsing–remitting MS (RRMS) according to the revised 2017 McDonald diagnostic criteria and a lower degree of disability on the Expanded Disability Status Scale (EDSS), score ≤ 4, were selected for this study. Patients with a history of COVID-19 or any other infectious disease, patients with COVID-19 underlying medical conditions, history of alcohol abuse, changing medication between 2 stages of the study, having corticosteroid pulse or MS relapse within 8 weeks of the assessments, systemic diseases or severe disabilities, and presence of physical impairments that could interfere with HQoL testing were excluded from our sample. At both stages, patients were examined by a neurologist and where there was any change in the EDSS score, they were excluded from our sample.
Ethical considerations

The ethics committee of Tabriz University of Medical Sciences reviewed and approved the study protocol (Ethics Code: IR.TBZMED.REC.1399.385).

Data collection

The first stage of collecting data was carried out between October 2019 and February 2020, before the COVID-19 pandemic as a part of another published study (12); 92 patients were involved in this stage. The second stage was during the COVID-19 pandemic in May and June 2020; in total, 50 patients were involved in this stage. All of the patients who had participated in the first stage of the study and had attended the medical centre for their routine medical visit were involved in this study apart from those who were ruled out according to the exclusion criteria. To reduce the risk of infection, all the hygiene protocols were followed strictly by both the healthcare providers and the patients, during the examination. We used the Farsi version of the MS quality of life-54 (MSQOL-54) questionnaire designed by Vickrey et al. (10,11,13) for measuring HQoL. The validity and reliability of the Farsi translated version of the questionnaire were approved by Ghaem et al. (14). A printed version of the questionnaire was completed by the patients (in the case of disability, a trained colleague helped in reading and completing it). We divided patients into 3 groups according to drug usage: oral, injection and infusion medications. The oral drug group included dimethyl fumarate and fingolid. The injection group included high-dose high-frequency drugs (interferon-beta-1a), glatiramer acetate and low-dose low-frequency drugs (interferon-beta-1a) and infusion drugs, including natalizumab and rituximab.

Statistical analysis

The results of the first and the second stages of study were compared by patients themselves using SPSS, version 26.0, with significance level 0.05 and 95% confidence interval. Values are given as mean and standard deviation (SD) rounded to 2 decimal places and the paired samples t-test was used to compare results before and during the pandemic. The HQoL changes were calculated and the Pearson correlation was used to find the correlation coefficients between demographic factors and absolute values of HQoL changes. For assessment of differences

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean (SD)</th>
<th>P-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>33.14 (9.08)</td>
<td>0.98</td>
</tr>
<tr>
<td>Education (years)</td>
<td>12.54 (3.86)</td>
<td>0.11</td>
</tr>
<tr>
<td>EDSS score</td>
<td>1.34 (1.24)</td>
<td>0.91</td>
</tr>
<tr>
<td>Disease duration (months)</td>
<td>88.46 (72.91)</td>
<td>0.47</td>
</tr>
<tr>
<td>No. of relapses</td>
<td>2.56 (2.53)</td>
<td>0.83</td>
</tr>
<tr>
<td>Medication (no. of patients using oral; injection; infusion)</td>
<td>20; 17; 13</td>
<td>0.95</td>
</tr>
</tbody>
</table>

SD = standard deviation.
EDSS = Expanded Disability Status Scale.

Table 1 Demographic and clinical characteristics of relapsing–remitting MS patients (n = 50: 17 males, 33 females), Tabriz, 2019–2020

<table>
<thead>
<tr>
<th>HQoL subscales</th>
<th>Score</th>
<th>P-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical function</td>
<td>80.15 (22.83)</td>
<td>80.10 (24.85)</td>
</tr>
<tr>
<td>Health perceptions</td>
<td>62.70 (19.27)</td>
<td>66.80 (20.64)</td>
</tr>
<tr>
<td>Energy/fatigue</td>
<td>57.12 (18.16)</td>
<td>57.44 (21.97)</td>
</tr>
<tr>
<td>Physical role limitations</td>
<td>71.50 (37.46)</td>
<td>66.00 (40.01)</td>
</tr>
<tr>
<td>Pain</td>
<td>71.96 (20.05)</td>
<td>69.69 (26.23)</td>
</tr>
<tr>
<td>Sexual function</td>
<td>71.98 (31.37)</td>
<td>70.83 (35.66)</td>
</tr>
<tr>
<td>Social function</td>
<td>71.50 (20.48)</td>
<td>70.99 (20.28)</td>
</tr>
<tr>
<td>Health distress</td>
<td>67.70 (25.75)</td>
<td>67.90 (28.99)</td>
</tr>
<tr>
<td><strong>Mental</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall quality of life</td>
<td>71.63 (20.33)</td>
<td>70.93 (21.86)</td>
</tr>
<tr>
<td>Emotional well-being</td>
<td>59.35 (19.19)</td>
<td>59.51 (21.42)</td>
</tr>
<tr>
<td>Mental role limitations</td>
<td>67.99 (38.07)</td>
<td>67.33 (39.54)</td>
</tr>
<tr>
<td>Cognitive function</td>
<td>76.30 (17.43)</td>
<td>72.70 (25.39)</td>
</tr>
<tr>
<td>Health distress</td>
<td>67.70 (25.75)</td>
<td>67.90 (28.99)</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical health composite</td>
<td>69.29 (16.59)</td>
<td>68.40 (20.95)</td>
</tr>
<tr>
<td>Mental health composite</td>
<td>67.36 (19.02)</td>
<td>66.76 (22.70)</td>
</tr>
</tbody>
</table>

HQoL = health-related quality of life; SD = standard deviation.
*Difference was not statistically significant in any subscale in our sample.
related to sex and medications, the independent samples t-test and one-way ANOVA were used for both demographic factors and HQoL score changes.

Results

We recruited 50 RRMS patients, 17 males and 33 females. Table 1 gives a summary of the demographic characteristics. Mean age of the participants was 33.14 (SD 9.08; range 19–54) years. Mean duration of illness was 88.46 (SD 72.92) months.

Table 2 gives a summary of the scores on the MSQOL-54 questionnaire subscales before and during the pandemic. Although the overall physical (69.29, SD 16.59, to 68.40, SD 20.95) and mental health (67.36 SD 19.02 to 66.76 SD 22.70) composite scores decreased slightly in the second stage, however, this change was not statistically significant (P = 0.67, P = 0.83). Some subscales such as physical role limitations (P = 0.25), pain (P = 0.24) and cognitive function (P = 0.23) showed a decline, while health perception (P = 0.11) showed an improvement during the COVID-19 pandemic. Generally, none of these changes were statistically significant. Physical function and emotional well-being were the subscales that were the most similar between the first and second stages of the study (P = 0.98, P = 0.95). The decrease in mental (P =

Table 3 Correlation coefficients for demographic factors and clinical characteristics among relapsing–remitting MS patients in Tabriz (October 2019–June 2020) and absolute values of the health-related quality of life (HQoL) subscale changes (Pearson correlation)

