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Following the unfolding events in Afghanistan, the World Health Organization (WHO) is fully committed to staying in the country and delivering public health services as well as distribution of medicines and medical equipment. Currently, WHO has a network of 684 staff and health workers inside the country working in all 34 provinces to ensure the most vulnerable in Afghanistan can access essential health services.

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# Adapting to the events in Afghanistan: Call for maintaining essential public health services and supporting critical medical supplies distribution

Ahmed Al-Mandhari [1]

[1]Regional Director, World Health Organization Regional Office for the Eastern Mediterranean, Cairo, Egypt (Correspondence to: Ahmed Al-Mandhari: almandharia@who.int).

The unfolding events in Afghanistan have recently left us with scenes of chaos and desperation at Kabul airport where men, women and children risked their lives, and some tragically died in efforts to flee the country. However, it is important to note that even before these latest events, Afghanistan was the world's third largest humanitarian operation due to war, displacement, and, of course, the COVID-19 pandemic (1). Over 18 million people – more than half the population – already need humanitarian assistance to survive, and these needs are increasing daily (1).

As the events quickly unfolded, the World Health Organization Regional Office for the Eastern Mediterranean has 2 priorities. First, to ensure the absolute safety of WHO staff in-country; a range of steps to increase the security and protection of staff and their dependents have been implemented, including relocating thousands of Afghan colleagues and their families out of harm's way to areas away from conflict. Second, to stay and deliver by continuing life-saving work for millions of Afghans who need assistance. This means prioritizing the delivery of life-saving supplies that health facilities badly need to stay operational, especially in Kabul, Kandahar and Kunduz. More than 500 metric tons of medicines and supplies remain in WHO warehouses in Dubai, but Kabul airport remains closed to commercial flights, and based on operational and security constraints, countries sending in empty planes to pick up evacuees do not feel they are able to help (2).

Over these years, WHO and partners have worked with authorities on multiple advances for the health and well-being of the people in Afghanistan, such as the Sehatmandi Project, which provides quality health, nutrition and family planning services across Afghanistan (3). Working together, a battered health system was strengthened by training health-care workers and delivering lifesaving and essential medicines, medical supplies and equipment. In addition, we monitored and responded to disease outbreaks, scaled up the trauma care programme, and ensured that services for women, mothers and children were available and accessible, even in the most remote and hard-to-reach areas.

As a result of the collective work of many partners and thousands of health-care workers, the number of women in Afghanistan dying in childbirth has reduced by 60% and child mortality has reduced by over 50%. Almost 70% of all women now have a chance of surviving to the age of 65, compared to only 54% 20 years ago. It is more important than ever to keep building on these gains, so that every man, woman and child in Afghanistan has a chance to live a life filled with dignity, good health and hope (2).

However, other public health issues remain. Afghanistan remains one of only 2 countries in the world that has not eradicated wild poliovirus (4,5). With only one child contracting wild poliovirus being reported in Afghanistan and Pakistan so far in 2019 and 2020, now is a critical time and an unprecedented opportunity for the programme in Afghanistan to eradicate polio and not lose the hard-won gains achieved so far.

In addition, it is essential to keep the COVID-19 pandemic under control where both Alpha and Delta variants have been documented in Afghanistan (6–8). Overcrowding among displaced people has limited infection prevention measures and increased the risk of transmission of different type of infections. Concerns remain that a new spike among displaced people could lead to further transmission across cities due to a very low vaccination rate of just 5%; Afghanistan has reported over 153 000 COVID-19 cases and more than 7000 deaths as of 3 September 2021 (9).

The resulting instability has put some key measures to strengthen the COVID-19 response on hold, including the establishment of new laboratories for testing, the installation of oxygen plants in hospitals, and the expansion of isolation centres and intensive care beds for COVID-19 in different provinces of Afghanistan. It has also made implementation of infection prevention measures extremely difficult across the country and impacted the COVID-19 vaccination programme. As well as COVID-19-like symptoms among displaced persons, there have been reports of an increase in cases of diarrhoea, high blood pressure, and reproductive health complications and malnutrition (2).

As needs increase, WHO continues working in coordination with health partners. Six medical teams have been deployed during August 2021 in Kabul to

provide lifesaving emergency primary health care services to more than 100 000 displaced people (*2*). The first shipment of medical supplies was secured on 30 August and subsequent shipments are under process. Fourteen medical teams were deployed to provide health services in the eastern region of the country (*2*). Overall, more than 3000 medical consultations have been provided, including outpatient, antenatal and post-natal care, immunization, and screening for malnutrition (*2*). 130 WHO-supported trauma care health facilities remained open, providing case management services (*2*).

Critical polio surveillance activities continued largely undisrupted and polio vaccinations are continuing to be administered to children through permanent transit teams in most regions and at cross-border sites, including Friendship Gate (between Afghanistan and Pakistan) (*10*). In addition, WHO has delivered trauma kits, basic medical supplies and cholera kits to health facilities in Bamyan, Daikundi, Ghazni, Helmand, Kabul and Kunduz provinces. These supplies are enough to cover the urgent health care needs of 152 700 people (*2*). Medicines and supplies were also dispatched to 22 malnutrition centres treating children with severe acute malnutrition (*2*).

Nevertheless, there is still urgent need for reproductive-child health services, mental health services, mosquito nets and hygiene kits for newly displaced people. Nutrition supplements are needed to address rising malnutrition among children, especially those affected by conflict. COVID-19 and other routine immunization, including polio vaccination, must continue without interruption to control infectious diseases and prevent secondary health emergencies. Moreover, injured people – including women and children – need trauma care, as well as longer term rehabilitation to prevent life-long injuries. Mental health services are also needed now more than ever before.

As the current events continue to unfold, WHO is fully committed to staying and delivering in Afghanistan. Today, WHO has a network of 684 staff and health workers inside the country working in all 34 provinces. We now need the support of our donors and partners to count on us, work with us, and help us save lives, promote health and serve the vulnerable. The health and well-being of the Afghani population continue to remain one of our top priorities, based on WHO's regional vision of 'Health for All by All – a call for solidarity and action' (*11*), and it remains our goal to fulfil this vision for Afghanistan.

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# COVID-19 and family planning in the Eastern Mediterranean Region

Azza Sarfraz,[1,2] Zouina Sarfraz,[1,3] Sameer Saleem Tebha,[1] Namrata Hange,[1] Kuchalambal Agadi,[1] Alanna Barrios,[1] Manish Kc[1] and Gaurav Patel[1]

[1]Larkin Health System, South Miami, Florida, United States of America. [2]Pediatrics and Child Health, Aga Khan University, Karachi, Pakistan. (Correspondence to: Azza Sarfraz: azza.sarfraz@aku.edu). [3]Fatima Jinnah Medical University, Lahore, Pakistan.

## Introduction

As of 3 February 2021, 5 741 533 confirmed cases of coronavirus disease 2019 (COVID-19) had been recorded across the 22 countries of World Health Organization's (WHO) Eastern Mediterranean Region since the first case was reported in the Region on 29 January 2020. Although the number of COVID-19 cases reported differs considerably between different WHO regions, the burden of COVID-19 on health care systems remains critical (1). The need to prioritize resources to protect against economic, health and social crises, and the reduction in in-person assistance and access to health services, could lead to a reduction in health services for family planning programmes. One of the most important features of family planning is the use of birth control methods which allows families to plan the desired number of children and birth spacing for women of reproductive age. We explore the family planning practices prevalent in the Eastern Mediterranean Region in the 21st century and access to these services during the COVID-19 pandemic.

## Contraceptive use in the Region

One of the ways to reduce maternal and infant mortality and morbidity in a cost-effective manner is birth control. However, despite the efforts made, the evidence suggests that the prevalence of contraceptive use is low in the Eastern Mediterranean Region. Under-5 mortality remains high in the Region and accounts for nearly 15% of the global burden of under-5 mortality (2). While maternal mortality rates have been decreasing in the Region over the past 25 years, they are still high when compared with global trends. Some countries of the Region are classified as high-risk instability groups according to the Fragile State Index in 2020 (3,4). To reduce the maternal mortality rate, practices such as birth spacing and use of contraceptive methods have shown satisfactory outcomes (5,6). The use of contraceptive methods differs by sociocultural beliefs, thus the uptake of these methods differs across regions and has changed over the years (7). There are still unmet needs for and misconceptions about contraceptive methods, for example, about their mechanism of action or side-effects. Such misconceptions could be a main reason for the lack of use of contraceptive methods, even with the most popular methods such as oral contraceptive pills (8,9).

Although measures to control rapid population growth were adopted by many countries as early as the 1950s, sub-Saharan Africa and the Eastern Mediterranean Region lagged behind (10,11). At the same time, the maternal mortality and under-5 mortality rates in the Region are among the highest in the world, although they have been steadily decreasing since 2000 in many of the countries of the Region. However, Libya, Lebanon and Kuwait reported an increase in maternal mortality from 70, 28 and 10 per 100 000 live births respectively in 2000 to 72, 29 and 12 per 100 000 live births in 2017 (12). Under-5 mortality has shown a steady decline in all countries of the Region (13).

Today, the two most common methods of contraception in the Region are the pill (10.5%) and intrauterine device (9.5%) (14). Family planning is crucial for the health of women and their families, and it can accelerate a country's progress toward reducing poverty and achieving development goals. Unintended pregnancies are widespread in the Region, placing a burden on individuals, families, health systems and socioeconomic development (14,15). The need for family planning supplies and services is increasing throughout the Region in part because of the rise in the number of women of reproductive age and increasing use of modern contraceptives (14,15).

## Effect of COVID-19

In March 2021, a United Nations survey in 115 low- and middle-income countries reported that about 1.4 million unwanted pregnancies might have occurred as a result of the disruptions to health care delivery caused by COVID-19 (16). While there have been few published data on these outcomes during the COVID-19 lockdowns, a prospective observational study noted that institutional childbirth decreased by more than half during the lockdown, with increased institutional stillbirths and neonatal deaths (17).

The COVID-19 pandemic has led to the postponement of planned permanent contraception procedures (e.g. tubal ligation and vasectomy) due to the need for resource allocation to COVID-19 patients, the infectious risk from intubation and extubation in hospital settings, and the theoretical infectious risk from aerosolization of surgical smoke during laparoscopy (18). While awaiting surgery for permanent contraception, these women are at risk of

unintended pregnancies if not using an effective method of birth control. This suggests the need for reminders and counselling for such women on other effective contraceptive options by direct or virtual encounters. Importantly, the contraceptive trends demonstrate that the use of temporary and long-acting reversible contraceptives is higher than permanent methods of contraception (19). Couples who are waiting for provision of contraception should be reminded to use an effective, reversible method of contraception at this time as the pandemic has limited health care accessibility (20).

The decline in the prevalence of contraceptive use due to COVID-19 disruptions among women of reproductive age (15–49 years) is estimated to be 10% for each modern method and 20% for female and male sterilization (18). Rates of female sterilization have decreased in the Eastern Mediterranean Region (21). Previous disease outbreaks, such as Zika virus, have provided evidence of overloaded health services that limit women's access to pre- and post-natal health care, and contraception (22). Existing low use of health services for permanent contraception compounded with compromised access to family planning services may lead to an increased the number of unintended pregnancies and unsafe abortions thus adversely affecting maternal and neonatal health (23). Ensuring that people have access to contraceptive services will reduce avoidable pressures on the health system to manage the consequences of unintended pregnancy and future detrimental consequences of population growth.

## Family planning provision in the Region

In Saudi Arabia, where most health services (75%) are provided through government agencies, disruption due to COVID-19 might affect access to free contraception services (24). Qatar has one of the best health care services in the Region and citizens receive free or subsidized health care services in the public health care system. Higher-priced private care is also available for people desiring faster or more specialist treatment (25). Despite the fact that Qatar's public health department prioritizes free family planning services, the COVID-19 pandemic has affected access to these services (26). The advanced state-funded health care system in Kuwait also provides

free treatment to citizens while expatriates pay nominal fees for non-emergency health services and government-subsidized medications (27). Health care services in Pakistan are provided by three-tiered public health care services and efficient private institutions, through ownership of the provincial government (28,29). All of Pakistan's provinces have forwarded costed implementation plans for enhancement of family planning status and have formed family planning task forces incorporating public and private stakeholders. Each province is using local resources and training existing personnel to help increase the use of contraceptives. In addition, to promote the acceptability of family planning, the government is collaborating with men and religious leaders as part of its social mobilization efforts (30). In Lebanon, the economic collapse prior to the COVID-19 pandemic has impacted the healthcare sector, which is working at suboptimal capacity due to the pressure on the healthcare system (31). Given the change in focus of primary health services due to the COVID 19 pandemic and the expected lack of support for and supervision of the health care system, delivery of family planning services may be adversely affected (32). For most of the countries of the Region, family planning services are provided by the government health care system free of charge or at subsidized rates. COVID-19 has increased the burden on government health care systems, which has affected the provision of non-emergent services such as family planning. Permanent contraception, especially surgical procedures, have been put on hold, thus likely increasing unintended pregnancies. Many of the countries that have expatriate populations are more likely to be affected because these populations have less access to health care sectors (33).

The adopted family planning strategies and health care systems throughout the Eastern Mediterranean Region seem to be unique with the lowest contraceptive prevalence rates (11). Certain countries with higher population growth such as Kuwait have a state-funded health care system, suggesting the multifactorial contributors to successful family planning. The methods adopted by couples are likely influenced by sociocultural practices and the health care infrastructure. Further studies are needed to understand the effect of COVID-19 on access to family planning services across the Region. Strategies are needed to address the rise in the annual population growth in 2021 following COVID-19.

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# Validation of the Arabic Childbirth Care Satisfaction Survey

Waleed Al Nadabi,[1] Sahdia Parveen,[1] Muhammad Faisal[1] and Mohammed Mohammed[1]

[1]Faculty of Health Studies, University of Bradford, Bradford, United Kingdom (Correspondence to: W. Alnadabi: (alnadabi2030@yahoo.com).

## Abstract

**Background:** Measuring maternal satisfaction in Arab countries is an essential indicator of care quality. However, existing surveys have limited psychometric properties and inclusion criteria.

**Aims:** To present the psychometric properties of the Arabic Childbirth Care Satisfaction Survey (CCSS).

**Methods:** The Arabic CCSS was developed from 2 English surveys. In 2017, 13 mothers assessed survey items in terms of clarity, importance and acceptability. The CCSS was distributed to all mothers who delivered a live baby during the 4-week study period in 9 hospitals in Oman. A sample of 461 participants was used for principal component analysis (PCA) and another sample of 408 participants (after removing missing data) was used for confirmatory factor analysis (CFA). Two-sample independent t tests were conducted to establish discriminant validity. Stata software was used for the analysis.

**Results:** The survey demonstrated good face and content validity with all items rated above 3 out of 5. Out of the 3566 targeted population, 958 (26.9%) mothers participated. PCA identified 2 factors labelled as communication and control (Cronbach's $\alpha$ = 0.90) and care organization (Cronbach's $\alpha$ = 0.68) with good internal reliability. CFA demonstrated good model fit, confirming construct validity. Mothers who had vaginal delivery were more satisfied ($P < 0.05$) compared with those who underwent caesarean section, thus establishing good discriminant validity.

**Conclusion:** A short Arabic CCSS tool was developed. This new 10-item tool had good face and content validity, good internal reliability, construct validity and discriminant validity. It can provide valuable information to clinicians and decision-makers about the quality of maternity services.