<table>
<thead>
<tr>
<th>HQoL subscale</th>
<th>Statistic</th>
<th>Age</th>
<th>Education</th>
<th>Duration of disease</th>
<th>EDSS score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical function</td>
<td>r</td>
<td>0.20</td>
<td>-0.03</td>
<td>0.46</td>
<td>0.48</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>0.15</td>
<td>0.78</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Health perceptions</td>
<td>r</td>
<td>0.05</td>
<td>-0.27</td>
<td>0.13</td>
<td>0.06</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>0.70</td>
<td>0.05</td>
<td>0.33</td>
<td>0.66</td>
</tr>
<tr>
<td>Energy/fatigue</td>
<td>r</td>
<td>0.01</td>
<td>-0.01</td>
<td>0.00</td>
<td>0.20</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>0.93</td>
<td>0.93</td>
<td>0.98</td>
<td>0.15</td>
</tr>
<tr>
<td>Physical role limitation</td>
<td>r</td>
<td>0.17</td>
<td>-0.06</td>
<td>0.18</td>
<td>0.34</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>0.21</td>
<td>0.64</td>
<td>0.18</td>
<td>0.01</td>
</tr>
<tr>
<td>Pain</td>
<td>r</td>
<td>0.28</td>
<td>0.64</td>
<td>0.29</td>
<td>0.25</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>0.04</td>
<td>0.43</td>
<td>0.03</td>
<td>0.07</td>
</tr>
<tr>
<td>Sexual function</td>
<td>r</td>
<td>-0.05</td>
<td>0.02</td>
<td>-0.19</td>
<td>0.03</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>0.75</td>
<td>0.87</td>
<td>0.24</td>
<td>0.84</td>
</tr>
<tr>
<td>Social function</td>
<td>r</td>
<td>-0.16</td>
<td>-0.15</td>
<td>-0.03</td>
<td>-0.00</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>0.26</td>
<td>0.27</td>
<td>0.81</td>
<td>0.96</td>
</tr>
<tr>
<td>Health distress</td>
<td>r</td>
<td>0.07</td>
<td>-0.08</td>
<td>0.01</td>
<td>0.26</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>0.59</td>
<td>0.55</td>
<td>0.89</td>
<td>0.06</td>
</tr>
<tr>
<td>Mental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall quality of life</td>
<td>r</td>
<td>0.10</td>
<td>-0.22</td>
<td>0.28</td>
<td>0.33</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>0.48</td>
<td>0.11</td>
<td>0.04</td>
<td>0.01</td>
</tr>
<tr>
<td>Emotional well-being</td>
<td>r</td>
<td>-0.04</td>
<td>-0.26</td>
<td>-0.02</td>
<td>0.28</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>0.74</td>
<td>0.06</td>
<td>0.85</td>
<td>0.04</td>
</tr>
<tr>
<td>Mental role limitations</td>
<td>r</td>
<td>-0.12</td>
<td>0.10</td>
<td>0.02</td>
<td>0.26</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>0.38</td>
<td>0.44</td>
<td>0.86</td>
<td>0.06</td>
</tr>
<tr>
<td>Cognitive function</td>
<td>r</td>
<td>0.42</td>
<td>-0.27</td>
<td>0.30</td>
<td>0.21</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>&lt; 0.01</td>
<td>0.05</td>
<td>0.03</td>
<td>0.13</td>
</tr>
<tr>
<td>Health distress</td>
<td>r</td>
<td>0.07</td>
<td>-0.08</td>
<td>0.01</td>
<td>0.26</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>0.59</td>
<td>0.55</td>
<td>0.89</td>
<td>0.06</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical health composite</td>
<td>r</td>
<td>0.06</td>
<td>-0.09</td>
<td>0.26</td>
<td>0.35</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>0.64</td>
<td>0.50</td>
<td>0.06</td>
<td>0.01</td>
</tr>
<tr>
<td>Mental health composite</td>
<td>r</td>
<td>0.03</td>
<td>-0.13</td>
<td>0.23</td>
<td>0.29</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td>0.81</td>
<td>0.34</td>
<td>0.09</td>
<td>0.03</td>
</tr>
</tbody>
</table>

EDSS = Expanded Disability Status Scale.
A summary of the correlation coefficients for the demographic factors and clinical characteristics of patients with absolute values of changes in the HQoL subscales is presented in Table 3. Age was associated with the pain \( P = 0.04 \) and cognitive function \( P < 0.01 \) subscale changes. Education did not affect changes in any subscale of HQoL but duration of the disease influenced the physical function \( P < 0.01 \), pain \( P = 0.03 \), overall QoL \( P = 0.04 \) and cognitive function \( P = 0.03 \) subscales. Severity of MS according to the EDSS score had an association with physical function \( P < 0.01 \), physical role limitation \( P = 0.01 \), emotional well-being \( P = 0.04 \), and physical \( P = 0.01 \) and mental \( P = 0.03 \) health composites changes. Without any significant difference between the demographic characteristics of the female and male participants, the changes in HQoL subscales were not statistically significant in any HQoL subscale (overall score \( P \)-values 0.41 and 0.46). Also, comparing types of medication, there was no significant difference in any HQoL subscale between users of oral, injection and infusion disease-modifying drugs (overall score \( P \)-values 0.18 and 0.24).

### Discussion

The COVID-19 pandemic had negative effects on patients’ HQoL but the differences were not statistically significant in our sample. The effects of the COVID-19 pandemic on mental and physical health composites were greater in patients with a higher EDSS score.

A 2020 cross-sectional study in an Iranian setting found that 90% of MS patients knew that COVID-19 was in the pandemic stage but 27% did not follow quarantine guidelines strictly (15). It is essential to take the risk seriously, but feelings of anxiety can make people more susceptible to infection. This could be more worrying when we consider the higher rate of anxiety and depression among MS patients (16,17). Nevertheless, the pandemic did not significantly worsen the mental health of the patients in our sample.

MS is not one of conditions that increase the risk of severe illness from COVID-19 (3,18) so health perception showed improvement during the pandemic in MS patients based on the HQoL questionnaire. The United Kingdom MS society advises patients just to practice social distancing and keep washing their hands (19). Italy, the first European country to encounter the effects of COVID-19 pandemic (20), has set up a programme for a compressive response to COVID-19 in patients with MS and achieved reassuring results in the time of the pandemic (21). According to their reports, only 5 of 238 MS patients with symptomatic COVID-19 infection died. All of them had an EDSS score \( \geq 6.5 \) (22). Also, all 3 cases of COVID-19-positive MS patients in a study in Chile required hospitalization but after a course of treatment they were discharged home and none of them died (23). In our sample, the EDSS score was associated with mental and physical health composites. To keep patients safe and also minimize disease severity, we did not include patients with an EDSS score \( > 4 \) in our study.

A study in Saudi Arabia found 32% missing hospital appointments and 35.2% missing drug infusions in MS patients (24). As over 40% of the COVID-19 infections are hospital-acquired (25), the World Health Organization recommends doctors use telehealth services (26) but there are still some doubts in regard to efficacy (27).

Another concern is medications; the Association of British Neurologists has issued a guideline to assess the safety of using drugs during this pandemic (28). Immunosuppressive drugs can make patients more susceptible to getting infected by SARS-CoV-2 and their use should be reduced as much as possible during the COVID-19 pandemic. In our study, however, differences in type of medication were not associated with any effect of the pandemic on HQoL.

### Conclusion

In conclusion, the COVID-19 pandemic can worsen the HQoL of MS patients but not statistically significantly. The changes in HQoL mental health and physical health composites are associated with severity of MS, but age, education, duration of the disease, sex and type of disease-modifying drugs did not affect these changes.

### Funding:

This study was supported by the Student Research Committee of Tabriz University of Medical Sciences (Registration code: 65442).

### Competing interests:

None declared.
Résultats : Nous avons recruté 50 patients pour cette étude. Même si les scores composites globaux pour la santé physique [69.29, écart type (±ET) 16.59 à 68.40, ±ET 20.95] et mentale (67.36, ±ET 19.02 à 66.76, ±ET 22.70) ont légèrement diminué au cours de la deuxième phase, ce changement n’était pas significatif (p = 0.67, p = 0.83). La gravité de la SEP est associée à des changements dans les composites de santé mentale et physique.

Conclusions : L’effet de la pandémie sur la qualité de vie liée à la santé des patients légèrement handicapés atteints de SEP n’est pas statistiquement significatif.

Résultats : Nous avons recruté 50 patients pour cette étude. Même si les scores composites globaux pour la santé physique [69.29, écart type (±ET) 16.59 à 68.40, ±ET 20.95] et mentale (67.36, ±ET 19.02 à 66.76, ±ET 22.70) ont légèrement diminué au cours de la deuxième phase, ce changement n’était pas significatif (p = 0.67, p = 0.83). La gravité de la SEP est associée à des changements dans les composites de santé mentale et physique.

Conclusions : L’effet de la pandémie sur la qualité de vie liée à la santé des patients légèrement handicapés atteints de SEP n’est pas statistiquement significatif.
Pharmaceutical regulations in Iraq: from medicine approval to post-marketing

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Abstract

Background: Recent information on regulation of the pharmaceutical sector in Iraq is scarce.

Aims: This report summarizes the regulations governing pharmaceutical products in Iraq, assesses the challenges faced and makes recommendations to tackle these issues.

Methods: The Iraq pharmaceutical country profile 2020, prepared by the Iraqi Ministry of Health in collaboration with the World Health Organization (WHO) in 2020, was the main source of information.

Results: Despite all the efforts by the Ministry of Health to provide adequate and safe medicines, the Iraqi pharmaceutical sector has several challenges, including inadequate budget allocated to the ministry, shortages in essential medicines, underutilization of electronic technologies in the management of regulation-related work, a large number of substandard and falsified medications in the private sector and a stagnant national pharmaceutical industry.

Conclusion: The Ministry of Health needs more financial support from the federal government to fund its activities and technical support from international health organizations to provide training and resources.

Keywords: drug industry, essential drugs, regulation, Iraq

Introduction

Iraq has suffered several wars in the past 4 decades which resulted in significant humanitarian crises. In 2019, the country had a total population of 39.128 million (1) and a gross domestic product (GDP) of US$ 110.83 billion (133 trillion Iraqi dinars) (2). However, only 4.5% (about US$ 5 billion) of the GDP was allocated to the health care sector. This percentage is low compared with other countries in the Middle East region with comparable GDPs. Government expenditure on pharmaceuticals was US$ 1.25 billion for all population, which represented 25% of the total health expenditure (2).

All people are covered by government health services (3). All health care facilities in the public sector are owned by the government and under the authority of the Ministry of Health and Environment (hereafter called the Ministry of Health). All health care providers working in the public health sector are government employees. No accurate data are available on private health insurance as it is not commonly used in Iraq (2).

This report aims to describe the regulation of pharmaceutical products by the Iraqi Ministry of Health from registration and approval to post-marketing, assess the main challenges faced and make recommendations to tackle the issues.

National Regulatory Authority

Four directorates within the Ministry of Health are involved in regulation of medicines: Directorate of Technical Affairs, the State Company for Marketing Drugs and Medical Appliances (KIMADIA), Directorate of Public Health and Directorate of Inspection. The Directorate of Technical Affairs is the main entity responsible for medicine regulation. This Directorate has several departments: Pharmacy Department, Registrations Department, National Committee for Drug Selection, National Centre for Drug Control and Research, Consulting Committees, Therapeutics Department, Needs Estimation Department, National Committee for Selection of Herbal Medicines and Food Supplements and Herbal Medicines Department (Figure 1) (4).

The Directorate of Technical Affairs has the following functions as the medicinal regulatory authority in Iraq: approving medicines/vaccines, issuing marketing authorization, regulatory inspection, granting import and manufacture licences, laboratory testing (quality control and assurance), controlling release of medicines to the market and pharmacovigilance. The Directorate regulates the following health products: medicines, biotherapeutics, vaccines, blood and blood components, herbal and traditional medicines, food supplements, medical devices, diagnostics and narcotics.
Approval of medicines

The National Committee for Drugs Selection is responsible for selecting medicines and vaccines for the national essential medicines list (EML) and comprehensive medicines list (4). The National Committee usually includes 12–16 specialist physicians and pharmacists representing different specialties and departments. The Committee may approve new medications in each meeting and the members usually meet weekly. Hence, medicines in the EML are updated regularly.

The national EML contains medicines and vaccines that need to be available in public health care settings. The EML has three levels (levels 1, 2 and 3) (5). As of 23 June 2020, 1105 medicines and vaccines were included in the EML, but only 554 of them were at level 1. The three levels refer to the need to secure medicines for public health care settings (hospitals and primary health care centres). The three levels include different medications from each pharmacological group and class. Level 1 medications are the most cost-effective ones. The central public agency for procurement in the health ministry (KIMADIA) is responsible for procuring level 1 medicines on the EML for public health care facilities. Although medicines on levels 2 and 3 of the EML are approved for public facilities, they are not required to be procured by the State Company. However, level 2 and 3 medications can be procured by peripheral public health care facilities, but the priority is for level 2 over level 3 medications. In other words, if medicines on level 1 are not secured by KIMADIA, health care directorates and hospitals can procure level 2 medicines as alternative. If level 2 medicines are not available in the market, then they can procure level 3 medicines instead.

The Comprehensive Medicine List includes additional medicines which can be procured by the private sector. As of June 23, 2020, the Comprehensive Medicine List included 3700 (essential and non-essential) medicines. Some medicines are approved for the comprehensive list, but not for the EML (5).

To select the most cost-effective medications, the National Committee for Drugs Selection requests pharmacoeconomic studies to be conducted by the unit on studies and data analyses at the Needs Estimation Department before approving high-cost medications for the EML, such as biological and oncology medicines (5).

It is worth mentioning that the National Committee for Drugs Selection is not responsible for approving herbal or traditional medicines. The National Committee for Selection of Herbal Medicines and Food Supplements oversees the approval of herbal and natural medicines, and sports and food supplements in the National Herbal List (5).

Registration of pharmaceutical companies and products

Figure 2 shows the regulatory pathways for registration and approval of pharmaceutical companies and products in the private and public sectors in Iraq.

The Registration Department of the Directorate of Technical Affairs is responsible for registration (marketing authorization) of pharmaceutical companies and medicinal products for both private and public
sectors, whether they are produced nationally or internationally. The Registration Department includes several technical committees and subcommittees: Medicines’ Registration Committee, Bioequivalence Study Committee, Biological Medicines Committee, Medical Appliances Committee, Laboratory Materials’ Committee, Pharmaceutical Company Registration Committee and Price Determination Committee.

The most important prequalifications to register pharmaceutical companies include a good manufacturing practice (GMP) certificate and a certificate of pharmaceutical product, preferably from one or more of the following medicine regulatory agencies: United States Food and Drug Administration (FDA); European Medicines Agency (EMA); Medicines and Healthcare Products Regulatory Agency, United Kingdom of Great Britain and Northern Ireland; Swiss surveillance authority for medicines (Swissmedic); Health Product and Food Branch, Canada; Therapeutic Goods Administration, Australia; Ministry of Health, Labour and Welfare of Japan; or Gulf Cooperation Council (GCC) (5).

Information on registered medical products, authorized companies and licenced facilities are recorded, reviewed and updated by the Registration Department every 5 years (5). However, this information may not be published routinely. If a scientific bureau or pharmaceutical company fails to update its product information after 5 years of registration, its product registration will be revoked automatically.

International manufacturers that do not have one of the above-mentioned certifications, need to be visited once by a health ministry expert team (from the Pharmacy and Registration Departments) to make sure they follow GMP before being approved as a supplier (5).

**Recognized certification**

The Directorate of Technical Affairs recognizes reliable certifications (from FDA, EMA, WHO and the medicines authorities of Australia, Canada, Japan and the United Kingdom) (6). According to regulations of the Directorate of Technical Affairs in February 2018, pharmaceutical companies with products that have one or more of reliable certificate(s) (from EMA, FDA, Swissmedic, or the medicines authorities of Australia, Canada, Japan and the United Kingdom and the GCC) will be exempt from the inspection visit that is usually required before company registration. In addition, pharmaceutical companies that have one of the above-mentioned recognized certificates (e.g. FDA, EMA) are also exempt from batch testing by the National Centre for Drug Control and Research (5). Similarly, the National Committee for Drug Selection recognizes EMA and/or FDA certificates which are the most acceptable criteria on which to base decisions to approve new medicines in the essential or comprehensive medicine lists.

**Pharmaceutical products and companies registered in Iraq**

As of 12 August 2020, the Registration Department had 4665 registered medicines and vaccines. The number of registered medicines has increased over the past 3 years from 2500 in December 2018 to 4665 in August 2020. This increase has been achieved by adopting fast track registration and assigning specialized expert registration committees for each type of medicinal product (pharma-
Determination of medicine prices

The Registration Department determines the registration price of medicines (5). However, KIMADIA may negotiate companies to lower their price to below the registered prices during their application to win a public procurement tender. On the other hand, the Syndicate of Iraqi Pharmacists uses the registered prices to determine the prices on the registered medication sticker sold to the private sector. The Registration Department regulations determine the prices of brand medicines according to a national guideline which relies mainly on the prices in some neighbouring countries (Jordan and Saudi Arabia) and in the British National Formulary. On the other hand, determination of the prices of generic medicines depends on the geographical area of the manufacturers. For instance, if the pharmaceutical manufacturers are based in North America, Europe, Australia, South Korea or Japan, the price of generics equals to 60% of the brand price, given that brand prices may differ between countries. When the manufacturers are based in the Middle East, Arabic countries or South America, the price of generic equals to 40% of the brand price. Finally, when manufacturers are based in east and south-east Asia (e.g., China, India), the price of generic medicine equals to 20% of the brand price (5).

Only officially procured medicines in the private sector have price stickers of the Syndicate of Iraqi Pharmacists. It is worth noting that public health care settings provide the prescribed medications to patients at subsidized prices. For example, the fees of any prescription for outpatients at public health clinics are between US$ 0.8 and US$ 2.5 only.

Granting marketing licence to pharmaceutical companies

The Pharmacy Department of the Directorate of Technical Affairs is responsible for granting import licences to international companies and working licences to national manufacturers (Figure 3). Import licences for international and national companies are valid for 1 year. All international pharmaceutical manufacturers should have a GMP certificate to be registered.

The Syndicate of Iraqi Pharmacists (a nongovernmental organization) has the authority to grant licences to scientific drug bureaus, private wholesalers (drug stores) and private community pharmacies, which are inspected by both the Inspection Directorate of the Ministry of Health and the Syndicate of Iraqi Pharmacists (Figure 3) (7,8).

Regulation of national pharmaceutical manufacturing

Experts from the National Industry Section at the Pharmacy Department should inspect national pharmaceutical companies before granting a work licence. To obtain a work licence, national pharmaceutical manufacturers need to follow GMP (according to the WHO requirements) (5).