**Keywords:** survey validation, Arabic, childbirth, maternal satisfaction, Oman

## Introduction

Patient satisfaction is an essential measure of quality in health care that can be used for further improvement and research (1). Despite the extensive work related to maternal satisfaction with maternity care, there are few Arabic surveys available to measure satisfaction. There are 26 countries where Arabic is officially recognized by the government, with 18 having a majority of their people using it as their first language (2). A recent review by Hussein et al. (3) examined studies related to maternal satisfaction in the Middle East; however, they did not assess the quality of the surveys and focused instead on identifying components of satisfaction.

The systematic review by Sawyer et al. (4) found 9 instruments that can be used to measure satisfaction with care during labour and childbirth. They concluded that the Six Simple Questions (SSQ) and Patient Perception Score (PPS) are brief, easily administered, and have good reliability and validity. Although other tools included in their systematic review have high reliability and validity, they were lengthy, designed for a specific condition (e.g., caesarean section), or developed for a particular group of patients (uncomplicated vaginal deliveries with healthy born babies).

This paper presents the translation and validation of an Arabic survey to measure women's satisfaction with care during childbirth based on the SSQ and PPS. This survey will help clinicians and decision-makers to measure maternal quality of care as perceived by mothers.

## Methods

### Survey development

The survey items were devised by merging items from 2 validated English questionnaires, PPS and SSQ. The reason for merging the tools was to cover dimensions that were not covered by the other survey. The SSQ was developed by Harvey et al. (5) to measure maternal satisfaction with childbirth at 48 hours and 2 and 6 weeks postpartum. As the name implies, the tool consisted of 6 questions that were scored on a 7-point scale. Two questions were negatively worded. The SSQ was found to have high reliability with Cronbach's $\alpha$ = 0.86. The PPS was developed by Siassakos et al. (6) to measure maternal perceptions following operative childbirth. The questionnaire had 3 questions each measuring 1 dimension using a 5-point Likert scale. The dimensions measured were communication, respect and safety. The 3 items of the tool had good internal consistency with Cronbach's

α=0.83 and established face validity. Additionally, the authors reported that participants found it easy and simple to complete the questionnaire. After combining the 2 surveys, items 1, 2 and 3 were reworded, and 1 item was split into 2. The resulting combined tool, referred to as the Childbirth Care Satisfaction Survey (CCSS), had 10 items. Instead of the 5-point scale in the original PPS, 7 points were used to match the scales of the SSQ. Compared with the 5-point scale, the 7-point scale was believed to provide a more accurate and sensitive measure of a participant's evaluation (7). The survey had other items related to participants' educational level, employment status, number of babies in this delivery, number of previous deliveries, and type of delivery. Before finalizing the CCSS, the English version was translated into Arabic, validated and pilot tested. The following sections describe these steps in more detail.

## Translation of the tool

The majority of participants were expected not to be fluent in English, hence the need for translation into the Arabic language (8). Compared with other techniques like forward-only translation, back translation is suggested to be the most reliable technique to avoid possible translation errors (9). In back translation, the original survey is translated into the target language and then translated back into the original language by another individual. In this study, the questionnaire was translated into Arabic by 2 researchers who were fluent in both languages. The translated version was then sent to a physician who was fluent in Arabic and English. The back-translated version was checked by the researcher and found to be consistent with only a few words that required amendment.

## Face and content validity of the Arabic questionnaire

Once the tool was translated into Arabic, it was tested to determine face and content validity. Thirteen Omani mothers who had a previous delivery in Oman were contacted and requested to rate the survey items voluntarily. Mothers were asked to rate each question from 1 to 5 in terms of clarity, acceptability and importance. All survey items had an average score > 3 in terms of clarity, importance and acceptability. The final English and Arabic translated versions of the SSQ and PPS can be seen in Appendixes 1 and 2.

## Study design and participants

This was a descriptive cross-sectional study that was piloted in March 2017 in 1 hospital before including the remaining 9 secondary care hospitals that are under the umbrella of the Ministry of Health, Oman. All the included hospitals were certified by 1999 as baby friendly by the World Health Organization and United Nations Children's Fund (10). The whole study in the other hospitals was conducted from April to June 2017. The study targeted all mothers who gave a live birth (whether vaginal delivery with and without anaesthesia or caesarean section) during the study period (4 weeks in each hospital). Mothers who did not read Arabic were asked to get help from

their attending relative (mother, husband, sister, etc.). If they had no relative to help them in completing the survey, they were excluded from the study. In Oman, institutions and staff are encouraged to ensure that a close relative/husband accompanies mothers so that they get the required support at delivery (11).

## Distribution and data entry

The researcher gave questionnaires to the heads of quality departments in the participating hospitals who, in turn, gave them to the ward in-charge nurse for distribution to mothers. A distribution plan was provided to heads of quality departments to ensure consistency of distribution. As detailed in the plan, the surveys were handed to the mothers on their date of discharge (usually 36–48 hours after admission). Data were entered in a pre-prepared Microsoft Excel sheet by a coordinator who was trained in data entry, and the researcher double-checked 10% of surveys entered to ensure accuracy.

## Data analysis

Data from the pilot hospital were included in the data analysis. Questions 3 and 6 were negatively worded and thus reverse coded. The 7-point Likert scale of responses ranged from strongly disagree (1) to strongly agree (7). The scales were used to measure the mean satisfaction score by adding the scores given by each respondent for each question and dividing by the number of respondents for that question. Similarly, the total satisfaction score was calculated by taking the average scores for all survey items for each hospital. Participants were considered satisfied if the mean score was above the midpoint response (> 4). Since 1 of the hospitals had only 4 participants, it was dropped from the analysis. Thus, the data presented here were confined to 9 hospitals with 958 mothers participating in the study.

The first sample of 461 participants was recruited from hospitals 1–4, and this sample was used to conduct principal component analysis (PCA) using StataCorp. PCA is an exploratory analytical tool to test the number of common factors influencing a group of measures (12). PCA was conducted using oblique (Oblimin) rotation to examine the internal structure of the CCSS and how each item contributed to the construct. The Kaiser–Meyer–Olkin (KMO) test was used to assess sample adequacy where a value of ≥ 0.8 represented a good sample size. Eigenvalues of ≥ 1 were used to retain the factor and items were retained if they had a factor loading of ≥ 0.30, as recommended by Field (13). Cronbach α was used to assess the internal reliability of the scale and the retained factors. As recommended by Pallant (14), an α value of 0.8, 0.7 and 0.6 indicated good, satisfactory and poor reliability, respectively.

Another sample of 497 women was recruited from hospitals 5–9. After removing missing data, 408 samples were used for confirmatory factor analysis (CFA) to examine the construct validity. CFA is another analytical tool to examine whether the factor model suggested by the PCA fits the observed group of data (12). Amos version 22 was used to assess the CFA using maximum likelihood

estimation. Testing the model fit followed the guidelines of Hooper et al. (15) as follows: a $?^2$ to degree of freedom ratio (CMIN/DF) ≤ 2.0, goodness of fit index (GFI) ≥ 0.90, Comparative Fit Index (CFI) ≥ 0.90, standardized root mean square residual (SRMR) ≥ 0.05 and root mean square of approximation (RMSEA) ≥ 0.05. Two-sample independent $t$ tests were conducted to assess the discriminant validity where the null hypothesis was that there was no difference in the satisfaction score between vaginal and caesarean delivery. Statistical significance was set at $P < 0.05$.

## Ethics, confidentiality and anonymity

The Omani Ministry of Health approved this study. An information sheet was provided in front of the questionnaire to explain the purpose and importance of the study. The information sheet also emphasized that participation was voluntary and would not negatively affect the partic-ipants in any way in the future. To ensure confidentiality and anonymity, participants were not asked to provide any information that could identify them, such as name, identification number, address, or mobile number.

## Results

### Respondents' characteristics and response rate

Out of the 3566 targeted population, 958 (26.9%) mothers participated in the study in the 9 hospitals, with a response rate of 18–79%. The majority of respondents were not employed (67.2%); had completed primary to tertiary level of education (62.7%); did not have a chronic condition (87.7%); this delivery was not their first (72.7%); had a single baby (86.5%); had vaginal delivery (70.1%); and this was not their first delivery in the hospital (59.5%) (Table 1). Participants in both samples had similar characteristics.

**Table 1 Characteristics of participants**

| Characteristics | Sample 1 N (%) | Sample 2 N (%) | Both samples N (%) |
|---|---|---|---|
| | 461 | 497 | 958 |
| *Education level* | | | |
| No education | 5 (1.1) | 13 (2.6) | 18 (1.9) |
| Primary/secondary/tertiary school | 284 (61.6) | 315 (63.4) | 599 (62.7) |
| Graduate/postgraduate | 168 (36.4) | 163 (32.8) | 331 (34.4) |
| Missing | 4 (0.9) | 6 (1.2) | 10 (1.0) |
| *Employment status* | | | |
| Employed | 132 (28.6) | 136 (27.4) | 268 (27.9) |
| Not employed | 302 (65.5) | 340 (68.4) | 642 (67.2) |
| Retired | 5 (1.1) | 3 (0.6) | 8 (0.8) |
| Missing | 22 (4.8) | 18 (3.6) | 40 (4.2) |
| *Do you have a chronic condition* | | | |
| Yes | 38 (8.2) | 44 (8.9) | 82 (8.5) |
| No | 400 (86.8) | 440 (88.5) | 840 (87.7) |
| Missing | 23 (5.0) | 13 (2.6) | 36 (3.7) |
| *Is this your first delivery?* | | | |
| Yes | 126 (27.3) | 107 (21.5) | 233 (24.3) |
| No | 318 (69.0) | 378 (76.1) | 696 (72.7) |
| Missing | 17 (3.7) | 12 (2.4) | 29 (3.0) |
| *No. of babies delivered* | | | |
| Single | 393 (85.3) | 435 (87.5) | 832 (86.5) |
| Twins | 8 (1.7) | 10 (2.0) | 18 (1.9) |
| Triplets or more | 37 (8.0) | 35 (7.0) | 72 (7.5) |
| Missing | 23 (5.0) | 17 (3.4) | 40 (4.2) |
| *Mode of delivery* | | | |
| Vaginal | 310 (67.3) | 361 (72.6) | 674 (70.1) |
| Caesarean | 130 (28.2) | 124 (25.0) | 254 (26.4) |
| Missing | 21 (4.6) | 12 (2.4) | 34 (3.5) |
| *Is this your first delivery in this hospital?* | | | |
| Yes | 193 (41.9) | 170 (34.2) | 364 (37.8) |
| No | 253 (54.9) | 316 (63.6) | 572 (59.5) |
| Missing | 15 (3.3) | 11 (2.2) | 26 (2.7) |

## Study 1: exploring the factor structure of the CCSS

The factor structure of the CCSS was examined using a sample of 461 participants. The sample size was found to be adequate (KMO = 0.883) to conduct PCA which suggested 2 factors with eigenvalues > 1.0. Factors 1 and 2 explained 50% and 16% of the variance, respectively. Using a factor loading of ≥ 0.3, 8 items loaded onto factor 1 (labelled as communication and control) and 2 items loaded onto factor 2 (labelled as care organization) (Table 2). Although item 5 (I felt involved in the procedures related to my care) did not reach the threshold eigenvalue, due to its theoretical importance and proximity to the threshold (0.29) it was kept in the survey. Factor 1 had Cronbach's $\alpha$ = 0.90, while factor 2 had a score of 0.68, representing good internal reliability. As factor 2 had only 2 items, the average interitem correlation was explored and found to be 0.52, which was above the optimum range of 0.2–0.4 (16). This suggested that the 2 items were too closely related.

## Study 2: testing the validity of the factor structure

A separate sample of 408 mothers was used to test a 2-factor model using maximum likelihood estimation. CFA showed that the data fitted the model well ($\chi^2$ (89) = 56.26, $P < 0.001$; CMIN/DF = 2.16; GFI = 0.97, CFI = 0.93, SRMR = 0.06 and RMSEA = 0.05), thus demonstrating good construct validity.

## Discriminant validity

A two-sample independent $t$ test using data from both samples was conducted and showed that the overall mean satisfaction score was significantly higher among those who had a vaginal delivery (5.4) compared with caesarean delivery (5.3) ($t$ = 2.10, $P$ = 0.036) (Table 3). Mean satisfaction score across all survey items (except Q8) was higher among mothers who delivered vaginally compared with women who had a caesarean section. However, this difference was significant in Q2.

## Discussion

Currently, there are few Arabic surveys to measure maternal satisfaction in Arab countries, even though the majority of people in 18 countries use the Arabic language. This study aimed to address this gap by describing the psychometric properties of an Arabic survey developed by combining 2 existing tools to measure maternal satisfaction in 9 maternity units in Oman. The survey showed good face and content validity. The PCA showed that the new survey was based on adequate sample size and the 10 items loaded into 2 factors labelled as communication and control (7 items) and care organization (2 items). Both factors had good internal reliability with Cronbach's $\alpha$ = 0.90 for communication and control while care organization had a score of 0.68. Measurement of CFA confirmed that the model fitted well and demonstrated good construct validity.

Additionally, the survey has good discriminant validity as shown by the 2-way independent $t$ test between mothers who had a vaginal delivery and those with caesarean section. Previous studies have suggested that women are more satisfied after vaginal delivery (including those with and without anaesthesia) compared with caesarean section (17, 18). The new scale was sensitive enough to pick up this difference and confirmed the finding of Mathew et al. (19) that Omani women prefer vaginal delivery.

The study had 2 main limitations. First, the study only had a 26.9% response rate. Nonetheless, the sample size ($n$ = 958) made psychometric testing possible, as demonstrated by the KMO test. Second, the survey was given to mothers on their date of discharge (36–48 hours after delivery). Thus, the results might not be applicable to measurement of satisfaction 2 weeks or 2 months after delivery. Despite these limitations, we believe that the new tool has good psychometric properties and might be of some use in follow-up studies. Unlike other studies, we did not exclude complicated vaginal deliveries, making the results applicable to all deliveries. Although the new survey was tested in Oman only, the new CCSS could still be applied in Arab-speaking countries because it was

**Table 2 Factor loadings based on sample 1 data (461 participants)**

| Item | Variable | Factor 1 | Factor 2 |
|------|----------|----------|----------|
| 1 | I felt that I had adequate control over my care | 0.33 | |
| 2 | The staff responsible for my care were caring and compassionate | 0.37 | |
| 3 | Problems arose were not dealt with effectively | | 0.69 |
| 4 | My needs have been addressed with appropriate consideration for my time | 0.35 | |
| 5 | I felt involved in the procedures related to my care | 0.29 | |
| 6 | The overall organization of my care has not been appropriate | | 0.69 |
| 7 | I would choose the same type of care for my next pregnancy | 0.37 | |
| 8 | I felt safe at all times | 0.38 | |
| 9 | I felt well informed due to good communication | 0.34 | |
| 10 | I felt I was treated with respect at all times | 0.38 | |

**Table 3 Mean satisfaction score by mode of delivery**

|  |  | Caesarean section | Vaginal delivery | P |
|---|---|---|---|---|
| All items | N | 2445 | 6414 | 0.0357* |
|  | Mean (SD) | 5.3 (1.9) | 5.4 (2.0) |  |
| Q1 | N | 243 | 639 | 0.3353 |
|  | Mean (SD) | 5.2 (1.8) | 5.3 (1.8) |  |
| Q2 | N | 250 | 658 | 0.0175* |
|  | Mean (SD) | 5.7 (1.7) | 6.0 (1.6) |  |
| Q3 | N | 244 | 632 | 0.5207 |
|  | Mean (SD) | 3.4 (2.3) | 3.5 (2.4) |  |
| Q4 | N | 242 | 637 | 0.3802 |
|  | Mean (SD) | 5.4 (1.8) | 5.5 (1.8) |  |
| Q5 | N | 240 | 617 | 0.0741 |
|  | Mean (SD) | 5.1 (1.9) | 5.3 (1.9) |  |
| Q6 | N | 242 | 639 | 0.1461 |
|  | Mean (SD) | 2.9 (2.1) | 3.2 (2.3) |  |
| Q7 | N | 244 | 638 | 0.3671 |
|  | Mean (SD) | 5.2 (2.0) | 5.3 (2.0) |  |
| Q8 | N | 246 | 648 | 0.6024 |
|  | Mean (SD) | 5.7 (1.7) | 5.6 (1.8) |  |
| Q9 | N | 245 | 649 | 0.0826 |
|  | Mean (SD) | 5.5 (1.8) | 5.7 (1.7) |  |
| Q10 | N | 249 | 657 | 0.077 |
|  | Mean (SD) | 5.8 (1.7) | 6.0 (1.6) |  |

*Statistically significant; SD = standard deviation.*

written in classical Arabic, which is the language spoken in formal communication and printed publications, with only minor differences among the Arab countries (*20*). This enhances our ability to generalize the CCSS, without the need for further modifications or corrections.

## Conclusion

A short and easy to use Arabic CCSS to measure maternal satisfaction with the childbearing experience was developed. This new 10-item tool has good face and content validity, internal reliability, construct validity and discriminant validity. It could provide valuable information to clinicians and decision-makers about the quality of maternity services.

# Validation de l'enquête en langue arabe sur la satisfaction vis-à-vis des soins à l'accouchement

## Résumé

**Contexte :** La mesure de la satisfaction maternelle dans les pays arabes est un indicateur essentiel de la qualité des soins. Cependant, les enquêtes existantes ont des propriétés psychométriques et des critères d'inclusion limités.

**Objectifs :** Présenter les propriétés psychométriques de l'enquête de satisfaction vis-à-vis des soins à l'accouchement en arabe.

**Méthodes :** L'enquête en langue arabe sur la satisfaction vis-à-vis des soins à l'accouchement en arabe a été élaborée à partir de deux enquêtes en anglais. En 2017, 13 mères ont évalué les questions de l'enquête en termes de clarté, d'importance et d'acceptabilité. L'enquête a été réalisée auprès de toutes les mères ayant accouché d'un bébé vivant pendant la période d'étude de quatre semaines dans neuf hôpitaux d'Oman. Un échantillon de 461 participants a été utilisé pour l'analyse en composantes principales (ACP) et un autre échantillon de 408 participants (après suppression des données manquantes) a été utilisé pour l'analyse factorielle confirmatoire (AFC). Des tests *t* indépendants à deux échantillons ont été réalisés pour établir la validité discriminante. Le logiciel Stata a été utilisé pour l'analyse.

**Résultats :** L'enquête a démontré une bonne validité apparente et de contenu, avec un score supérieur à trois sur cinq pour tous les items. Sur les 3566 personnes ciblées, 958 mères (26,9 %) ont participé. L'ACP a identifié deux facteurs appelés communication et contrôle (alpha de Cronbach = 0,90) et organisation des soins (alpha de Cronbach = 0,68) avec une bonne fiabilité interne. L'AFC a démontré une bonne adéquation du modèle, confirmant la validité du construit. Les mères ayant accouché par voie basse étaient plus satisfaites (*p* < 0,05) que celles qui avaient subi une césarienne, établissant ainsi une bonne validité discriminante.

**Conclusion :** Un outil d'enquête de satisfaction brève en arabe sur les soins à l'accouchement a été mis au point. Ce nouvel outil qui comporte 10 items présente une bonne validité apparente et de contenu, une bonne fiabilité interne, une validité du construit et une validité discriminante. Il peut fournir des informations précieuses aux cliniciens et aux décideurs sur la qualité des services de maternité.

## التحقق من استقصاء الرضا عن رعاية الولادَة في البلدان العربية

وليد النضبي، سعدية بروين، محمد فيصل، محمد محمد

### الخلاصة

**الخلفية:** قياس الرضا عن رعاية الولادة في البلدان العربية مؤشر أساسي لجودة الرعاية المقدَّمة للأمهات أثناء الولادة. غير أن الدراسات الاستقصائية القائمة تتسم بخصائص قياسية نفسية ومعايير إدراج محدودة.

**الأهداف:** هدفت هذه الدراسة إلى القياس النفسي في استقصاء الرضا عن رعاية الولادَة في البلدان العربية.

**طُرق البحث:** استُحدِثت النسخة العربية لاستقصاء الرضا عن رعاية الولادَة في البلدان العربية بناءً على استقصائيْن باللغة الإنجليزية. وفي عام 2017، أجرت 13 أمًّا تقييمًا لبنود الاستقصاء من حيث الوضوح والأهميةِ والمقبولية. ووُزِّع استقصاء الرضا عن رعاية الولادةِ على جميع الأمهات اللاتي ولدن طفلًا حيًّا خلال فترة الدراسة، التي استمرت 4 أسابيع في 9 مستشفيات في عُمان. واستُخدمت عينة من 461 أمًّا مُشاركة لتحليل المكونات الرئيسية، واستُخدمت عينة أخرى من 408 أمهات مُشاركات (بعد إزالة البيانات المفقودة) لإجراء التحليل العاملي التوكيديَ. وأجريت اختبارات "t" مستقلة تتألف من عينتيْن لإثبات صلاحية التمييز. واستُخدمت برمجية Stata لإجراء التحليل.

**النتائج:** أظهر الاستقصاء صلاحية جيدة من حيث السمات الظاهرية والمحتوى في جميع البنود التي حصلت على درجة تجاوزت 3 من 5. وشاركت 958 أمًّا (26.9٪) من بين الفئة السكانية المستهدفة البالغ عددها 3566 نسمة. وحدد تحليل المكونات الرئيسية عامليْن وُصفا بالتواصل والمراقبة (معامل ألفا كرونباخ = 0.90) وتنظيم الرعاية (معامل ألفا كرونباخ = 0.68) مع موثوقية داخلية جيدة. وأثبت التحليل العاملي التوكيدي الملاءمة الجيدة للنموذج، الأمر الذي يؤكِّد صلاحية البنية. وكانت الأمهات اللاتي خضعن للولادة الطبيعية أكثر رضا مقارنةً (القيمة الاحتمالية > 0.05) باللاتي خضعن للولادة القيصرية، الأمر الذي يُثبت جودة صلاحية التمييز.

**الاستنتاجات:** استُحدثت النسخة العربية الموجزة لاستقصاء الرضا عن رعاية الولادَة في البلدان العربية. وتمتاز هذه الأداة الجديدة المكوَّنة من 10 بنود بصلاحية جيدة من حيث السمات الظاهرية والمحتوى، وموثوقية داخلية جيدَة، وصلاحية البنية، وصلاحية التمييز. ويمكن أن توفر معلومات قيِّمة للأطباء السريريين وصنَّاع القرار بشأن جودة خدمات الولادة.

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# Intestinal parasitic infection among mentally handicapped students in the Islamic Republic of Iran

Maryam Khedri,[1] Mina Piri[1] and Mohammad Matini[2]

[1]Students Research Center, Hamadan University of Medical Sciences, Hamadan, Islamic Republic of Iran. [2]Department of Medical Parasitology and Mycology, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Islamic Republic of Iran (Correspondence to: Mohammad Matini: matini@umsha.ac.ir; matini.mohammad@yahoo.com).

## Abstract

**Background:** Intestinal parasitic infections are among the most common public health problems in populations with poor hygiene. Consequently, mental retardation increases the risk of infection.

**Aims:** The aim of this study was to investigate the prevalence of intestinal parasitic infections among mentally disabled young people in Hamadan, western Islamic Republic of Iran.

**Methods:** This descriptive cross-sectional study was conducted on 318 students in 9 special schools in 2017. Triplicate faecal specimens for each student were subjected to stool analysis using direct wet mount, sedimentation concentration, and permanent staining technique. Chi-squared or Fisher's exact test were used for statistical analysis.

**Results:** Out of 318 students, 135 (42.5%, 95% CI: 37.1–47.9) were infected with intestinal parasites. Prevalence rates for females and males were 45.2% (61/135) and 40.4% (74/183) respectively. Protozoan infections (42.5%, 135) were more numerous than helminthiasis (0.6%, 2). *Blastocystis hominis* (28%, 89) was the most common parasite, followed by *Giardia lamblia* (9.7%, 31), *Entamoeba coli* (9.1%, 29) and *Trichomonas hominis* (6%, 19).

**Conclusions:** The high prevalence rate of intestinal protozoan infection reflects poor personal hygiene among the students and inappropriate environmental conditions. Therefore, specific public health measures are required for the mentally handicapped students in special schools.

Keywords: intestinal parasitic infections, mentally disabled persons, students, prevalence, Iran

## Introduction

Parasite infection still strongly influences the lives of humans. Their major impact is seen in developing countries, and especially in vulnerable groups. It is estimated that 3.5 billion people are affected and 450 million are sick worldwide as a result of intestinal parasitic infections (IPIs) (1). The economic burden is significant: they are responsible for a loss of around 35.4 million disability adjusted life years annually. In addition to gastrointestinal symptoms and digestive disorders, IPIs can cause micronutrient deficiency, mental and physical growth retardation and other serious health problems in children (2–4). Nonpathogenic parasites do not cause sickness and some parasitic pathogens may cause asymptomatic or mildly symptomatic infection in immunocompetent hosts. Therefore, these infections have been overlooked in high-risk groups (5).

Intestinal parasites are transmitted via the faecal–oral route, through unsafe drinking water and food and direct contact with contaminated soil and infected people. Low socioeconomic conditions and poor personal hygiene are believed to be the main epidemiological factors in the spread of IPIs in a society (4,6,7). The high incidence of infections among mentally disabled persons is predictable owing to inadequate personal hygiene. Indeed, IPIs are one of the major problems in the management of rehabilitation centres for mentally disabled persons, and mental disability can be considered another risk factor for intestinal infections, especially for parasitic infections (8).

There have been several reports of IPIs in people with disabilities from different parts of the country (9–13), but to our knowledge, there is little information about the infections in people with disabilities in Hamadan province. Therefore, considering the importance of IPIs in school-aged individuals with disabilities, this study was conducted to evaluate the prevalence of IPIs and their epidemiological associations among the students in special schools in Hamadan.

## Methods

### Patients and study area

Hamadan, the capital city of Hamadan province, is located in the western region of the country, with a population of over 676 105 and an area of 2831 square kilometres. This city lies at 48°32′ E and 34°51′ N and at an altitude of 1850 metres. The region has an average annual temperature of 13.4 °C and average annual precipitation is 308 mm (data from the Statistical Centre of Iran: https://www.amar.org.ir).

This cross-sectional study was conducted in 9 special schools for students with intellectual disability, including primary and high schools, from January to July 2017 in Hamadan. All of the students, 530 individuals, were enrolled in the study.

## Ethical considerations

Before the start of the study, informed consent was obtained from the students' parents. This study was approved by the research ethics committee of the Hamadan University of Medical Sciences (Ref. Number: 16.35.1.5168).

## Sample collection and examination

Interviews were conducted by trained teachers. Parents answered sociodemographic questions regarding age, sex, parents' education, residence status, and method of washing vegetables. Then, stool specimens were collected every other day (total 3 specimens) because of the intermittent nature of parasite shedding (14). The stool specimens were transferred to the parasitology research laboratory of Hamadan University of Medical Sciences and tested by complete ova and parasite examination

(15). After macroscopic examination, the samples were subjected to microscopic examination: direct wet smear (saline and Lugol's iodine preparation), formalin–ethyl acetate concentration, and trichrome permanent stained smear (15). Those students found to be infected were referred to health centres for treatment.

## Statistical analysis

Statistical data analysis was performed using *SPSS*, version 16, and chi-squared ($\chi^2$) or Fisher's exact tests. *P*-value < 0.05 was considered statistically significant.

## Results

Of the 530 students in total, 318 remained in the study; the others were excluded because of incomplete information or improper sample collection. The age of the participants ranged from 7 to 18 years; 183 (57.5%) were males and 135 (42.5%) were females.

We found that 135 of the students (42.5%, 95% CI: 37.1–47.9%) were parasitized by intestinal protozoa and helminths, prevalence 42.5% ($n = 135$) and 0.6% ($n = 2$) respectively. Sociodemographic characteristics of the

**Table 1 Prevalence of intestinal parasitic infections, according to demographic and epidemiological characteristics, among 318 mentally handicapped students in Hamadan, Islamic Republic of Iran, 2017**

| Demographic characteristics | Total | Students | | P-value |
|---|---|---|---|---|
| | No. (%) | Infected No. (%) | Uninfected No. (%) | |
| *Age (years)* | | | | 0.002 |
| 7–12 | 190 (100) | 67 (35.3) | 123 (64.7) | |
| 13–18 | 128 (100) | 68 (53.1) | 60 (46.9) | |
| *Sex* | | | | 0.397 |
| Male | 183 (100) | 74 (40.4) | 109 (59.6) | |
| Female | 135 (100) | 61 (45.2) | 74 (54.8) | |
| *Mother's education*[a] | | | | 0.292 |
| Illiterate | 60 (100) | 32 (53.3) | 28 (46.6) | |
| Primary school | 80 (100) | 37 (46.3) | 43 (53.7) | |
| Junior high school | 57 (100) | 24 (42.1) | 33 (57.9) | |
| Senior high school | 26 (100) | 8 (30.8) | 18 (69.2) | |
| University | 10 (100) | 3 (30) | 7 (70) | |
| *Father's education*[a] | | | | 0.027 |
| Illiterate | 54 (100) | 33 (61.1) | 21 (38.9) | |
| Primary school | 54 (100) | 27 (50) | 27 (50) | |
| Junior high school | 65 (100) | 25 (38.5) | 40 (61.5) | |
| Senior high school | 37 (100) | 11 (29.7) | 26 (70.3) | |
| University | 20 (100) | 8 (40) | 12 (60) | |
| *Residence*[a] | | | | 0.21 |
| Urban | 203 (100) | 87 (42.8) | 116 (87.1) | |
| Rural | 29 (100) | 16 (55.2) | 13 (44.8) | |
| *Method of washing vegetables*[a] | | | | 0.002 |
| Water | 70 (100) | 43 (61.4) | 27 (38.6) | |
| Detergent solution | 109 (100) | 45 (41.3) | 64 (58.7) | |
| Disinfectant solution | 52 (100) | 16 (30.8) | 36 (69.2) | |

[a]Data analysis was conducted on 232 participants who had fully answered the questions.