There are 23 national pharmaceutical manufacturers (two governmental and 21 private) in Iraq. They are actual manufacturers and produce the finished products. However, no national factory produces active pharmaceutical ingredients or packages already formulated imported products. Nor do these manufacturers produce biopharmaceuticals or WHO prequalified products. A recent mixed-method study interviewed seven managers or owners of national manufactures to explore the challenges facing these companies (9). They said experienced several financial and regulation difficulties including the lengthy process to get a 1-year import licence, delays in payments from KIMADIA and barriers to importing active ingredients (5,9). As a result, the market share of domestic pharmaceutical medicines was only 15.3% of the total value of public sector (KIMADIA) contracts in 2019. In terms of volume share, national pharmaceutical products represented 47.8% of the total volume of public sector medicine contracts in the same year. This indicates that most nationally produced medicines were low cost (5).

Medicine procurement for the public sector

KIMADIA, founded in 1964, is the agency responsible for procurement and distribution of medicines, medical appliances and equipment for public health care settings (public hospitals and primary health care settings) in all 18 provinces if Iraq (Figure 2). If KIMADIA is unable to secure medicines in the EML, health directorates in all provinces have the right to procure these essential medicines from the private sector (10). In 2019, KIMADIA procured 60% of essential medicines in the EML (level I). An insufficient budget allocated to KIMADIA is one of the main reasons for a shortage in essential medicines in Iraq in the past few decades.

Medicine procurement for the private sector

The private sector medicine procurement and distribution differs from the public sector. Registered international pharmaceutical companies can market their
registered medicines through scientific bureaus to drug wholesalers which in turn supply community pharmacies with medicines (Figure 2). Scientific drug bureaus are the national representatives of international pharmaceutical companies. National pharmaceutical manufacturers can provide their products directly to drug wholesalers (7). As a third party between the scientific bureaus of international companies and community pharmacies (7), drug wholesalers may increase medicine prices given that few medicines have the syndicate price sticker. In addition, wholesalers may procure substandard and/or falsified medications through unofficial routes (11).

**Customs policies on the pharmaceuticals in public and private sectors**

There are customs policies for pharmaceuticals at the federal level and in Kurdistan region, Iraq. The Customs Clearance Department of KIMADIA and the Ministry of Trade regulate pharmaceuticals at the federal level for the public and private sectors. In contrast, the Kurdistan Medicines Control Agency is responsible for regulating pharmaceuticals in Kurdistan region. The customs in Kurdistan region have a pharmacist at each point of entry, while there is no pharmacist at customs points of the federal government.

There are three main requirements for the release of medicines at customs. First, the manufacturing site must be registered (either in the federal Ministry of Health or the Kurdistan Medicines Control Agency). Second, medicines must be approved and listed in the national EML. Third, the medicines must be analysed by the quality laboratory and pass the tests successfully. There are exceptions for some medicines that have FDA and/or EMA approval which may not need to be tested.

**National quality control laboratory**

The National Centre for Drug Control and Research, founded in 1984, is part of the Directorate of Technical Affairs. The National Centre tests the quality of medicines before registration and release to the private and public sectors (Figure 2). The National Centre usually tests the biological, chemical and physical characteristics of both imported and nationally produced medicines. The National Centre relies on pharmacopeia (US, British and European) for products in these compendia and on manufacturer-validated in-house methods for products not in the compendia (5).

The National Centre for Drug Control and Research tests medications before and after registration. Before registration, testing is part of the assessment for product registration. After registration, testing is conducted before the release of new batches (spot check). In addition, the National Centre can test medicines in case of complaints or problems identified. In contrast, there is no testing for quality monitoring in the private sector (routine sampling). Depending on the ministry department requested, the National Centre for Drug Control and Research sends the results of testing to the Registration Department, Pharmacy Department or KIMADIA. The National Centre usually examines every batch of imported and national medicines before releasing to the private market (scientific bureaus/drug wholesalers) or public health care settings. Medications with FDA, EMA and United Kingdom certificate(s) are exempted and can be released without testing or with testing one batch out of several. The National Centre has increased the total number of tested samples over the past three years: 15,843 samples were tested in 2017, 17,087 samples in 2018 and 19,388 samples in 2019 (5).
Pharmacovigilance in Iraq

The Iraqi Pharmacovigilance Centre assures postmarket-ing medication safety in private and public health care settings. The Pharmacovigilance Centre is part of the Pharmacy Department of the Directorate of Technical Affairs and has been a member the WHO International Drug Monitoring Programme since 2010 (12). The main role of the Pharmacovigilance Centre is to monitor adverse reactions to medicines, vaccines, herbal products and biopharmaceutical products in both the private and public sectors (5).

The Iraqi Pharmacovigilance Centre has a regional centre in each health care directorate which has a person responsible for hospital safety (usually a pharmacist) at each public hospital. The medication safety personnel monitors and reports any adverse drug reactions (using a paper-based form) to the regional centre, where data are processed using the Vigiflow system (a web-based individual case safety report management system) to send later to the Iraqi Pharmacovigilance Centre. In addition, companies with marketing authorization and their representatives in Iraq are required to send reports of adverse drug reactions from both public and private sectors to the Pharmacovigilance Centre (5). On the other hand, immunization is conducted in public primary health care settings and the Public Health Directorate monitors and reports adverse events following immunization to the Pharmacovigilance Centre (5). Thereafter, the Pharmacovigilance Centre validates and distributes alerts on adverse drug reactions to all public health care settings.

In addition to monitoring and providing alerts on adverse drug reactions, the Pharmacovigilance Centre has a major role in monitoring substandard and falsified medications and sending notifications about them (13). Substandard and falsified medications are usually available in the private sector only since the public sector procurement is secured by KIMADIA. In 2019, the Ministry of Health reported that 60–70% of the private sector medications were neither registered nor quality monitored and has a strong collaboration with federal Directorate of Technical Affairs and has been a member the WHO International Drug Monitoring Programme since 2010 (12). The main role of the Pharmacovigilance Centre is to monitor adverse reactions to medicines, vaccines, herbal products and biopharmaceutical products in both the private and public sectors (5).

In 2013, the Iraqi health ministry became a member in the WHO Global Surveillance and Monitoring System for substandard and falsified medications. This is global rapid alert system to manage the threat of substandard and falsified products (14). A pharmacist in the health ministry is the focal point for the WHO Global Surveillance and Monitoring System. The focal point usually receives notifications from WHO system of substandard and falsified medications and disseminates them to public health care outlets. On 15 September 2020, the health ministry submitted its first alert about a substandard and falsified medicine through this WHO system (5).

National programme on rational use of medicines

The unit of rational use of medicines at the clinical pharmacy section of the Pharmacy Department at the Directorate of Technical Affairs, which was established in 2008, promotes the rational use of medicines within the public health care settings (5). Clinical pharmacists who have completed the clinical pharmacy programme (run by the Clinical Pharmacy Section for 23 years) play an essential role in minimizing medications errors. They review prescribed medicines in medical charts and inform physicians about any inappropriately prescribed medicines (15).

Pharmaceutical regulations in Kurdistan Region, Iraq

Kurdistan Region, northern Iraq, has three provinces (Erbil, Dohuk and Sulaymaniyah) and has been autonomous since 1991. The Kurdistan Regional Government has its own Ministry of Health which collaborates with the federal Ministry of Health in Baghdad (16). The Kurdistan Medicines Control Agency (17) has its own departments to regulate pharmaceutical products in the region and has a strong collaboration with federal Directorate of Technical Affairs. All official health ministry letters and regulations are circulated from Baghdad to all public health care settings in Iraq including those in Kurdistan Region.

The Kurdistan Medicines Control Agency has a local committee for drug selection (Drug Approval Higher Committee), but it also relies on the federal selection...
committee in Baghdad to approve the medications and vaccines, and on the national EML of the federal government. Medicine prices are also regulated by the Kurdistan Medicines Control Agency (in the pricing department) and the Agency decides the price stickers of the private sector in the region.

KIMADIA (federal Ministry of Health) distributes medicines to public health care facilities in the Kurdistan region (16). The Kurdistan Medicines Control Agency does not have an agency like KIMADIA (17). Thus, local directorates of health are responsible for medicine procurement from marketing authorization holders (decentralized) in addition to the medicines from KIMADIA (centralized). The private sector in Kurdistan region relies on international pharmaceutical companies and scientific bureaus to import medications which are registered at the health ministry of the Kurdistan region. In addition, there are two local pharmaceutical industries in the region. Scientific bureaus in Baghdad can import through Kurdistan region borders. Similar to the federal health ministry, there is one quality control laboratory in the Ministry of Health of the Kurdistan region. Kurdistan does not have a pharmacovigilance department (17). Thus, it relies on the Iraqi Pharmacovigilance Centre for alerts on adverse drug reactions.