**Table 2 Prevalence of intestinal parasites, according to parasite species and multiplicity of infection, among 318 mentally handicapped students in Hamadan, Islamic Republic of Iran, 2017**

| Multiplicity of infection | Parasite species (cyst, trophozoite & ova) | No. (%) |
|---|---|---|
| **Single** | | 96 (30.2) |
| | Blastocystis hominis | 55 (17.3) |
| | Giardia lamblia | 20 (6.3) |
| | Trichomonas hominis | 9 (2.8) |
| | Entamoeba coli | 7 (2.2) |
| | Iodamoeba butschlii | 3 (0.9) |
| | Dientamoeba fragilis | 1 (0.3) |
| | Endolimax nana | 1 (0.3) |
| **Double** | | 25 (7.9) |
| | Blastocystis hominis + Entamoeba coli | 7 (2.2) |
| | Blastocystis hominis + Trichomonas hominis | 6 (1.9) |
| | Blastocystis hominis + Giardia lamblia | 5 (1.6) |
| | Blastocystis hominis + Iodamoeba butschlii | 3 (0.9) |
| | Blastocystis hominis + Dientamoeba fragilis | 1 (0.3) |
| | Entamoeba coli + Giardia lamblia | 1 (0.3) |
| | Entamoeba coli + Iodamoeba butschlii | 1 (0.3) |
| | Entamoeba coli + Endolimax nana | 1 (0.3) |
| **Triple** | | 10 (3.1) |
| | Giardia lamblia + Entamoeba coli + Endolimax nana | 1 (0.3) |
| | Giardia lamblia + Blastocystis hominis + Iodamoeba butschlii | 1 (0.3) |
| | Giardia lamblia + Blastocystis hominis + Entamoeba coli | 1 (0.3) |
| | Giardia lamblia + Blastocystis hominis + Dicrocoelium dendriticum | 1 (0.3) |
| | Blastocystis hominis + Entamoeba coli + Trichomonas hominis | 3 (0.9) |
| | Blastocystis hominis + Entamoeba coli + Chilomastix mesnili | 1 (0.3) |
| | Blastocystis hominis + Entamoeba coli + Iodamoeba butschlii | 1 (0.3) |
| | Blastocystis hominis + Entamoeba coli + Ascaris lumbricoides | 1 (0.3) |
| **Quadruple** | | 4 (1.3) |
| | Entamoeba coli + Blastocystis hominis + Iodamoeba butschlii + Giardia lamblia | 1 (0.3) |
| | Entamoeba coli + Blastocystis hominis + Iodamoeba butschlii + Endolimax nana | 1 (0.3) |
| | Entamoeba coli + Blastocystis hominis + Iodamoeba butschlii + Trichomonas hominis | 1 (0.3) |
| | Entamoeba coli + Endolimax nana + Iodamoeba butschlii + Entamoeba hartmanni | 1 (0.3) |

participants are presented in Table 1. The associations between IPIs and age, father's education, method of washing vegetables were statistically significant.

The prevalence rates for parasites are listed in Table 2. Mono- and polyparasitism rates were 30.2% (96) and 12.3% (39), respectively. Thirty-three of the students (10.4%) harboured pathogenic intestinal parasites and 102 (32.1%) were infected with nonpathogenic parasites. *Blastocystis hominis* was the most common intestinal parasite with an overall prevalence of 28% (89 cases) compared with 0.3% (1 case) for both *Ascaris lumbricoides* and *Dicrocoelium dendriticum*.

## Discussion

Intestinal parasitic infections constitute a major public health concern globally. The infections are often associated with certain socioeconomic factors such as poverty, high population density, lack of access to health facilities and poor personal hygiene. Epidemiological survey of IPIs is necessary for health promotion interventions in targeted populations. In our study, we investigated the prevalence of IPIs and the predisposing factors among children and adolescent students with intellectual disability in Hamadan. Prevalence was 42.5% (95% confidence interval 37.1–47.9, which is higher than findings reported during the past decade from other parts of the country, including Urmia (20.4%) in the north west, Mazandaran province (26.2%) and Rasht (29.5%) in the north, and Ahvaz (33%) in the south (9–12). However, it is lower than the 48.5% prevalence described in the intellectually disabled residents of a rehabilitation centre in Bandar Abbas, another area in southern Islamic Republic of Iran (13).

The difference between our findings and those of previous studies may be attributable to sample size, sampling strategy, method of stool examination, geographical area or study population. In other parts of the world there are relatively few estimates of the prevalence of IPIs in the mentally disabled population; examples include Egypt 43.5%, Korea 35.7% and Thailand 38.46% (16–18).

In our study, protozoal infections were common among the participants and intestinal helminthiasis was rare although enterobiasis was not investigated by the adhesive sellotape anal swab method. This finding is in accordance with the results of studies conducted in the north of the country (10,11). The human dicrocoeliasis detected in our study is a spurious infection and must be ignored due to the consumption of raw liver from animals infected with *D. dendriticum*. Two decades ago, soil-transmitted helminth infections were one of the most common IPIs in the general population in Hamadan: prevalence of ascariasis was 19% in 2001 (19). Development of health promotion and education programmes in this region has led to a reduction in IPIs, particularly helminthiasis (20).

A high frequency of multiple parasitic infections was another important finding: 12.3% were infected with ≥ 2 parasite species. In our study, polyparasitism was significantly higher than in the other studies conducted in the Islamic Republic of Iran and in contrast with those studies, triple and quadruple infections were observed

(*9–13*). These disparities may be a result of differences in the severity of contamination of the environment or the sensitivity of diagnostic methods. Ten species of intestinal protozoan and helminthic parasites were detected in the samples, the most common was *B. hominis* with a prevalence rate of 28%. This is higher than rates reported in previous Iranian studies (*9–13*). *Giardia lamblia* was the second most common parasite observed in the students, with a prevalence of 9.7%. This is similar to that observed in other studies conducted in Mazandaran province (10.2%) and Ahvaz (9.4%), and is slightly higher than those reported from Urmia (6.2%), Rasht (4.6%) and Bandar Abbas (6%) (*9–13*).

Climate is one of the factors affecting the distribution of parasite species. *Strongyloides stercoralis* is a prevalent parasite in some areas with warm moist climates; it is reported in Bandar Abbas as the most common parasite (17.3%) among people with mental retardation (*13*). In our study, *S. stercoralis* was not detected, and this is consistent with reports from studies conducted in Urmia, Mazandaran province and Ahvaz (*9,10,12*).

We found that the infection was slightly more prevalent in females than males, but this was not statistically significant (*P* = 0.397). This finding is consistent with other studies that demonstrated sex was not a substantial risk factor for IPIs (*9–11,13,16,18*). Age is another epidemiological factor that can affect the prevalence of IPIs (*9,12*). A statistically significant correlation was observed between the age of the students and IPIs. But unexpectedly, the prevalence of the infection increased with increasing age. This conflicts with the studies that showed a negative correlation between older age and IPI rate (*9,12*). This contradiction can be explained by the fact that parents and mentors are likely to be caring more for children than teenagers. The other risk factor investigated in the present study was washing methods of vegetables. Along with the study conducted in the north of the country, the results demonstrated consumption of raw vegetables could be considered as a risk factor for IPIs. Investigations of parasitic contamination of vegetables in Hamadan province confirm this finding, however infection can be significantly reduced by proper washing vegetables (*11,21,22*).

One limitation of this study was the inability to detect enterobiasis and coccidiosis because identification of the parasite infections required specific methods.

## Conclusion

Our findings show that the prevalence of intestinal protozoan infections among mentally disabled students is considerable in Hamadan. The high prevalence rate of the pathogenic parasites *B. hominis* and *G. lamblia* is a concern as they can cause further conditions affecting in mental and cognitive development in the students. Also it indicates the high potential for transmission of other intestinal microbes among them. Therefore, there is a need to promote preventive health care to raise awareness about the health and hygiene of mentally handicapped students.

## Infection parasitaire intestinale chez les élèves atteints d'un handicap mental, République islamique d'Iran

### Résumé

**Contexte :** Les infections parasitaires intestinales comptent parmi les problèmes de santé publique les plus courants dans les populations dont l'hygiène est insuffisante. Par conséquent, le retard mental augmente le risque d'infection.

**Objectifs :** La présente étude avait pour objectif d'étudier la prévalence des infections parasitaires intestinales chez les jeunes présentant un handicap mental à Hamadan, dans l'ouest de la République islamique d'Iran.

**Méthodes :** Cette étude transversale descriptive a été menée auprès de 318 élèves de neuf écoles spéciales en 2017. Des échantillons de selles en triplicata pour chaque élève ont été soumis à analyse en utilisant la technique de montage humide direct, de concentration par sédimentation et de coloration permanente. Le test du khi carré et le test exact de Fisher ont été utilisés pour l'analyse statistique.

**Résultats :** Sur 318 élèves, 135 (42,5 %, IC 95 % : 37,1 à 47,9) étaient infectés par des parasites intestinaux. Les taux de prévalence chez les filles et les garçons étaient de 45,2 % (61/135) et 40,4 % (74/183) respectivement. Les infections à protozoaires (42,5 %, 135) ont été plus nombreuses que les helminthiases (0,6 %, 2). *Blastocystis hominis* (28 %, 89) était le parasite le plus fréquent, suivi par *Giardia lamblia* (9,7 %, 31), *Entamoeba coli* (9,1 %, 29) et *Trichomonas hominis* (6 %, 19).

**Conclusions :** Le taux élevé de prévalence des infections intestinales à protozoaires reflète le manque d'hygiène personnelle des étudiants et des conditions environnementales inappropriées. Par conséquent, des mesures de santé publique spécifiques sont nécessaires pour les étudiants atteints d'un handicap mental dans les écoles spéciales.

## العدوى الطفيلية المعوية في صفوف الطلاب المعوَّقين ذهنيًّا في جمهورية إيران الإسلامية

مريم خضري، مينا بيري ، محمد متيني

### الخلاصة

**الخلفية:** تُعد العدوى الطفيلية المعوية من أكثر مشاكل الصحة العامة شيوعًا في صفوف السكان الذين يعانون من قلة النظافة الشخصية. ومن ثَمَّ، فإن التخلف العقلي يزيد من خطر العدوى.

**الأهداف:** هدفت هذه الدراسة إلى استقصاء معدل انتشار العدوى الطفيلية المعوية في صفوف الأطفال المعوَّقين ذهنيًّا في همدان، غرب جمهورية إيران الإسلامية.

**طُرق البحث:** أُجريت هذه الدراسة المقطعية الوصفية على 318 طالبًا في 9 مدارس خاصة في عام 2017. وخضعت عينات البراز الثلاثية لكل طالب للتحليل بأسلوب إضافة السائل للشريحة مباشرةً لفحصها ميكروسكوبيًّا، وتركيز الترسيب، وتقنية التلوين الدائم. واستُخدم اختبار كاي تربيع أو اختبار فيشر الدقيق للتحليل الإحصائي.

**النتائج:** أُصيب 135 طالبًا من بين 318 طالبًا بالطفيليات المعوية (42.5٪، فاصل ثقة 95٪: 37.1–47.9). وكانت معدلات الانتشار في صفوف الإناث والذكور 45.2٪ (61/ 135) و40.4٪ (74/ 183) على التوالي. وكانت حالات العدوى بالطفيليات الأحادية الخلية (42.5٪، 135) أكثر عددًا من داء الديدان (0.6٪، 2). وكانت المتبرعمة الكيسية البشرية (28٪، 89) أكثر الطفيليات شيوعًا، تلتها الجياردية اللمبلية (9.7٪، 31)، والمتحولة القولونية (9.1٪، 29)، والمُشعَّرة البشرية (6٪، 19).

**الاستنتاجات:** يعكس ارتفاع معدل انتشار عدوى الطفيليات المعوية الأحادية الخلية قلة النظافة الشخصية في صفوف الطلاب والظروف البيئية غير الملائمة. ولذلك، يلزم اتخاذ تدابير محددة في مجال الصحة العامة للطلاب المعوَّقين ذهنيًّا في المدارس الخاصة.

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# Epidemiological update on prevalence and incidence of overweight and obesity in adults in the south-east of the Islamic Republic of Iran: findings from the Kerman Coronary Artery Diseases Risk Factors Study (KERCADRS)

Hamid Najafipour,[1] Mehdi Bagheri,[2] Shadan Saberi,[3] Mitra Farokhi,[4] Raheleh Amirzadeh[5] and Ali Mirzazadeh[6]

[1]Cardiovascular Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Islamic Republic of Iran. (Correspondence to: M. Bagheri: mehdi_b_ped@yahoo.com). [2]Cardiovascular Research Center and Department of Cardiology, Afzalipour Medical Faculty, Shafa Hospital, Kerman, Islamic Republic of Iran. [3]Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Islamic Republic of Iran. [4]Endocrinology and Metabolism Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Islamic Republic of Iran. [5]Social Determinants of Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Islamic Republic of Iran. [6]Department of Epidemiology and Biostatistics, University of California San Francisco, California, United States of America.

## Abstract

**Background:** Obesity is common worldwide, especially in low- and middle-income countries.

**Aims:** To update data on the prevalence of overweight, obesity and central obesity, and to measure incidence rates for such outcomes in adults living in the south-east of the Islamic Republic of Iran.

**Methods:** We enrolled 9997 adults (aged 15–80 years) between 2014 and 2018 (phase 2); 2820 of whom had participated in phase 1 (2009–2011). Participants were examined for overweight, obesity, central obesity, diabetes, hypertension, low physical activity, and dyslipidaemia. Univariate and multivariate logistic regression models were used to determine the potential predictors of overweight, obesity and central obesity, and adjusted odds ratios (AOR) were obtained. Incidence rate of overweight, obesity and central obesity was reported among those who had none of these outcomes in phase 1.

**Results:** The prevalence was 35.8% (37% men, 35% women) for overweight, 22.3% (16% men, 26.3% women) for obesity, and 31.1% (15.6% men, 41.2% women) for central obesity. The prevalence of overweight/obesity was significantly associated with age (AOR = 2.8–7.4), higher education (AOR = 1.7), female gender (AOR = 1.4), low physical activity (AOR = 1.3), smoking (AOR = 0.55) and opium use (AOR = 0.79). The prevalence increased from 33.3% to 35.8% for overweight and from 15.4% to 22.3% for obesity between phases 1 and 2. The incidence rate per 100 person-years was 5.5 for overweight, 4.7 for obesity and 2.9 for central obesity.

**Conclusion:** Prevalence of overweight and obesity increased over 5 years. Middle-aged participants, women, and those with low physical activity were at higher risk for overweight/obesity.

Keywords: overweight, obesity, risk factors, prevalence, incidence

## Introduction

Abnormal body mass index (BMI), which can be in the form of overweight and obesity, has been one of the greatest health challenges worldwide. Recent studies have indicated that the worldwide prevalence of obesity nearly tripled between 1975 and 2016 (1,2). Obesity has been associated with many diseases such as type 2 diabetes mellitus, cardiovascular disease (CVD), hypertension, and cancer (3). According to the World Health Organization (WHO) in 2018, ~13% of the global adult population was obese in 2016 (4). The problem of obesity affects many Asian and Persian Gulf countries, especially the Islamic Republic of Iran, and it has become one of the top health challenges in such countries (5,6). WHO has also reported that the prevalence of overweight and obesity in Middle East countries is 54.2% in women and 31.4% in men (7,8). Studies in the Islamic Republic of Iran have shown the upward trend in obesity prevalence in all age groups > 15 years (9–11). Due to the plentiful differences in sociocultural issues in all Iranian provinces, and considerable variations in lifestyle and dietary/nutritional culture, a varied pattern of overweight and obesity prevalence has been observed in recent years. A systematic review revealed a prevalence of overweight between 27% and 38.5% and a prevalence of obesity between 12.6% and 25.9% (12). To our knowledge, there is little information about the prevalence of obesity and overweight and their predictors in Southeastern Iran. In a population-based study (Kerman Coronary Artery Disease Risk Factors Study;

KERCADRS) conducted from 2009 to 2011 on 5900 adults aged 15–75 years, the prevalence of overweight and obesity was 29.6% (29.5% men, 29.7% women) and 13.0% (9.3% men, 16.9% women), respectively (13).