**Pharmaceutical-related challenges and recommendations**

Based on the last comprehensive assessment in 2020, the Iraqi pharmaceutical sector has five main challenges (5). First, all document processing and official communications within the departments of the Directorate of Technical Affairs are paper-based. In addition, all applications need in-person follow-ups by pharmaceutical company representatives. Implementing an electronic management system could help process all applications steps from drug approval to release. In addition, providing publicly available and updated information and/or instructions on the websites of the Ministry of Health departments can save pharmaceutical companies time and effort and minimize work interruptions from visits of pharmaceutical company representatives. Second, KIMADIA procured 60% of the total essential medicines in 2019. Hence, KIMADIA needs to improve its procurement procedures and the government needs to expand the allocated budget for public procurement to ensure the availability of 100% of needed essential medicines. Third, about 60–70% of medications in the private sector are neither registered nor quality tested by the Ministry of Health for various reasons. This problem can be minimized by the Ministry of Health and the private sector implementing a trace and track system. Fourth, the share of national pharmaceutical products in the national drug market is only 11% (5). Sustainable local production requires effective multisectoral collaboration to promote investment, and provide favourable legal and technical environments. National manufacturers suggest that assistance needs to be expanded beyond GMP and quality assurance standards into other key areas for regulation and policy considerations, such as help in importing active ingredients and extending the duration of importing licences (9). Finally, clear standard operating procedures should be applied in all pharmaceutical activities to minimize interference in duties between different departments and sections (5).

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**Réglementation pharmaceutique en Iraq : de l’homologation des médicaments à la post-commercialisation**

**Résumé**

**Contexte :** Les informations récentes sur la réglementation du secteur pharmaceutique en Iraq sont rares.

**Objectifs :** Le présent rapport rça les réglementations régissant les produits pharmaceutiques en Iraq, évalue les défis rencontrés et formule des recommandations pour y faire face.
Méthodes: Le profil pharmaceutique de l'Iraq pour 2020, préparé par le ministère de la Santé iraquien en collaboration avec l'Organisation mondiale de la Santé (OMS) en 2020, a été la principale source d'information.

Résultats: Malgré les nombreux efforts déployés par le ministère de la Santé pour fournir des médicaments adéquats et sûrs, le secteur pharmaceutique iraquien est confronté à plusieurs défis, notamment l'insuffisance du budget alloué au ministère, les pénuries de médicaments essentiels, une sous-utilisation des technologies électroniques dans la gestion des travaux liés à la réglementation, un grand nombre de médicaments de qualité inférieure et falsifiés dans le secteur privé et une industrie pharmaceutique nationale stagnante.

Conclusion: Le ministère de la Santé a besoin d'un soutien financier plus important de la part du gouvernement fédéral pour financer ses activités et d'un appui technique de la part d'organisations internationales œuvrant dans le domaine de la santé pour dispenser des formations et fournir des ressources.

References


Primary health care reform in Saudi Arabia: progress, challenges and prospects

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Abstract

Background: Saudi Arabia embarked on transforming its primary health care system in 2016 to meet international standards, gain the people’s trust and respond to the growing burden of noncommunicable diseases, as proposed in the Saudi Vision 2030.

Aims: This review aims to highlight the progress, identify challenges and prospects for Saudi Arabia’s PHC reform process in order to make recommendations to facilitate strengthening of the PHC system.

Methods: A review of previous studies and governmental reports was undertaken to extract, analyse, synthesize and report the findings.

Results: The review has indicated that by mid-2019, the reform has contributed to an increase of 37.5% in the rate of PHC visits and 4.7% increase in patient satisfaction, enhanced coverage of rural communities (from 78% to 83%), and contributed to increasing the screening rate for prevalent chronic diseases. However, the country still faces gaps and challenges pertaining to human resources issues, cultural and lifestyle behaviour, geography, intersectoral collaboration and PHC infrastructure.

Conclusion: PHC reform process in Saudi Arabia has demonstrated that positive change is achievable. This has been aided by building on previous accomplishments and the wealth of experience gained throughout the PHC journey in Saudi Arabia. However, despite improvement in the quality of services, continuous improvement is required to meet the rising expectations of the population.

Keywords: primary health care; reform; transformation; Saudi Arabia

Introduction

Health care reform

In 2016, Saudi Arabia embarked on reforming its primary health care (PHC) system as part of the wider agenda of the government. The reform was proposed in Vision 2030 (1), and was informed by an in-depth review of PHC undertaken in collaboration with the World Health Organization (WHO) (2). The aim of the reform programme is to meet international standards, gain the people’s trust and respond to the growing burden of noncommunicable diseases (3).

Reform of PHC is exemplified as an integrated, family-centred approach, which has introduced new clinical pathways, screening for chronic diseases and the integration of mental health into primary care. The reform is marked by huge investments in technology and capacity-building and enhanced access to services (3).

This review highlights the progress, challenges and prospects for Saudi Arabia’s PHC reform process.

Background

The original PHC concepts enshrined in the Alma Ata Declaration (1978) and accepted globally remain the same (4,5) even as the world embraces a new call to action: the Sustainable Development Goals (SDGs): SDG-3 exclusively addresses health, aiming to “ensure healthy lives and promote well-being for all at all ages” (6,7). Primary health care explicitly ensures a focus on equity, accessibility and quality of care (8).

While the basic concepts of PHC have remained the same, there have been changes in the context where reforms are being introduced. These reforms are aimed at solving problems and include changes in the demographic, epidemiological, educational, technical, cultural, political and economic situation (9–11).

The Saudi Arabian Ministry of Health embarked on transforming its health sector as part of a wider agenda for transforming all government sectors as envisioned in Vision 2030 (12) and the National Transformation Programme 2020 (13).
Vision 2030 explicitly directs the reform agenda and processes towards achieving universal health coverage, ensuring healthy living and sustaining population health. It conforms with the targets of the SDGs, particularly SDG-3. Vision 2030 emphasizes the utilization of primary care as a first step through family practice and the concept of gatekeeping (1,14).

In line with Vision 2030, the reform agenda proposed under the National Transformation Programme 2020 further underlines the importance of bridging the gap to accessing health services, emphasizing universal health coverage. Moreover, the National Transformation Programme 2020 aims at building primary health care as a “patient-centred model of care” and envisages the creation of “management units”, thus introducing the concept of corporatization of health services (15).

The goals of the National Transformation Programme 2020 focus on improving infrastructure and safety standards and the quality of services in health care facilities; greater utilization of e-health and digital transformation; strengthening governance and accountability; and involvement of the private sector in financing and supervision (13). In view of the goals set out in Vision 2030 and the National Transformation Programme 2020, the current health sector reform is intended to separate provision, payment and regulation. A group of government-owned corporations which manage integrated networks of health care facilities will provide health care. The ministry’s role will mainly focus on regulating the health sector. The system will be funded by a standalone financing entity that will focus on outcomes, enabling the system to shift towards a value-based payment model (12,16).

Health care will be provided under a new model of care, a comprehensive care system for meeting health needs. This model is designed around 6 packages: keep well, planned care, maternity care, urgent care, chronic care and end of life (palliative) care (Figure 1). Five key enablers will support the implementation of the model: workforce, governance and regulations, e-health, private sector participation and appropriate payment mechanisms. The model of care design includes 42 interventions, of which 36 are directly related to PHC (12,16).

Transforming the health services will require significant time to realize, hence the Ministry of Health embarked on developing a transitional plan to cover the period 2016–2020.

**Figure 1** Saudi Arabia patient-centred model of care [source: Health sector transformation strategy (14)]
Development and progress

Development of the primary health care reform transitional plan (roadmap) 2016–2020

The primary health care reform roadmap 2016–2020 was developed as part of the government’s National Transformation Programme 2020 and Vision 2030 (12). Saudi Arabia’s Vision 2030 aims to bring about multisectoral reforms, including the health sector as a whole, and was formulated in response to the challenges faced by the government as a result of declining oil prices and the implications this could have on the economic and development sectors (12).

To align with Vision 2030 and the National Transformation Programme 2020, the assistant deputyship for PHC formulated a taskforce to revisit the Ministry of Health Strategic Plan (2010–2020) (17), and the PHC Strategic Plan (2010–2020) (18), both of which consider PHC as the cornerstone for the health system. An in-depth review of the PHC system guided the reform process (2). Conceptualization of the reform drew on best practices and international experience.

The PHC in-depth review, conducted in February 2016 by a team of highly experienced experts in the field of public health and PHC along with experts from the WHO, aimed at determining the challenges faced by the PHC system, providing strategic directions and proposing the best model for PHC (2). The findings of the review indicated that Saudi Arabia has achieved marked health gains during the past few decades. Primary care services are provided through an elaborate network of 2390 primary health care centres (PHCCs) that are accessible and have acceptable standards in terms of infrastructure, equipment and health workforce. The services are provided free of charge for all citizens, however the private sector provides insurance for its employees (2).