The present study is the second phase of KERCADRS conducted on a larger sample size of 9997 individuals from 2014 to 2018. The study had 2 main objectives: (1) to determine the prevalence and predictors of overweight and obesity, and their affecting factors [e.g., level of physical activity, anxiety, depression, cigarette smoking, and opium addiction] in the population aged 15–80 years; and (2) to compare the findings of the second phase with the first phase (2009–2011) to explore the incidence rate and trend in changes in prevalence of overweight and obesity. This will provide a better insight into the severity and growth rate of these two important CVD risk factors in this region in the past 5 years.

## Methods

### Study design

This was a serial cross-sectional study that recruited participants in two phases (2014–2018 and 2009–2011) and was conducted according to the Declaration of Helsinki. The study protocols were approved by the Ethics Committee of Kerman University of Medical Sciences (ethics code: IR.KMU.REC.1392.405). Written informed consent was obtained from all subjects.

### Study population

Phase 2 of KERCADRS was conducted from 2014 to 2018 on 9997 adults aged 15–80 years in Kerman, the largest city in Southeastern Iran. Kerman is the capital city of Kerman Province with a population of ~750 000 and is located ~1000 km from the capital, Tehran. People are mostly busy with white-collar jobs in the government sector, agriculture, and trade. Lifestyle patterns are typically aggregated in families. The methodology and more detailed description of the selected variables have been published elsewhere (14). We used a non-proportional-to-size one-stage cluster sampling household survey, and randomly selected 420 zip codes, each representing a house (called a seed). Social mobilizers approached the seed household and invited all eligible people to participate in the study. Recruitment was continued until 24 persons were recruited in each cluster and an overall target sample size of close to 10 000 was achieved.

### Data collection

The study participants were examined by a physician for various coronary artery disease (CAD) risk factors using a standard structured questionnaire (14). The questionnaire consisted of sociodemographic data; level of education [1, illiterate; 2, primary to high school; and 3, above high school (college level)]; cigarette smoking (1, never smoked; 2, current smoker); and opium use [1, nonuser; 2, occasional user, and 3, dependent (continuous use)]. Level of depression and anxiety were assessed using the

Beck Depression Inventory and Beck Anxiety Inventory, respectively. For depression, scores > 30 and for anxiety, scores > 26 were identified as disease states (14). The Global Physical Activity Questionnaire was used to evaluate the level of physical activity. The total metabolic equivalent of task (MET) was calculated for the status of activity in work-, transport- and recreation-related physical activity. MET is the rate of energy used by a person while sitting. Moderate physical activity is considered as consuming energy > 4 times, and high physical activity is energy consumption > 8 times the energy used while sitting (15).

### Measurements

Height, weight and waist circumference (WC) were measured by standard methods (14). WC > 88 cm for women and > 102 cm for men was considered as central obesity. Height was measured in standing position without shoes, and weight was measured by a standard weighing balance (Seca, Hamburg, Germany). BMI was classified as normal (18.5–24.9 kg/m²), overweight (25–29.9 kg/m²) and obese (≥ 30 kg/m²). Laboratory measurements (10–12 hours of fasting) included fasting plasma glucose, triglyceride and total cholesterol. Cholesterol and triglyceride values > 200 mg/dl were considered abnormal. All individuals with previously diagnosed diabetes, taking insulin or antidiabetic drugs, or with fasting plasma glucose ≥ 126 mg/dl were considered to have diabetes. Blood pressure was measured with a standard mercury manometer (Richter, Speichersdorf, Germany). All individuals with previously diagnosed hypertension, taking antihypertensive drugs, or with resting systolic/diastolic blood pressure ≥ 140/90 mmHg were considered to have hypertension.

### Incidence of overweight/obesity

We used the same method to calculate the incidence rate of overweight, obesity and central obesity. Therefore, we only present the method for calculation of incidence rate of overweight. To calculate the incidence rate of overweight, we used data from those who participated in both study phases, and who had normal BMI in phase 1, and therefore, were at the risk of becoming overweight during follow-up (Supplementary Figure 1). Therefore, 48.7% of the 5900 participants (2873 cases) in phase 1 who were already overweight were excluded from calculation of incidence rate. Out of the remaining 3027 participants, 207 (6.8%) were lost to follow-up. The number of new overweight cases (among the 3027 cases) identified during the follow-up period was designated the numerator. For those who had normal BMI in phase 1, the time difference (in years) between the visits in phases 1 and 2 was calculated as person-years at risk. Therefore, the denominator was the sum of the time each person was followed (person-year), totalled for all 3027 persons who were at risk of becoming overweight. For those who were lost to follow-up, we assumed that they had followed up for an average 2.5 years (half of the overall follow-up time be-

tween phases 1 and 2), and were then lost to follow-up. Incidence rate was calculated using the formula (16):

Number of new cases of overweight during 5 years

Incidence rate = _____ x 100

Total person-years for all persons at risk

## Statistical analysis

Numerical variables were described as mean and standard deviation and categorical/ordinal variables as n (%). Data management and all statistical analyses were conducted using STATA version 14. Data were analysed using the survey data analysis package. To account for the clustering effect, we used the survey data package analysis, in which we set clusters as the primary sampling units. Because of the non-proportionate-to-size sampling method, the total estimates were standardized based on the real age distribution of the target population (national census of Kerman population size in 2016). We reported weighted prevalence (17) for overweight, obesity and central obesity. We ran the bivariate analysis to assess the association between all covariates and the study outcome (overweight, obesity and central obesity binary outcomes), one at a time. We included all covariates with P < 0.05 in the multivariate logistic regression. Outputs from univariate and multivariate survey logistic regression were reported as crude and adjusted odds ratios (AORs). Data from phase 2 of the study were used in the logistic regression.

## Results

### Overweight, obesity and central obesity

Overall mean BMI was 27 kg/m$^2$ in phase 2 (Supplementary Table 1), which was higher than 25.6 kg/m$^2$ obtained in phase 1 (Figure 1A). Overall mean WC was 89.8 cm in phase 2, which was also higher than 85 cm obtained in phase 1 (Figure 1B). BMI and WC, overall and for both genders, were significantly higher in phase 2 than in phase 1 (P < 0.001). In phase 2, mean BMI was 23.1 kg/m$^2$ among those aged 15–24 years and reached 28.2 kg/m$^2$ among those aged 45–54 years (Figure 1C). The corresponding values were both lower in the same age groups in phase 1. In phase 2, mean WC was 77.4 cm among those aged 15–24 years and reached 94.3 cm among those aged 55–64 years (Figure 1D). These values were also lower in the same age groups in phase 1.

The overall prevalence of overweight and obesity was 35.8% and 22.3%, respectively (Table 1), whereas the corresponding values in phase 1 were 33.3% and 15.4%, respectively (Figure 2). The prevalence of central obesity was 31.1% in phase 2 (Table 1) and 18.2% in phase 1 (Figure 2). All three variables, overall and in each gender, were significantly higher in phase 2 than in phase 1. The overweight prevalence increased from 15.5% (phase 1) and 20.6% (phase 2) in subjects aged 15–24 years to peaks at 43.2% (phase 1) among those aged 35–44 years and 42.6% (phase 2) among those aged 45–54 years (Figure 2D).

Obesity among the first age group was 5.1% (phase 1) and 10.3% (phase 2), which significantly increased with age to a maximum of 25.8% (phase 1) among those aged 45–54 years and 31.0% (phase 2) among those aged 55–64 years (Figure 2E). Both obesity and central obesity were higher in all age groups in phase 2 compared with the same values in phase 1.

The prevalence of obesity and central obesity showed a decreasing trend with education and cigarette smoking and in dependent opium users (Table 1). Depression and anxiety had almost no significant effect. People with higher physical activity had a lower prevalence of overweight, obesity and central obesity.

### Predictors of abnormal BMI and WC

The odds of combined overweight and obesity significantly increased with age, in people with hypertension, patients with diabetes, higher education levels, female gender, and those with low physical activity (Table 1). Conversely, AOR for overweight/obesity significantly decreased among cigarette smokers, opium users and those with depression. In terms of central obesity, AOR of abnormal WC showed a trend similar to overweight/obesity. The corresponding results for phase 1 showed that AOR for overweight/obesity significantly increased with age, education level, lower physical activity and female gender (13).

### Comorbidities with overweight and obesity

On the whole, with increasing BMI, the prevalence of diabetes mellitus increased from 9.1% in people with normal weight to 21.5% in those with obesity and from 10.3% in people with normal WC to 24.1% in those with abnormal WC (Table 2). Similarly, the prevalence of hypertension increased from 13.7% to 35.4% in participants with obesity and from 16.7% to 35.7% in those with central obesity. The corresponding values for diabetes changed from 7.0% to 11.6% for participants with obesity and from 7.7% to 12.8% for central obesity in phase 1 (13). With regard to hypertension, these values were 22.6% to 37.4% for participants with obesity and 16.5% to 40.9% for those with central obesity in phase 1 (13). Almost all values were higher in phase 2 compared to phase 1. Hypercholesterolaemia and hypertriglyceridaemia were also important comorbidities accompanying overweight, obesity and central obesity (Table 2).

### Incidence rate of overweight, obesity and central obesity

Overall, the 5-year incidence rate (persons per 100 person-years) was 5.5 for overweight, 4.7 for obesity and 2.9 for central obesity (Table 3). The lowest incidence rate of obesity belonged to those who were dependent opium users, while the highest incidence rate of obesity was in the age group of 25–34 years. Higher incidence rates of overweight, obesity and central obesity were observed in women compared to men. Also, people in the age group of 35–44 years had the highest incidence rate of over-

**Table 1 Standardized prevalence of OW, OB and COB, and AOR for different associated factors in adults in Kerman, Islamic Republic of Iran**

| Subgroup | OW % (95% CI) | OB % (95% CI) | P | COB % (95%CI) | P | OW/OB AOR (95% CI) | P | COB AOR (95% CI) | P |
|---|---|---|---|---|---|---|---|---|---|
| Overall | 35.8 (34.7–36.8) | 22.3 (21.4–23.2) | | 31.1 (30.1–32.0) | | — | | — | |
| **Sex** | | | | | | | | | |
| Men | 37.0 (35.3–38.6) | 16.0 (14.7–17.3) | <0.001 | 15.6 (14.4–16.8) | <0.001 | 1 | | 1 | |
| Women | 35.0 (33.6–36.4) | 26.3 (25.2–27.5) | | 41.2 (39.9–42.5) | | 1.4 (1.3–1.6) | <0.001 | 4.6 (4.1–5.1) | <0.001 |
| **Age group (yr)** | | | | | | | | | |
| 15–24 | 20.6 (18.7–22.4) | 10.3 (8.9–11.7) | <0.001 | 10.9 (9.5–12.4) | <0.001 | 1 | | 1 | |
| 25–34 | 36.2 (34.6–37.8) | 18.0 (16.7–19.3) | | 23.4 (22.0–24.8) | | 2.8 (2.4–3.2) | <0.001 | 2.6 (2.1–3.3) | <0.001 |
| 35–44 | 42.6 (41.1–44.2) | 26.7 (25.4–28.1) | | 36.2 (34.7–37.6) | | 6.1 (5.2–7.1) | <0.001 | 4.8 (3.8–5.9) | <0.001 |
| 45–54 | 43.6 (42.0–45.1) | 31.0 (29.6–32.4) | | 42.6 (41.1–44.0) | | 7.4 (6.3–8.6) | <0.001 | 6.1 (4.9–7.6) | <0.001 |
| 55–64 | 40.2 (38.7–41.7) | 31.9 (30.4–33.3) | | 48.4 (47.0–49.9) | | 5.8 (4.9–6.8) | <0.001 | 6.8 (5.4–8.5) | <0.001 |
| 65–75 | 40.8 (38.9–42.7) | 22.6 (21.0–24.2) | | 41.9 (40.1–43.7) | | 3.4 (2.8–4.1) | <0.001 | 4.4 (3.4–5.7) | <0.001 |
| **Education** | | | | | | | | | |
| Illiterate | 36.1 (17.2–55.0) | 31.8 (13.9–49.6) | <0.001 | 43.6 (24.6–62.7) | <0.001 | 1 | | 1 | |
| Primary to high school | 34.8 (33.6–36.0) | 23.5 (22.5–24.6) | | 32.5 (31.3–33.6) | | 1.5 (1.3–1.7) | <0.001 | 0.93 (0.81–1.06) | 0.304 |
| Above high school | 40.4 (38.2–42.6) | 19.1 (17.3–20.8) | | 24.7 (22.9–26.6) | | 1.7 (1.4–2.0) | <0.001 | 0.75 (0.63–0.89) | <0.001 |
| **Current cigarette smoker** | | | | | | | | | |
| No | 36.1 (35.0–37.1) | 23.3 (22.4–24.2) | <0.001 | 32.8 (31.8–33.8) | <0.001 | 1 | | 1 | |
| Yes | 35.9 (30.7–41.1) | 14.1 (10.4–17.8) | | 15.2 (11.5–18.8) | | 0.55 (0.48–0.62) | <0.001 | 0.7 (0.58–0.84) | <0.001 |
| **Opium use** | | | | | | | | | |
| No | 36.2 (35.1–37.3) | 23.5 (22.6–24.4) | <0.001 | 33.2 (32.2–34.2) | <0.001 | 1 | | 1 | |
| Occasional | 35.0 (28.6–41.3) | 14.6 (12.0–17.3) | | 17.0 (14.2–19.7) | | 0.65 (0.57–0.73) | <0.001 | 0.78 (0.68–0.90) | 0.001 |
| Dependent | 35.0 (28.1–41.8) | 19.4 (12.0–26.7) | | 22.0 (15.7–28.3) | | 0.79 (0.64–0.97) | 0.025 | 1.2 (0.98–1.6) | 0.064 |
| **Depression** | | | | | | | | | |
| No | 36.3 (35.2–37.5) | 21.9 (21.0–22.9) | <0.001 | 30.5 (29.5–31.5) | 0.01 | 1 | | 1 | |
| Yes | 33.2 (30.5–35.9) | 24.3 (22.0–26.5) | | 34.2 (31.6–36.7) | | 0.87 (0.79–0.96) | 0.005 | 0.94 (0.85–1.0) | 0.246 |
| **Anxiety** | | | | | | | | | |
| No | 35.4 (34.1–36.8) | 21.2 (20.1–22.4) | <0.001 | 29.1 (27.9–30.3) | <0.001 | 1 | | 1 | |
| Yes | 36.3 (34.7–38.0) | 23.8 (22.4–25.1) | | 33.8 (32.4–35.3) | | 1.1 (1.0–1.2) | 0.004 | 1.0 (0.94–1.1) | 0.47 |
| **Diabetes** | | | | | | | | | |
| Normal | 35.1 (34.0–36.3) | 19.8 (18.9–20.8) | <0.001 | 27.3 (26.3–28.4) | <0.001 | 1 | | 1 | |
| Prediabetes | 38.9 (35.3–424) | 29.0 (25.8–32.3) | | 38.7 (35.5–41.9) | | 1.8 (1.6–2.0) | <0.001 | 1.7 (1.6–1.9) | <0.001 |
| Diabetes | 33.4 (25.7–41.1) | 38.7 (29.6–47.7) | | 51.5 (41.9–61.2) | | 1.8 (1.6–2.1) | <0.001 | 2.0 (1.8–2.3) | <0.001 |
| **Hypertension** | | | | | | | | | |
| Normal | 35.7 (34.6–36.7) | 20.0 (19.1–20.9) | <0.001 | 28.6 (27.6–29.6) | <0.001 | 1 | | 1 | |
| Hypertension | 35.4 (25.1–45.6) | 46.5 (35.0–58.1) | | 51.3 (39.8–62.8) | | 2.0 (1.7–2.2) | <0.001 | 1.8 (1.6–2.0) | <0.001 |
| **Physical activity** | | | | | | | | | |
| Low | 36.2 (34.6–37.7) | 22.5 (21.3–23.8) | | 31.5 (30.1–32.9) | | 1 | | 1 | |
| Moderate | 36.1 (34.4–37.9) | 23.5 (22.0–24.9) | <0.001 | 33.5 (31.9–35.1) | <0.001 | 1.1 (1.0–1.3) | 0.016 | 1.1 (0.95–1.2) | 0.174 |
| High | 32.9 (30.4–35.3) | 17.8 (15.7–19.8) | | 21.8 (19.7–24.0) | | 1.3 (1.1–1.4) | <0.001 | 1.2 (1.0–1.4) | 0.005 |

*Data from Kerman Coronary Artery Disease Risk Factors Study phase 2, n = 9997, 2014–2018. AOR = adjusted odds ratio; CI = confidence interval; COB = central obesity; OB = obesity; OW = overweight.*

weight. Cigarette smokers and opium users had a lower incidence rate of overweight and obesity. Also, there was a reverse relationship between the level of physical activity and incidence rates of overweight, obesity and central obesity; i.e., the people with high physical activity had lower incidence rate of overweight, obesity and central obesity.