Despite the health gains, our review revealed that many challenges still remain; these are summarized below:

- an epidemiological shift from communicable to non-communicable diseases (Table 1);
- demographic changes, with geriatric care increasingly becoming a population need;
- enhanced stress in life and increasing prevalence of mental illness;
- rising cost and quality consciousness of population for PHC;
- reduced community trust and underutilization of PHC services;
- PHC organization and setup is geared towards curative care;
- noncommunicable disease care and prevention programmes are not fully integrated;
- limited role of PHC facilities in ensuring essential public health functions related to health promotion and public health; PHC lacks a patient-centred approach and continuity of care.

Based on the above, a 5-year PHC reform roadmap (2016–2020) was developed. Figure 2 presents a conceptual framework of this and identifies the different tenets of the reform nested in successive layers (3).

The global burden of noncommunicable diseases has underscored the need for effective health systems based on primary care, where health promotion, disease prevention and continuity of care is provided by well-trained family physicians/general practitioners to manage and care for people with chronic diseases and their associated comorbidities (20). The findings of the PHC in-depth review indicated the need for full integration of noncommunicable diseases in PHC and a family medicine approach to the provision of services (2). Addressing noncommunicable diseases at the primary care level is not only essential for curbing the epidemic but also for strengthening health system equity and efficiency (21). The need to strengthen PHC had previously been highlighted in the political declaration of the United Nations High-Level Meeting for Noncommunicable Disease Prevention and Control (22). A 2019 review of the public health care system and primary care services in Saudi Arabia identified a crucial need for strengthening PHC services to address the high burden of noncommunicable diseases the country is facing (23). This view had previously been supported in a study by Almalki et al., who recommended addressing the high burden of noncommunicable diseases in future health care system reforms (24).

Family physicians and general practitioners working at PHCCs provide the foundation of health care systems and are the main figures that ensure access, connect care and endorse continuity of care for patients and their families (25). An assessment of family practice shows that family physicians constitute 10% of primary care physicians (656 out of 6107) working in 7% of PHCCs. The in-depth review revealed that PHCCs lack staff qualified in chronic disease management, and they have limited communication and interpersonal skills (17). Al-Khaldi et al., highlighted the need for improving the quality of PHC services through the development and implementation of a strategic plan for 2020 to address the shortage in

### Table 1: Prevalence and risk factors of noncommunicable diseases (NCDs) in Saudi Arabia, 2013 (2,19)

<table>
<thead>
<tr>
<th>Key indicator</th>
<th>Prevalence (%)</th>
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<tr>
<td>Hypertension</td>
<td>15.1</td>
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<tr>
<td>Diabetes</td>
<td>14.2</td>
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<tr>
<td>Obesity/overweight</td>
<td>59.4</td>
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<tr>
<td>Hypercholesterolaemia</td>
<td>8.5</td>
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<td>Cigarette smoking</td>
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</tbody>
</table>
The in-depth review revealed that PHC services are not optimally utilized, only 2 visits per person per year, and do not meet the expectations of the population as the quality of care provided at the level of PHCCs is generally perceived as weak (2). To improve the quality of the services, the Ministry of Health is imposing quality standards on PHCCs set by the Saudi Central Board for Accreditation of Healthcare Institutions; this is the only national agency authorized to grant accreditation certificates to governmental and private health care facilities operating in Saudi Arabia (27). Its standards are recognized as a well-developed and high-quality PHC accreditation model, on a par with Australia, Canada, Egypt, Jordan, Lebanon, New Zealand, the United Kingdom and the United States of America (28). To promote the quality of PHC services, Alghamdi et al. recommended regular assessment of patient satisfaction and patterns of utilization (29). In their evaluation of the views of PHC users, Alzaied et al. reported that regaining the trust can be obtained by training and continuous development to improve PHC staff performance since this affects users’ decisions (30).

Developing and improving the public health services through technology is a main focus of Vision 2030 (1).
The current health care information system is paper-based (2). The absence of an electronic system has been identified as a major contributor to the weaknesses of PHC services and infrastructure (32). Computerized services are essential to a quality health care service (33) and delivering effective patient-centred care and serving patients’ needs (34). Al Asmri et al. (23) consider utilization of technology and e-health as a means of ensuring the trustworthiness of services for both the public and private sectors (31).

Saudi Arabia’s Vision 2030 highlights the development of the health care sector through privatization (35). Sajjad et al. identified the need for public–private health care partnerships in order to develop a blended service delivery mechanism (36).

Bringing about change such as health systems reform is challenging due to the technical and human complexities that may exist within the system (37). Human factors in a system are more complex to modify than technical factors but are very often overlooked, leading to failures in realizing the goals and objectives of the required organizational change (38).

Leadership is one of the main factors in bringing about positive change in an organization. Effective leaders have the ability to influence or change the values, beliefs, behaviour and attitudes of employees (39), steering them towards achieving the goals of the organization (40).

Alharbi identified high organizational readiness to implement change as one of the main factors determining efficient and effective implementation of changes in the context of the National Transformation Programme and Vision 2030 (41) and recommended developing leadership talent to motivate the workforce to bring about the changes (42).

A few studies have been conducted anticipating the future PHC reform. A review of the public health services and the PHC services highlighted the urgent need for PHC reforms to address issues with scope, structure, infrastructure, finance, increased demand, increased costs, workforce, inequitable access to services, quality and safety of the services, the growing burden of disease, information system, management and leadership, and the referral system (23). Based on their analysis of the old, current and future health systems in Saudi Arabia, Sajjad et al. expected greater attention to be given in future reforms to the strengthening of PHCCs, automation of the system, and human resources for health training and development (36).

The current PHC reform roadmap (2016–2020) envisions that PHC facilities will be the first and optimal choice for people in Saudi Arabia through the provision of high quality, convenient services and a supporting environment that responds to public needs and expectations (3). The overall objective of the reform is to strengthen the PHC system in order to improve the trust in and utilization of the services. Four strategic objectives and a set of initiatives and interventions were proposed (Figure 2).

Primary health care reform aims at strengthening the family practice model, which is marked by provision of services by family physicians; a patient- and family-centred approach; multidisciplinary teamwork; elimination of barriers in accessing health care; automation; and a focus on quality. The model involves redefinition of the PHC services package; integration of geriatric and mental health; early detection of noncommunicable diseases; reduction of inefficiencies; redesigning of the PHC clinical pathway; and a triage system.

Reform initiatives were piloted in 5 PHCCs in each region during 2016–2017 and gradually expanded to other PHCCs. The planning process was inclusive, involving representatives of relevant PHC directorates and other stakeholders. This allowed for knowledge exchange, ownership and sharing of innovative ideas.

**Progress under primary health care reform**

To achieve Objective 1, “To establish a state of the art PHC system that meets the expectations of the Saudi Arabian population”, multi-pronged interventions were carried out: implementation of the Strengthening Family Medicine Approach Initiative in 975 PHCCs out of 1000 targeted in 2019; transformation of 116 large PHCCs into polyclinics; and accreditation of 300 PHCCs by the Central Board for Accreditation of Healthcare Institutions. In addition, the health information system was automated in 675 centres; the SEHA appointment application was introduced in all PHCCs; and an electronic medical prescription system, through which dispensing of free-of-charge drugs is outsourced to private pharmacies, was piloted in 500 PHCCs (Table 2). The Strengthening Family Medicine Approach Initiative has contributed to an increase in the proportion of individuals screened for obesity, hypertension and diabetes (Figure 3).

To achieve Objective 2, “To achieve universal health coverage to quality essential PHC services”, the following were implemented (Table 3): in order to improve accessibility to PHC package, 122 PHCCs were renovated, 162 substandard PHCCs replaced, 564 PHCCs supplied with equipment. Working hours were extended in 292 PHCCs.

Additionally, teleconsultation services are being offered to the whole population via a toll free number (937) as well as the SEHA appointment application, providing an average 6500 and 1500 daily teleconsultations respectively. To improve access for rural communities, 10 mobile clinics (phase I) were introduced, resulting in an increase in coverage from 78% to 83%. To expand PHC at community level, 7 maternal and child health clinics were established in shopping malls. The services include vaccination, mammography and DEXA scanning, provided in collaboration with the private sector as part of their social responsibility.

Vertical expansion of the PHC package involved integration of mental health services in 852 PHCCs, expansion of comprehensive geriatric screening in all functioning PHCCs, and provision of tobacco cessation
services through mobile (98) and fixed (574) clinics, resulting in a smoking quittance rate of 31%. Breast cancer screening was also provided through 5 mobile and 65 fixed clinics, resulting in screening of 156,000 females during the past 3 years.

School-based interventions included screening for body mass index; screening for dental caries and application of local fluoride; and implementation of a periodic medical examination targeting grades 1, 4, 7 and 10. All cases diagnosed were referred for further management and follow-up.