**Figure 1** Body mass index (BMI) and waist circumference (WC) values (mean ± SD) of the participants in the study by sex (A, B) and age group (C, D). Total participants = 9997 in phase 2 and 5900 in phase 1. The data of phase 1 were used here for comparison and are extracted from our paper published previously (13).
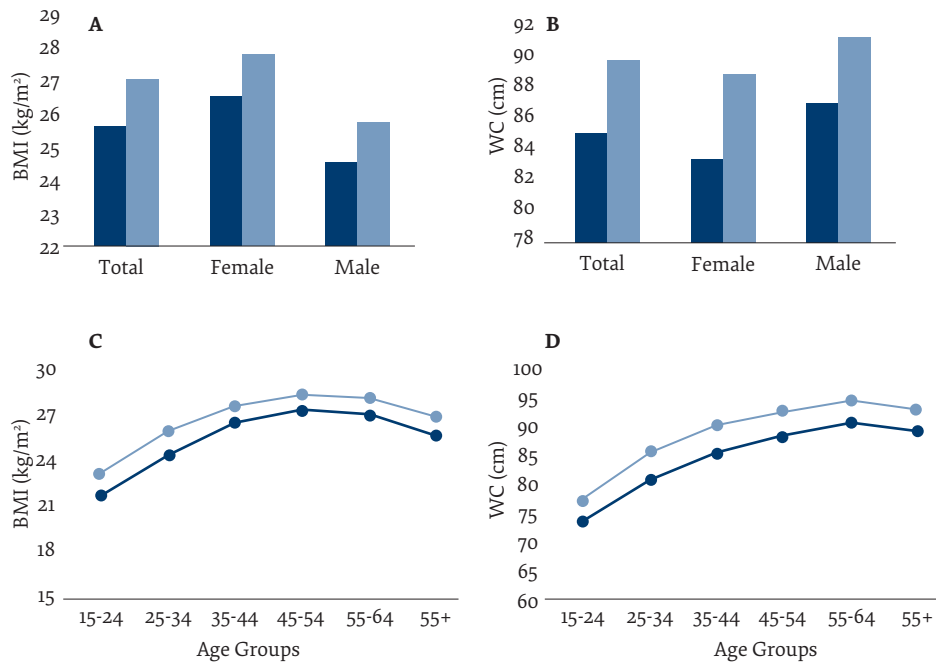


## Discussion

The findings of this study showed that currently one fourth to one third of the population in Southeastern Iran was overweight, obesity or central obesity, which were all significantly more prevalent in phase 2 compared to phase 1. These measures show a high current prevalence and a sharp rise in the prevalence of these unsafe metabolic variables during the 5-year period. In addition, all of the measures were higher in women than in men. People with low physical activity had a high incidence rate and those with high physical activity had a low incidence rate. Middle-aged people had the highest incidence of overweight, obesity and central obesity.

**Figure 2** Prevalence of overweight, obesity and central obesity in the participants by sex (A–C) and age (D–F) (total participants = 9997). The data of phase 1 (*n* = 5900) were used here for comparison and are extracted from our paper published previously (13).
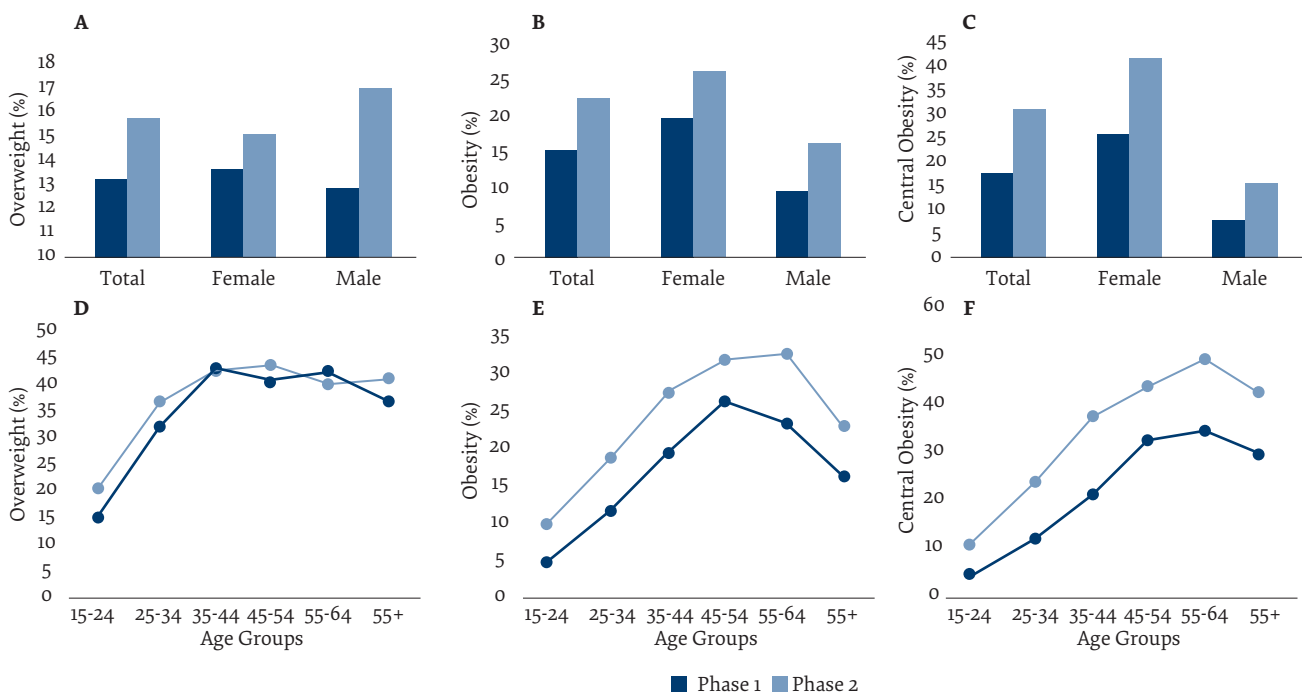
**Table 2 Prevalence of different comorbidities according to BMI and WC categories in adults in Kerman, Islamic Republic of Iran**

| Comorbidities | Normal weight % (95% CI) | Overweight % (95% CI) | Obesity % (95% CI) | Normal WC % (95% CI) | Inappropriate WC % (95% CI) |
|---|---|---|---|---|---|
| Diabetes mellitus | 9.1 (8.4–9.9) | 16.7 (15.7–17.7) | 21.5 (20.2–23.0) | 10.3 (9.8–10.9) | 24.1 (23.0–25.3) |
| Hypertension | 13.7 (12.8–14.5) | 24.9 (23.8–26.0) | 35.4 (33.8–36.9) | 16.7 (16.0–17.4) | 35.7 (34.4–37.1) |
| Hypercholesterolaemia | 13.8 (12.9–14.7) | 25.3 (24.2–26.4) | 31.0 (29.5–32.5) | 16.8 (16.1–17.5) | 33.2 (31.9–34.5) |
| Hypertriglyceridaemia | 24.4 (23.3–25.4) | 47.6 (46.3–48.9) | 51.8 (50.2–53.4) | 33.2 (32.3–34.1) | 52.7 (51.3–54.0) |
| Depression | 25.6 (24.5–26.7) | 22.8 (21.7–23.9) | 26.4 (25.0–27.8) | 23.9 (23.1–24.7) | 25.9 (24.7–27.2) |
| Anxiety | 54.8 (53.5–56.0) | 53.1 (51.9–54.4) | 55.4 (53.8–57.0) | 54.0 (53.1–55.0) | 59.4 (58.0–60.7) |

*Data from Kerman Coronary Artery Disease Risk Factors Study; n = 15,897), 2009–2011 (phase 1) and 2014–2018 (phase 2). Normal weight = BMI < 25 kg/m2; overweight = 25 ≤ BMI < 30 kg/m2; and obese = BMI ≥ 30 kg/m2. Inappropriate WC (central obesity) was defined as > 88 cm for women and > 102 cm for men. BMI = body mass index; CI = confidence interval; WC = waist circumference.*

In a recent systematic review, in subnational studies, the prevalence of overweight and obesity among adults ranged from 12.8% to 76.4% and from 2.4% to 35.4%, respectively, while in national studies, it was reported as 27.0–38.5% and 12.6–25.9%, respectively (12). There was a significant relationship between the 2 baseline variables of female gender and age and occurrence of overweight and obesity. The authors believe that the main reasons

**Table 3 Overall and subgroup incidence rate, person/100 person–years of OW, OB and COB in adults in Kerman, the Islamic Republic of Iran**

| Subgroup | No. with OW | Incidence rate of OW (95% CI) | No. with OB | Incidence rate of OB (95% CI) | No. with COB | Incidence rate of COB (95% CI) |
|---|---|---|---|---|---|---|
| Overall | 346 | 5.5 (4.9–6.1) | 271 | 4.7 (4.2–5.3) | 336 | 2.9 (2.6–3.2) |
| *Sex* | | | | | | |
| Male | 166 | 4.7 (4.0–5.5) | 97 | 3.6 (2.9–4.4) | 98 | 1.5 (1.2–1.9) |
| Female | 179 | 6.4 (5.5–7.4) | 173 | 5.7 (4.9 6.6) | 238 | 4.5 (3.9–5.1) |
| *Age group (yr)* | | | | | | |
| 15–24 | 49 | 4.2 (3.1–5.5) | 12 | 5.2 (2.7–8.9) | 17 | 1.1 (0.6–1.8) |
| 25–34 | 85 | 6.6 (5.3–8.2) | 51 | 7.0 (|5.2–9.1) | 53 | 2.6 (1.9–3.4) |
| 35–44 | 76 | 7.3 (5.8–9.1) | 59 | 4.8 (3.6–6.1) | 70 | 3.1 (2.4–3.9) |
| 45–54 | 60 | 6.0 (4.6–7.6) | 78 | 4.9 (3.9–6.1) | 95 | 3.8 (3.1–4.7) |
| 55–64 | 55 | 5.3 (4.0–6.8) | 54 | 4.2 (3.2–5.5) | 68 | 3.3 (2.6–4.2) |
| 65–75 | 21 | 2.5 (1.7–4.1) | 18 | 2.8 (1.6–4.2) | 33 | 2.5 (1.7–3.5) |
| *Cigarette smoker* | | | | | | |
| No | 311 | 5.7 (5.1–6.4) | 249 | 4.7 (4.1–5.3) | 316 | 3.1 (2.7–3.4) |
| Yes | 35 | 3.8 (2.7–5.3) | 21 | 4.8 (3.0–7.3) | 20 | 1.5 (0.9–2.3) |
| *Opium use* | | | | | | |
| No | 286 | 5.8 (5.1–6.5) | 240 | 4.9 (4.3–5.5) | 302 | 3.2 (2.8–3.5) |
| Occasional | 51 | 4.6 (3.4–6.0) | 26 | 3.7 (2.4–5.5) | 30 | 1.7 (1.1–2.4) |
| Dependent | 9 | 3.7 (1.7–7.0) | 4 | 3.6 (1.0–9.1) | 4 | 1.1 (0.3–2.8) |
| *Depression* | | | | | | |
| No | 223 | 5.5 (4.8–6.3) | 173 | 4.7 (4.0–5.5) | 195 | 2.5 (2.2–2.9) |
| Yes | 120 | 5.4 (4.5–6.4) | 93 | 4.6 (3.7–5.6) | 138 | 3.5 (3.0–4.2) |
| *Anxiety* | | | | | | |
| No | 85 | 4.8 (3.9–6.0) | 62 | 4.6 (3.5–5.8) | 68 | 2.2 (1.7–2.8) |
| Yes | 261 | 5.7 (5.1–6.4) | 200 | 4.6 (4.0–5.2) | 268 | 3.1 (2.8–3.5) |
| *Physical activity* | | | | | | |
| Low | 143 | 5.4 (4.6–6.4) | 115 | 4.8 (4.0–5.8) | 152 | 3.0 (2.6–3.6) |
| Moderate | 170 | 5.7 (4.8–6.5) | 136 | 4.7 (3.9–5.5) | 161 | 2.9 (2.5–3.4) |
| High | 33 | 4.9 (3.7–6.8) | 19 | 4.3 (2.6–6.7) | 23 | 2.1 (1.3–3.2) |

*Data from Kerman Coronary Artery Disease Risk Factors Study, phase 2, 2014–2018, n = 9997). CI = confidence interval; COB = central obesity; OB = obesity; OW = overweight.*

for the higher prevalence of obesity in these baseline subgroups included improper lifestyle such as low physical activity and tendency towards unhealthy dietary habits. The data obtained in phase 1 showed that low physical activity was significantly higher in women (15). The global prevalence of obesity is greater in women compared with men (18). Most of the studies in the Islamic Republic of Iran have shown higher prevalence of overweight and obesity among women (9,13,19,20), and low physical activity could be one of the main reasons for this difference between men and women (15,21). According to our study published in 2016, 16.9% of women and 9.3% of men were classified as obese and 7.5% of men and 21.5% of women were reported as overweight (13). A study by Saadatifar et al. (9) showed that the prevalence of obesity was 12.3% in men and 18.9% in women in Northeastern Iran. In a nationwide study by Janghorbani et al. (22), the age-adjusted prevalence of overweight and obesity was 42.8% and 11.1% in men and 57.0% and 25.2% in women, respectively. In this regard, advanced age, low physical activity, low education, marriage, and urban residence were strongly associated with obesity (22).