To achieve Objective 3, “To improve the availability, performance and motivation of the health workforce for better quality of PHC”, the following were implemented (Table 4): the family physicians postgraduate training programme was expanded to address the shortage of family physicians. The programme commenced with the accreditation of 160 fellowship training centres by the Saudi Commission for Health Specialties and the recruitment of 600 trainers. Training is provided through 19 regional branches. These efforts have resulted in more than doubling the production of family physicians (210 in 2016 to 466 in 2019). Quality of training is ensured through undertaking an external audit, evaluation of training by trainees, supportive supervision and competition between centres.

Continuing professional development included training of 3661 PHC frontline staff on customer service and 6001 general practitioners on the latest updates in family medicine in addition to launching a training programme for nurses.

To achieve Objective 4, “To strengthen PHC governance and leadership”, the following were implemented (Table 5): Training and equipping of 4 mid-level public health leaders from each of the 20 regions of the country with managerial and leadership skills, and training of 1000 PHC managers from 2390 PHCCs on leadership and management (43); additionally, the formation of community empowerment teams in 224 PHCCs and 865 patient support groups was accomplished (44).

**Success factors**

Early indirect results of the PHC reform roadmap (2016–2020) showed a national crude increase of 37.5% in the rate of PHC visits (from 2.4 visits/person/year in 2016 to 3.3 in mid-2019). In addition, patient satisfaction increased by 4.7% (71.7% in March 2018 and 75.1% in March 2019), according to quarterly sample surveys from 400

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**Table 2 Progress in primary health care reform (Objective 1) in Saudi Arabia, 2019**

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Indicator</th>
<th>Target 2017–2019</th>
<th>Achievements mid-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialized polyclinics</td>
<td>No. operational polyclinics</td>
<td>116</td>
<td>100 (86%)</td>
</tr>
<tr>
<td>PHCC quality improvement</td>
<td>% PHCCs obtaining CBAHI accreditation</td>
<td>400</td>
<td>300 (75%)</td>
</tr>
<tr>
<td>Electronic health information system</td>
<td>% PHCCs implementing e-HIS</td>
<td>1000</td>
<td>675 (68%)</td>
</tr>
<tr>
<td>Strengthening family medicine approach</td>
<td>No. PHCCs implementing the Strengthening Family Medicine Approach Initiative</td>
<td>1000</td>
<td>975 (97%)</td>
</tr>
<tr>
<td>SEHA appointment application</td>
<td>No. PHCCs</td>
<td>2390</td>
<td>2390 (100%)</td>
</tr>
<tr>
<td>Outsourcing of pharmaceutical services to private sector</td>
<td>No. PHCCs providing electronic prescriptions</td>
<td>514</td>
<td>500 (97%)</td>
</tr>
</tbody>
</table>

PHCC = Primary health care centre.
CBAHI = Central Board for Accreditation of Healthcare Institutions.
HIS = Health information system.
PHCCs conducted by Press Ganey (45). The remarkable achievements made under PHC reform could not have been achieved without the enthusiasm, dedication and collective efforts of all stakeholders. However, the following also contributed to the success of the reform:

- building on previous achievements and learning from the wealth of experience gained throughout the PHC journey in Saudi Arabia;
- political commitment for PHC reform, which is explicitly stated in Vision 2030 (12) [combating the rising burden of noncommunicable diseases is supported by the Royal Decree on Health in All Policies (2017) (46), establishment of the Saudi Center for Disease Control and Prevention (CDC) (47), and launching of the Healthy Food Regulation Strategy for banning of trans-fats (48), limitation of salt, calorie calculation (49) and adoption of plain packaging for tobacco products (50)];
- high-level commitment and strong leadership at the Ministry of Health;
- creating a swift and flexible line of recruitment for PHC;
- transfer of the National School Health Programme from the Ministry of Education to the Ministry of Health and integration of the services into PHC;
- early adoption of technology, e.g. SEHA appointment application, and enterprise resource planning;
- greater opportunities for the voices of PHC providers and consumers to be heard through technology, e.g. 937 complaints and Press Ganey surveys;

### Table 3 Progress in primary health care (PHC) reform (Objective 2) in Saudi Arabia, 2019

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Indicator</th>
<th>Target, 2017–2019</th>
<th>Achievements, mid-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical (937)</td>
<td>Average daily No. teleconsultations</td>
<td>25% annual increase</td>
<td>Target achieved</td>
</tr>
<tr>
<td>SEHA mobile application</td>
<td>Average daily No. teleconsultations</td>
<td>25% annual increase</td>
<td>Target achieved</td>
</tr>
<tr>
<td>Health coach</td>
<td>No. chronic disease patients coached</td>
<td>1000/region</td>
<td>20 000 (total)</td>
</tr>
<tr>
<td>Extended after hours services initiative</td>
<td>No. PHCCs providing extended after-hours services</td>
<td>300</td>
<td>292 (97%)</td>
</tr>
<tr>
<td>Mobile clinics initiative</td>
<td>No. operational mobile clinics</td>
<td>10</td>
<td>10 (100%)</td>
</tr>
<tr>
<td>Primary mental health care initiative</td>
<td>% rural communities covered (baseline 78%)</td>
<td>83%</td>
<td>83% (100%)</td>
</tr>
<tr>
<td>School-based obesity reduction initiative</td>
<td>No. PHCCs providing primary mental health care</td>
<td>1 000</td>
<td>852 (85%)</td>
</tr>
<tr>
<td>Periodic health examination for school students</td>
<td>No. students examined</td>
<td>50% of grades 1,4,7,9</td>
<td>Target achieved</td>
</tr>
<tr>
<td>National dental health initiative for primary schools</td>
<td>% schools implementing school based oral health programme</td>
<td>8 500</td>
<td>8 639 (102%)</td>
</tr>
<tr>
<td>Early detection of colorectal cancer</td>
<td>No. individuals aged 45–75 years screened</td>
<td>20 000</td>
<td>8 840 (35%)</td>
</tr>
<tr>
<td>Early detection of breast cancer</td>
<td>No. females aged 40–69 years screened</td>
<td>150 000</td>
<td>156 000 (104%)</td>
</tr>
<tr>
<td>Establishment of MCH clinics at shopping malls</td>
<td>No. MCH mall clinics established</td>
<td>20</td>
<td>7 (35%)</td>
</tr>
<tr>
<td>Development of PHC infrastructure</td>
<td>No. PHCCs renovated</td>
<td>–</td>
<td>122</td>
</tr>
<tr>
<td>No. PHCCs replaced</td>
<td>–</td>
<td>162</td>
<td></td>
</tr>
<tr>
<td>Expansion of tobacco cessation clinics</td>
<td>No. tobacco cessation clinics established (fixed &amp; mobile)</td>
<td>Fixed (580)</td>
<td>574 (98%)</td>
</tr>
<tr>
<td>Smoking cessation rate</td>
<td>–</td>
<td>31%</td>
<td></td>
</tr>
</tbody>
</table>

PHCC = primary health care centre.

### Table 4 Progress in primary health care (PHC) reform (Objective 3) in Saudi Arabia, 2019

<table>
<thead>
<tr>
<th>Initiative/project</th>
<th>Indicator</th>
<th>Target 2017–2019</th>
<th>Achievement mid-2019 No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaling up of family physicians post-graduate training programme</td>
<td>No. seats offered (baseline 210)</td>
<td>420</td>
<td>466 (111%)</td>
</tr>
<tr>
<td>Customer service training programme</td>
<td>No. training centres established</td>
<td>20</td>
<td>19 (95%)</td>
</tr>
<tr>
<td>% training workshops conducted</td>
<td>124</td>
<td>124 (100%)</td>
<td>(3661 trainees)</td>
</tr>
<tr>
<td>Refresher training for family physicians</td>
<td>% general practitioners trained</td>
<td>8162</td>
<td>6001 (67%)</td>
</tr>
<tr>
<td>Patient experience</td>
<td>% patient satisfaction</td>
<td>75%</td>
<td>75% (1%)</td>
</tr>
<tr>
<td>Capacity-building of PHC managers</td>
<td>No. PHC managers trained</td>
<td>1000</td>
<td>976 (98%)</td>
</tr>
</tbody>
</table>

*Press Ganey survey.*
• opening the floor to innovative tools and methods (e.g. SEHA appointment application in PHC as a pilot, in addition to behaviour change approaches supported by the Central Nudge Unit at the Ministry of Health);

• formation of project management units to oversee implementation through key performance indicators; the newly introduced Ad’da health project at PHCCs offers opportunities for expert support and knowledge transfer; the project is being implemented at PHCCs following its successful implementation in hospitals; it is dedicated to improving health care delivery services across Saudi Arabia by standardizing performance measurement and reporting via an electronic dashboard (51);

• involvement and contribution of internal and external consultancy firms, and UN agencies (e.g. Saudi universities, WHO, World Bank) in the design and implementation of the reform and building the business case;

• establishment of a knowledge management unit responsible for documentation, evidence-based informed decisions, and exchange of expertise.

Remaining challenges

Despite the achievements made, several challenges remain. These are mainly due to the reform process still being in its infancy and it is estimated they will take at least 5–7 years to materialize.

Challenges include human resources issues, cultural habits and lifestyle behaviour, geography of the country, communication and collaboration between stakeholders, and PHC infrastructure.

Human resources issues include lack of incentives for the health cadre to work in remote areas, competitive salaries provided by non-Ministry of Health institutions, lack of a performance-based contracting system and filling the existing gap in human resources. Despite the expansion of family medicine training, a huge gap in number of family physicians (12 000) remains at PHC level.

Challenges related to PHC infrastructure include sustainability of funding to meet the requirements for e-health, maintenance and replacement of substandard PHC facilities.

Geographical issues are a result of the vast distances between the cities, which hinders the timely supply of drugs and medicines, and impedes supervision to health centres and outreach to remote communities.

Changing behaviours towards a healthy lifestyle continues to be a major challenge.

Future directions

Despite the challenges, viable opportunities exist for strengthening the PHC system:

• aligning PHC reform with the ongoing health system transformation;

• introducing a performance-based payment model and developing an incentive scheme to attract health professionals to work in remote areas;

• strengthening multisectoral collaboration and social responsibility;

• accelerating the process of expanding the primary care IT infrastructure and use of artificial intelligence; the implementation of a health information system has laid the foundation for in-depth data analysis and measurement of clinical outcomes through the Ad’da health project:

• improving the PHC image through the establishment of 100 mega centres to function as spoke and hub;

• expansion of family medicine training programmes to fill the gap in family physicians;

• full activation of the Saudi Center for Disease Prevention and Control, with new roles and responsibilities, including Health in All policies;

• Development of short- and long-term plans for investment in leadership.

Conclusion

Primary health care reform is a long and complex process. Despite the great achievements made so far and the improvement in the quality of services provided, continuous improvement is required in order to meet the rising expectations of the population in regard to what PHC should deliver. In Saudi Arabia, PHC reform demonstrates that positive change is achievable, it requires a high level of leadership, commitment, communication and collaboration between stakeholders. It has highlighted the importance of pragmatism, paying attention to context, teamwork, national ownership, transparency, encouraging innovations, social responsibility, rewards and motivation – all key to its success. Equally
important to the success of the reform is the existence of sustainability plans, knowledge management, leadership selection and continuing professional development. The adoption of a patient-centred approach and avenues for customers’ voices to be heard has created a culture of trust between PHC providers and clients, with unlimited opportunities for reaching all aspirations of the people of Saudi Arabia.

**Acknowledgement**

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Réforme des soins de santé primaires en Arabie saoudite : progrès, défis et perspectives

**Résumé**

**Contexte :** En 2016, l’Arabie saoudite s’est engagée dans la transformation de son système de soins de santé primaires pour se conformer aux normes internationales, obtenir la confiance de la population et faire face à la charge de plus en plus lourde des maladies non transmissibles, conformément à la Vision saoudienne à l’horizon 2030.

**Objectifs :** La présente analyse vise à mettre en évidence les progrès réalisés, à identifier les défis et les perspectives du processus de réforme des soins de santé primaires (SSP) en Arabie saoudite afin de formuler des recommandations pour faciliter le renforcement du système SSP.

**Méthodes :** Une analyse des études et des rapports gouvernementaux précédents a été réalisée afin d’extraire, d’analyser, de synthétiser les résultats et d’en rendre compte.

**Résultats :** L’analyse a indiqué qu’à la mi-2019, la réforme avait contribué à une augmentation de 37,5 % du taux de consultation pour les soins de santé primaires et de 4,7 % pour la satisfaction des patients, à une meilleure couverture des communautés rurales (passant de 78 % à 83 %) et à l’augmentation du taux de dépistage des maladies chroniques prévalentes. Cependant, le pays est toujours confronté à des lacunes et à des défis concernant les ressources humaines, les comportements liés à la culture et au mode de vie, la géographie, la collaboration intersectorielle et les infrastructures de soins de santé primaires.

**Conclusion :** Le processus de réforme des soins de santé primaires en Arabie saoudite a démontré qu’un changement positif était possible. Cela a été facilité par le recours aux réalisations antérieures et à la richesse de l’expérience acquise tout au long de la mise en œuvre des soins de santé primaires en Arabie saoudite. Toutefois, malgré l’amélioration de la qualité des services, une amélioration continue est nécessaire pour répondre aux attentes grandissantes de la population.
خلال البناء على الإنجازات السابقة والثروة من الخبرة المكتسبة خلال رحلة الرعاية الصحية الأولية في المملكة العربية السعودية بشبه الجزيرة، أظهرت عملية إصلاح الرعاية الصحية الأولية في المملكة العربية السعودية أن التغيير الإيجابي قابل للتحقيق. وقد ساعد هذا من خلال البناء على الإنجازات السابقة والثروة من الخبرة المكتسبة خلال رحلة الرعاية الصحية الأولية في المملكة العربية السعودية بشبه الجزيرة العربية، ومع ذلك، على الرغم من التحسن في جودة الخدمات، فإن التحسين المستمر مطلوب لمواجهة الأرتفاع بتوقيعات السكان.

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Meeting of the Eastern Mediterranean Regional Technical Advisory Group (RTAG) on Immunization

Introduction

The World Health Organization (WHO) Regional Office for the Eastern Mediterranean held a meeting of the Regional Technical Advisory Group (RTAG) on Immunization on 13–14 April 2020 (1). The meeting was conducted virtually due to the COVID-19 pandemic. The objectives of the meeting were to: review regional progress, challenges and constraints facing the achievement of the goals of the Eastern Mediterranean Vaccine Action Plan (EMVAP) (2); brief RTAG members on regional progress in verification of elimination of measles and rubella and hepatitis B control; discuss the impact of the COVID-19 pandemic on regional immunization programmes and measures to mitigate it.

Summary of discussions

Eight of the 10 members of the RTAG attended the meeting, along with staff from the UNICEF Middle East and North Africa Regional Office, UNICEF Regional Office for South Asia and WHO Regional Office. Dr Yvan Hutin, Director, Communicable Diseases Control, WHO Regional Office for the Eastern Mediterranean, underlined the importance of the RTAG in guiding the implementation of vaccination services in the Region, especially during the COVID-19 pandemic. He provided a brief overview of the epidemiology of COVID-19 in the WHO Eastern Mediterranean Region and its potential impact on immunization programmes, emphasizing the need for the continuity of essential health services. Dr Ziad Memish, RTAG chairperson, also welcomed participants and affirmed the role of the RTAG in supporting immunization programmes in the Region. The meeting was chaired by Dr Ziad Memish and Dr Ezzeddine Mohsni, RTAG vice-chairperson. The discussion included: reviewing the standard operating procedures of the RTAG; immunization programmes in the Region in the context of the COVID-19 pandemic; progress and challenges in achieving the goals of the EMVAP; routine immunization; disease elimination and control; new and underutilized vaccine introduction; immunization data; quality verification of VPD, as well as elimination and control targets.

Recommendations

To WHO

WHO should communicate with national immunization programmes for a response, copying in NITAG chairpersons, and WHO and UNICEF country offices, for information and provide support to national EPI programmes.

To Member States

Documenting the impact of the COVID-19 pandemic on national immunization programmes, monitoring vaccine availability and take the necessary action to ensure that records are kept of children who have missed vaccination during the pandemic.

Making plans for catch-up vaccination of missed children, using appropriate strategies, as soon as possible when the COVID-19 pandemic situation allows.

Involving the NITAG, relevant partners and stakeholders in decision-making on the implementation of immunization activities during the COVID-19 pandemic and in planning for catch-up vaccination of missed children as soon as possible.

Designing appropriate strategies for the integrated delivery of essential services during the pandemic where possible, and in the post-pandemic period.

In the context of COVID-19 and the possible reduction of routine vaccination coverage, delayed implementation of preventive vaccination campaigns and potential increase in incidence of VPDs, countries of the Region should maintain high quality VPD surveillance and alert functions to ensure the early detection of VPD outbreaks and a timely response to them.

References:


1 This summary is extracted from the report on the Eastern Mediterranean Regional Technical Advisory Group (RTAG) on Immunization, virtual meeting, 13-14 April 2020 (Microsoft Word - EPI-358-Final small (who.int) https://applications.emro.who.int/docs/whoemepi358e-eng.pdf?ua=1)
Eastern Mediterranean Health Journal

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