The prevalence of hypertension in participants with obesity was about 3 times that of normal-weight individuals. Also, the prevalence of diabetes in those with obesity/central obesity was more than double that of individuals with normal weight. Corresponding values for both diabetes and hypertension were about 1.5 times higher than those in phase 1 of the study (13). These findings show that obesity steeply increases the risk of other CAD risk factors, and this association has increased in the community during the 5-year interval between the 2 phases of the study.

Prevalence of overweight and obesity decreased with education level. This may be explained by the fact that those with a higher socioeconomic status have more appropriate lifestyle regarding daily activities and dietary behaviour, as well as a lower tendency towards smoking and alcohol consumption. Cutler and Lleras-Muney found that people with more years of schooling are less likely to smoke, consume excess alcohol, be overweight or obese, or use illegal drugs (23). In addition, the more-educated individuals are more likely to exercise. In the study by Veghari et al. in Isfahan, the risk of central obesity increased in illiterate people (24).

Cigarette smokers had a lower prevalence of overweight and obesity in our study. It has been shown that nicotine greatly increases energy expenditure, and it could reduce appetite, which could explain why smokers tend to have lower body weight (25). In terms of opium consumption, we found that the prevalence of obesity in dependent opium users was lower than it was in nonusers. Our previous study in diabetic patients also revealed lower BMI and prevalence of overweight and obesity in opium addicts compared to nonaddicted people (26).

People with higher physical activity had lower incidence of overweight, obesity and central obesity, and those with lower physical activity had higher incidence of overweight, obesity and central obesity. It has also been reported that low physical activity is associated with hypertension, high cholesterol and high triglyceride (27).

Overall, the rapid increase in the rate of overweight and obesity during the past 5 years, especially in women who are less physically active, predisposes the population to CAD, which is already a major health problem in the region. This risk profile may significantly increase the burden of CVD in the community in the near future if left unaddressed.

Our study had 2 limitations. First, we lost 52% of the participants from phase 1 and were not able to assess the effects of this on incidence rate. The time interval between phase 1 and 2 was 5 years and for incidence rate calculation (the denominator), for those who were lost to follow-up, we assumed they had been lost midway (16). Second, our study was conducted in Southern Iran, which may limit our ability to generalize our findings to the whole nation.

## Conclusion

Overall, overweight and obesity affected almost 60% of the participants, and were major public health problems, with a significantly higher prevalence and incidence rate in women, middle aged people, illiterate and less physically active individuals. Obesity increases the risk of other CAD risk factors (e.g., diabetes, hypertension and dyslipidaemia) and this association has increased during the last 5 years. Therefore, it is necessary to assess the efficacy of local and national intervention programmes in managing and controlling the epidemic of overweight/obesity and the consequent rise in CVD in Southeastern Iran.

# Point épidémiologique sur la prévalence et l'incidence du surpoids et de l'obésité chez les adultes dans le sud-est de la République islamique d'Iran : résultats de l'étude KERCADR (Kerman Coronary Artery Disease Risk Factors Study)

## Résumé

**Contexte :** L'obésité est un phénomène répandu dans le monde entier, notamment dans les pays à revenu faible et intermédiaire.

**Objectifs :** Mettre à jour les données sur la prévalence du surpoids, de l'obésité et de l'obésité centrale et mesurer les taux d'incidence de ces résultats chez les adultes vivant dans le sud-est de la République islamique d'Iran.

**Méthodes :** Nous avons recruté 9997 adultes (âgés de 15 à 80 ans) entre 2014 et 2018 (phase 2), dont 2820 avaient participé à la phase 1 (2009-2011). Les participants ont été examinés afin de détecter le surpoids, l'obésité, l'obésité centrale, un diabète, une hypertension, un manque d'activité physique et une dyslipidémie. Des modèles de régression logistique univariés et multivariés ont été utilisés pour déterminer les facteurs prédictifs potentiels du surpoids, de l'obésité et de l'obésité centrale, et ont permis d'obtenir des odds ratio ajustés (ORa). Le taux d'incidence du surpoids, de l'obésité et de l'obésité centrale a été rapporté parmi ceux qui n'ont présenté aucun de ces résultats lors de la phase 1.

**Résultats :** La prévalence était de 35,8 % (37 % chez les hommes, 35 % chez les femmes) pour le surpoids, de 22,3 % (16 % chez les hommes, 26,3 % chez les femmes) pour l'obésité et de 31,1 % (15,6 % chez les hommes, 41,2 % chez les femmes) pour l'obésité centrale. La prévalence du surpoids/de l'obésité était significativement associée à l'âge (ORa = 2,8 à 7,4), à un niveau d'éducation supérieur (ORa = 1,7), au sexe féminin (ORa = 1,4), à une faible activité physique (ORa = 1,3), au tabagisme (ORa = 0,55) et à la consommation d'opium (ORa = 0,79). La prévalence est passée de 33,3 % à 35,8 % pour le surpoids et de 15,4 % à 22,3 % pour l'obésité entre les phases 1 et 2. Le taux d'incidence pour 100 personnes-années était de 5,5 pour le surpoids, 4,7 pour l'obésité et 2,9 pour l'obésité centrale.

**Conclusion :** La prévalence du surpoids et de l'obésité a augmenté sur une période de cinq ans. Les participants d'âge moyen, les femmes et ceux qui avaient une faible activité physique présentaient un risque plus élevé de surpoids ou d'obésité.

## مستجدات الوضع الوبائي بشأن معدلات انتشار زيادة الوزن والسمنة والإصابة بها لدى البالغين في جنوب شرق إيران: نتائج مستقاة من دراسة أجريت بمدينة كرمان بشأن عوامل خطر مرض الشريان التاجي

حميد نجفيپور، مهدي باغري، شادان صابري، ميترا شادكام فاروقي، راحله أمير زاده، علي ميرزا زاده

### الخلاصة

**الخلفية:** تنتشر السمنة في جميع أنحاء العالم، لا سيَّما في البلدان المنخفضة والمتوسطة الدخل.

**الأهداف:** هدفت هذه الدراسة إلى تحديث بيانات معدلات انتشار زيادة الوزن، والسمنة، والسمنة المركزية، وقياس معدلات الإصابة في إطار هذه النتائج لدى البالغين الذين يعيشون في جنوب شرق إيران.

**طُرق البحث:** ضمَّت الدراسة 9997 بالغًا (في الفئة العمرية 15–80 عامًا) في الفترة بين عامَيْ 2014 و2018 (المرحلة الثانية)؛ وشارك منهم 2820 شخصًا في المرحلة الأولى (2009–2011). وخضع المشاركون للفحص للكشف عن زيادة الوزن، والسمنة، والسمنة المركزية، والسُّكري، وارتفاع ضغط الدم، وانخفاض النشاط البدني، وعسر شحميات الدم. واستُخدمت نماذج الانحدار اللوجستي الأحادي المتغيرات والمتعدد المتغيرات لتحديد العوامل المُنبئة المحتملة لزيادة الوزن، والسمنة، والسمنة المركزية، ونتج عن ذلك نسب الأرجحية المُصحَّحة. وأبلغ عن معدل الإصابة بزيادة الوزن، والسمنة، والسمنة المركزية بين أولئك الذين لم يحصلوا على أي من هذه النتائج في المرحلة الأولى.

**النتائج:** بلغ معدل انتشار زيادة الوزن 35.8٪ (37٪ لدى الرجال، و35٪ لدى النساء)، وبلغ معدل انتشار السمنة 22.3٪ (16٪ لدى الرجال، و26.3٪ لدى النساء)، وبلغ معدل انتشار السمنة المركزية 31.1٪ (15.6٪ لدى الرجال، و41.2٪ لدى النساء). وكان معدل انتشار زيادة الوزن أو السمنة مرتبطًا ارتباطًا قويًّا بالعمر (نسبة الأرجحية المُصحَّحة = 2.8–7.4)، وبالتعليم العالي (نسبة الأرجحية المُصحَّحة = 1.7)، وبنوع الجنس الأنثوي (نسبة الأرجحية المُصحَّحة = 1.4)، وبانخفاض النشاط البدني (نسبة الأرجحية المُصحَّحة = 1.3)، وبالتدخين (نسبة الأرجحية المُصحَّحة = 0.55)، وبتعاطي الأفيون (نسبة الأرجحية المُصحَّحة = 0.79). وارتفع معدل الانتشار من 33.3٪ إلى 35.8٪ بالنسبة لزيادة الوزن، ومن 15.4٪ إلى 22.3٪ بالنسبة للسمنة بين المرحلتَيْن الأولى والثانية. وكان معدل الإصابة لكل 100 شخص في السنة 5.5 لزيادة الوزن، و4.7 للسمنة، و2.9 للسمنة المركزية.

**الاستنتاجات:** ازداد معدل انتشار زيادة الوزن والسمنة على مدى 5 سنوات. وكان المشاركون في منتصف العمر والنساء والأشخاص من ذوي النشاط البدني المنخفض أكثر عُرضة لزيادة الوزن أو السمنة.

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# Impact of influenza vaccine in reduction of incidence and severity of influenza-like illness

Ruhi Khan,[1] Anwar Ahmed,[1] Rachid Zeitounie[1] and Rajiv Khandekar[1]

[1]King Khaled Eye Specialist Hospital, Riyadh, Saudi Arabia (Correspondence to: A. Ahmed: anwarahmed991@gmail.com).

## Abstract

**Background:** Vaccination is useful for protection against seasonal influenza but has a low uptake. Evidence of a protective effect of influenza vaccine among Arab populations would be a useful tool for advocacy.

**Aims:** To evaluate the impact of vaccine in reducing the incidence and severity of influenza-like illness among health staff of a tertiary care eye hospital in Saudi Arabia.

**Methods:** This retrospective cohort study was conducted in 2018–2019. Hospital staff were divided into vaccinated and unvaccinated groups. Influenza-like illness episodes and their severity were compared between the groups and influenza-like illness rate before and after vaccination was reviewed in the vaccinated group.

**Results:** The uptake of flu vaccine among 1180 health staff was 41%. There were 28 (9.3%) and 51 (17%) persons with influenza-like illness in the vaccinated ($n = 300$) and nonvaccinated ($n = 300$) groups, respectively. The nonvaccinated group had a significantly higher rate of influenza-like illness than the vaccinated group had. Vaccination, young age and absence of comorbidity were independent protectors against influenza-like illness.

**Conclusions:** Influenza vaccine confers significant protection and reduces the incidence and severity of influenza-like illness. However, this was a retrospective review of health data; therefore, the association of vaccine with outcomes should be considered as a weak form of evidence. The low uptake of influenza vaccine in hospital staff and their dependents is a matter of concern and should be addressed by greater awareness and education. This evidence can be used to improve overall vaccine coverage.

## Introduction

Influenza is a contagious viral illness that can cause severe morbidity and mortality. Each year up to 650 000 deaths due to influenza are reported by the World Health Organization (WHO) (*1*). There are yearly epidemics of influenza due to changes in circulating virus undergoing mutations, emergence of multiple variants and lack of specific immunity in susceptible hosts (*2*). Hence, timely vaccination is crucial to prevent severe complications and mortality in communities.

Influenza-related complications include otitis media, pneumonia, exacerbation of chronic respiratory disease, neurological complications, and myocarditis (*3*). Adults with chronic illnesses are more vulnerable to influenza-related complications (*3*). Many viruses can cause respiratory illnesses similar to influenza, called influenza-like illness (ILI). The symptoms of ILI include fever, cough, sore throat and myalgia. Therefore, differentiating influenza from ILI without a laboratory-confirmed test is challenging (*4*). According to WHO, ILI is the most predictive factor for influenza infection and seasonal variation of influenza activity.

Vaccination against influenza virus is used to decrease the severity and complications of respiratory illness and mitigate the risk of hospitalization (*5,6*). Unfortunately, changes in the circulating influenza virus strains every year require new vaccines to provide virus-specific immunity (*7*). Influenza vaccination of health workers is a cost-effective approach that provides protection to frontline medical staff involved in the care and management of patients (*8*). In spite of educational programmes and public health initiatives in many countries, the vaccination rate continues to be less than desired (33.2%) (*9,10*).

The annual Hajj pilgrimage in Saudi Arabia presents a unique challenge for controlling the spread of influenza. During the Hajj, pilgrims from many countries gather in a single region, posing a major risk for virus transmission and an influenza outbreak (*11*). While large mass gathering of many nationalities may be linked to influenza in the community, this study was undertaken after the completion of the 2018 Hajj season and did not overlap with the annual event. The Ministry of Health in Saudi Arabia therefore provides free vaccination to Saudi citizens and residents to protect against influenza virus circulating in the community, as well possible spread of disease emanating from influx of pilgrims. The uptake of these vaccinations is low in Saudi Arabia due to a

negative attitude to immunization and possible lack of understanding of its benefits in the community (*12*).

In Saudi Arabia, the epidemiology of influenza during the 2018–2019 season included both influenza A and B viruses (*13*). While influenza A (H1N1) pdm09 strain was predominant, other influenza A viruses (not subtyped) were also circulating earlier in the season. In contrast to the first half of 2018 when many cases of influenza B were noted, the number of infections due to influenza B declined later in the year, with the virus lineage undetermined. This coincided with an increase in the incidence of influenza A during the influenza season. In 2019, the type of influenza viruses circulating in Saudi Arabia was similar to 2018, with influenza A (H1N1) pdm09 being predominant compared to influenza B in earlier months. Other influenza A strains (not subtyped) were also circulating in the same period in 2019. This pattern was noted to be similar later in the season with increasing numbers of cases during October to December 2019. The vaccine provided by the Saudi Ministry of Health for the same season was a trivalent inactivated influenza virus vaccine with the following strains: Influenza A/Michigan/45/2015(H1N1) pdm-09 virus, Influenza A/Singapore/INFIMH-16-0019/2016(H3N2)-like virus, and Influenza B/Colorado/06/2017-like virus (B/Victoria/2/87 lineage). Unfortunately, there are no national data in Saudi Arabia available to evaluate the extent of vaccine match with circulating viruses in the community.

The King Khaled Eye Specialist Hospital (KKESH) is a specialized tertiary eye hospital in Riyadh, Saudi Arabia. Hospital staff and their dependents are offered free vaccines before the influenza season. Influenza vaccination records are maintained electronically for each staff member and their dependents.To the best of our knowledge, there are no currently available studies evaluating the impact of influenza vaccination on the burden and severity of influenza in a healthcare setting in Saudi Arabia. Since influenza infection in hospital staff can have profound consequences for patients, we present the profile of ILI and its determinants among hospital staff and their dependents who were vaccinated against influenza compared to those who were not vaccinated during the 2018–2019 season.

## Methods

The study was performed in compliance with the local heath authority ethical regulations and requirements and was approved by the Institutional Review Board of KKESH (R- 19109023).

The study population comprised all staff at KKESH and their dependents enrolled with the Employee Health Department during the influenza season from October 2018 to March 2019. Only those who were or were not vaccinated in 2018 were included in the study. The study population was divided into vaccinated and unvaccinated groups and subjects were randomly selected for each group.

For the calculation of sample size, we estimated the number of health staff with ILI that would need active intervention. In the vaccinated group, it was assumed to be 20% of the total vaccinated and in the unvaccinated group, it was 41% of the total unvaccinated (*14*). To achieve 95% confidence interval (CI), 80% power of a historical cohort study with a 1:1 ratio of vaccinated and unvaccinated individuals, we required a random selection of at least 268 vaccinated and 268 unvaccinated individuals. For logistic ease, we included 300 individuals in each group.

ILI was defined as fever ≥ 38°C and cough, with onset within the last 10 days (*15*). In addition to the aforementioned signs and symptoms, we also included cases with myalgia, dyspnea or pharyngitis, in the absence of another diagnosis (*16*). The severity of ILI was based on: (1) presence of tachycardia, abnormal oxygen saturation, and laboured breathing and adventitious breath sounds; (2) recommendation for further care at another referral hospital with specialized facilities; (3) provision of respiratory assistance therapy within KKESH and; (4) sick leave endorsed by a consultant physician for rest, time off work and to avoid the spread of ILI.

The retrospective chart (electronic medical record) review was performed to gather data on clinical and demographic variables including, age, gender, medical comorbidity (e.g., cardiac, pulmonary, neuromuscular, vascular or endocrine disease, or cancer), documented history of ILI during the current influenza season, severity of ILI, number of follow-up visits related to ILI, and sick leave.

The data were documented on a pretested data collection form and then transferred to an Access spreadsheet (Microsoft Corp., Redmond, WA, USA). Univariate analysis was performed using SPSS version 25 (IBM Corp., Armonk, NY, USA). Frequencies and percentage proportions were reported for qualitative data. Mean and standard deviations were reported for quantitative data. If the data were not normally distributed, the median and interquartile range were estimated. To compare the outcomes of vaccinated and unvaccinated groups, we calculated the difference of the means, the 95% CIs and the two-sided *P* values. For outcomes of qualitative variables, the relative risk, 95% CI and two-sided *P* value were reported. If > 2 subgroups were compared, $\chi^2$ value was estimated, along with degrees of freedom and *P* value. Binominal regression analysis was performed to study the effect of age, gender and comorbidity on the association of vaccination to rate of ILI. The adjusted odds ratio (OR) was estimated, 95% CI and two-sided *P* value using OpenEpi stat calculator (*17*). $P < 0.05$ was considered statistically significant.

## Results

Among the study population of 1180 individuals in the Employee Health Department, KKESH, 489 (41%) were vaccinated in 2018–2019. We randomly selected 300 people each from the vaccinated and unvaccinated groups.

Their demographic characteristics and systemic comorbidities are compared in Table 1. There were significantly more women in the vaccinated group compared to unvaccinated group.

There were 28 (9.3%, 95% CI 6.0–12.6%) people with ILI among the vaccinated group compared with 51 (17%, 95% CI 12.7–21.3%) in the unvaccinated group (Table 2). The vaccinated group had a significantly lower rate of ILI than the vaccinated group had (relative risk 0.7, 95% CI 0.5–0.9, $P = 0.006$). The rate of ILI according to different determinants is shown in Table 2. The incidence of ILI was significantly lower in the vaccinated group ($P = 0.005$) and in people of young age ($P < 0.001$).

In the vaccinated group, 9 (3%) people had symptoms only before vaccination, 15 (5%) had symptoms only after vaccination, and 4 (1.3%) had symptoms before as well as after vaccination. In the vaccinated group, 6 (2%) people were given nebulization treatment. In the unvaccinated group, 12 (4%) people underwent nebulization treatment in hospital and 2 at home. None of the cases (vaccinated and unvaccinated) had abnormal oxygen saturation. In the vaccinated group, the number of follow-up visits after initial presentation was 10 (3.3%) compared with 21 (7%) in the unvaccinated group. In the vaccinated group, 21 (7%) were given sick leave compared with 44 (14.7%) in the unvaccinated group.

We compared the impact of influenza vaccine in our study to that reported in literature (Table 3). Influenza vaccine reduces the risk of ILI, hospitalization and mortality related to influenza illness.

## Discussion

In our study, the vaccine uptake was 48% among health staff of a tertiary care eye hospital in Saudi Arabia. We noted that influenza vaccination provided good protection against ILI in all age groups, and reduced the number of episodes and severity of ILI. The number of follow-up visits and absenteeism decreased considerably among vaccinated compared to unvaccinated individuals. Vaccination status, age and systemic comorbidity were independent risk factors for ILI. The ILI episodes before vaccination suggested that scheduling the vaccination in the earlier part of an epidemic season in our institute would be justified in future programmes.

The low uptake of vaccination among our study population is not a novel finding and has been shown in other reports. It was < 20% in an underprivileged community in the United States of America (18). Uptake of influenza vaccination ranging from 6% to 45% has been reported among the global adult population at low risk (19). This low uptake is of concern, and aggressive efforts are required to identify the responsible factors to improve vaccination rates. The clinical outcomes used to determine the impact of vaccination in protecting humans against ILI is a unique feature of this study. These clinical parameters can be applied to most developing countries with limited laboratories resources for confirming the diagnosis of influenza. The low uptake of vaccine among health staff has also been reported in other Arab populations (20). The impact of vaccination in reducing infectious diseases and their severity is not new and our study confirmed this universal observation. There are many published reports that favour vaccination to protect populations against severe complications of influenza and other infectious diseases (21).

The benefits of influenza vaccine in reducing mortality, morbidity, hospitalization and disease burden and costs for countries are undisputed, and it has been shown to be beneficial for elderly people and children (22–24). In a study from Taiwan, mortality in people aged > 65 years was lower in the group who received influenza vaccine. This was after adjusting for confounding factors (22). In another study, the efficacy of influenza vaccine in children was reviewed based on a meta-analysis of effectiveness of influenza vaccine in reducing the incidence of ILI or laboratory-confirmed influenza. It was found that live influenza vaccines had higher efficacy in children (24). A German

**Table 1 Profile of participants in influenza-like illness study**

| | Vaccinated group (n = 300) | | Nonvaccinated group (n = 300) | | Validation |
|---|---|---|---|---|---|
| **Age, yr** | | | | | |
| Mean | 38.2 | | 31.9 | | Difference in mean 6.2 |
| SD | 12.8 | | 9.0 | | 95% CI: 4.5–8.0, $P < 0.001$ |
| | **Number** | **Percentage** | **Number** | **Percentage** | |
| **Gender** | | | | | |
| Male | 95 | 31.7 | 140 | 46.7 | OR = 1.9, 95% CI: 1.35–2.6 |
| Female | 205 | 68.3 | 160 | 53.3 | $P < 0.001$ |
| **Systemic comorbidity** | | | | | |
| None | 236 | 78.7 | 274 | 91.3 | $\chi^2 = 25$ |
| Cardiac | 0 | 0.0 | 3 | 1.0 | df = 8 |
| Pulmonary | 23 | 7.7 | 13 | 4.3 | $P < 0.001$ |
| Neuromuscular | 3 | 1.0 | 2 | 0.7 | |
| Vascular | 2 | 0.7 | 1 | 0.3 | |
| Endocrine | 31 | 10.3 | 7 | 2.3 | |
| Combination | 5 | 1.7 | 0 | 0.0 | |

*CI = confidence interval; df = degrees of freedom; OR = odds ratio; SD = standard deviation.*

**Table 2 ILI and its determinants among health staff of an eye hospital in Saudi Arabia**

| | ILI present (*n* = 79) | | ILI not present (*n* = 521) | | Validation |
|---|---|---|---|---|---|
| **Age, yr** | | | | | Difference in mean = 5.4 |
| Mean | 30.4 | | 35.8 | | (95% CI: 2.7–8.0) *P* < 0.001 |
| SD | 10.7 | | 11.4 | | |
| | **Number** | **Percentage** | **Number** | **Percentage** | |
| **Vaccination status** | | | | | |
| Yes | 28 | 35.4 | 272 | 52.2 | RR = 0.7 (95% CI: 0.5–0.9) *P* = 0.005 |
| No | 51 | 64.6 | 249 | 47.8 | |
| **Gender** | | | | | |
| Male | 34 | 43.0 | 201 | 38.6 | RR = 1.1 (95% CI: 0.8–1.5) *P* = 0.5 |
| Female | 45 | 57.0 | 320 | 61.4 | |
| **Comorbidity** | | | | | |
| Present | 63 | 79.7 | 446 | 85.6 | RR = 0.96 (95% CI: 0.86–1.1) *P* = 0.6 |
| Absent | 16 | 20.3 | 95 | 18.2 | |
| **Type of principal comorbidity** | | | | | |
| None | 63 | 79.7 | 446 | 85.6 | $\chi^2$ = 0.02 |
| Cardiac | 1 | 1.3 | 3 | 0.6 | df = 5 |
| Pulmonary | 11 | 13.9 | 28 | 5.4 | *P* = 0.9 |
| Neuromuscular | 0 | 0.0 | 6 | 1.2 | |
| Vascular | 1 | 1.3 | 2 | 0.4 | |
| Endocrine | 3 | 3.8 | 35 | 6.7 | |

*CI = confidence interval; df = degrees of freedom; ILI = influenza-like illness; OR = odds ratio; RR = relative risk; SD = standard deviation.*

study reported that prior influenza vaccination was associated with less severe clinical course and improved overall long-term survival in patients with community acquired pneumonia during influenza seasons. (*25*). A surveillance data review confirmed the health benefits of vaccination in preventing influenza, related clinical visits and hospitalization (*26*). In European countries, gaps between vaccination coverage and recommendations resulted in higher influenza-related morbidity (*27*). Our findings are comparable with these studies; although the

target population and methods used varied, the findings similarly suggest a gap between vaccination rates and public health recommendations.

In the current study, the health staff in the vaccinated group were older than in the unvaccinated group. Knowledge of the higher risk of complications of influenza in old age with greater systemic comorbidity among health staff could also occur in older individuals. The presence of comorbidity in a higher proportion of participants among the vaccinated group compared to

**Table 3 Comparison of impact of influenza vaccine reported in different studies**

| Study no. | Authors | Location | Sample | Main findings | Refs |
|---|---|---|---|---|---|
| 1 | Wang et al. | Taiwan | 35 637 (age > 65 yr) | Influenza vaccination reduces risk of major cause-specific mortality in elderly population. | 22 |
| 2 | Groenwold et al. | Netherland | 50 906 periods of observation | Influenza vaccination reduced mortality risk in 65 years and older in epidemic period compared to summer in Netherlands | 23 |
| 3 | Rhorer et al. | USA | 27 000 children | live attenuated influenza vaccine resulted in 46% fewer cases of influenza illness in children | 24 |
| 4 | Tessmer | Germany | 2368 patients | Prior influenza vaccination was associated with less severe clinical course and improved survival in patients with community-acquired pneumonia in influenza seasons. | 25 |
| 5 | Kostova et al. | USA | Influenza illnesses in 6 yr | Influenza vaccination programs in the US averted cases, clinic visits and hospitalizations. | 26 |
| 6 | Ryan et al. | 25 EU countries | Population at risk of 25 EU countries | Low influenza vaccination coverage in 25 European countries increased morbidity, hospitalizations and mortality associated with influenza-related complications. | 27 |
| 7 | Bresee et al. | USA | Data of FluSurv-NET | Influenza vaccination prevented 6.6 million influenza illnesses and 3.2 million medically attended illnesses in 2012–2013 influenza season | 32 |
| 8 | Reed et al. | USA | Laboratory-confirmed ILI FluSurv-NET | Influenza vaccination prevented approximately 7.2 million illnesses, 3.1 million medically attended illnesses, and 90 000 hospitalizations associated with influenza in 2013–2014 | 33 |
| 9 | Present study | Saudi Arabia | 600 Saudi patients attending clinic | Influenza vaccinated group had reduced the number of episodes and the severity of ILI. | – |

unvaccinated group confirms this unique difference in comorbidities between groups. Thus, the higher protection noted among the influenza-vaccinated people with high risk of comorbidity could be an important finding to promote vaccination in the elderly population and people with other health conditions.

There was no significant gender difference in the rate of ILI despite a greater number of women in the vaccination group than in the unvaccinated group. A higher uptake for vaccination among women has also been observed by Simpson et al. (28). The underlying causes of this differential uptake should be investigated in order to devise gender-specific health promotional initiatives for greater outcomes. The similar rates of ILI between genders noted in our study is in contrast to Wang et al. (29), who reported a higher incidence among men.

The influenza vaccine in Saudi Arabia is supplied by the Ministry of Health and is available in 0.5-ml preloaded syringes (InfluVac*S; Abbot). For the 2018–2019 influenza season, it was supplied on 1 September 2018. Prior to this date, the vaccine for the southern hemisphere was provided to institutions in view of the influx of people and increased risk of virus transmission during the Hajj. The unit cost of influenza vaccine in Saudi Arabia is approximately US $10.00 but is provided free at Ministry of Health institutions (including ours). In our institution, all staff and their dependents are encouraged to get vaccinated at the Employee Health Department.

There were some limitations to our study. This was a retrospective review of health data; therefore, the association of outcomes to the independent variables should be confirmed with prospective studies. Laboratory confirmation of clinically suspected ILI was not available due to lack of expertise and resources. The secondary indicators we used to determine the severity of ILI, such as respiratory support, leave certification and referral to other hospitals for further management, were influenced by a number of other factors. Hence these variables should be interpreted with caution before comparing our study to previous studies.

Some recent studies have investigated the attitudes and uptake of seasonal influenza vaccination in primary healthcare workers in Saudi arabia based on a questionnaire (12,30,31). These studies concluded that vaccine coverage was suboptimal with knowledge gaps, misconceptions and hesitancy as major reasons. While these highlight a lack of understanding and the need for education as well as creating more awareness in healthcare providers, they were focused on primary healthcare settings. In contrast, our study population was unique as it was at higher risk of exposure to influenza infection because most were either working at a health facility or had a family member at risk of exposure to infection. We followed up this group of participants and evaluated whether there was a positive impact of influenza vaccination. Furthermore, we evaluated whether influenza vaccine curtailed episodes of ILI and its severity. These findings could be useful to promote periodic vaccination in the general population. The outcomes of this study support the strategy of the Saudi Ministry of Health for providing annual vaccinations in the preseason period. Our observations and conclusions are consistent with other reports that have suggested a need to increase research funding into influenza vaccines and undertake wider educational programmes in the Middle Eastern region (33).

In a number of developing countries in Asia, Latin America and Africa, laboratory molecular tests for diagnosis of ILI are limited for several reasons. A healthcare provider may largely be dependent on symptomatology in ILI cases for diagnosis of influenza. In the present study, we demonstrated the benefit of influenza vaccine in reducing the occurrence and severity of clinically diagnosed ILI. A clinical diagnosis of influenza may not be considered as best practice compared to laboratory-confirmed diagnosis. However, it could be useful as evidence to promote influenza immunization programmes, and increase their coverage and vaccine uptake in areas with limited resources.

## Impact du vaccin antigrippal sur la réduction de l'incidence et de la gravité du syndrome de type grippal

### Résumé

**Contexte :** La vaccination est utile pour se protéger contre la grippe saisonnière, mais son taux d'utilisation est faible. Démontrer l'effet protecteur du vaccin contre la grippe dans les populations arabes permettrait de mener des actions de sensibilisation.

**Objectifs :** Évaluer l'impact du vaccin sur la réduction de l'incidence et de la gravité du syndrome de type grippal (STG) parmi le personnel de santé d'un hôpital ophtalmologique de soins tertiaires en Arabie saoudite.

**Méthodes :** La présente étude de cohorte rétrospective a été menée en 2018-2019. Le personnel hospitalier a été divisé en groupes vaccinés et non vaccinés. Les épisodes de syndromes de type grippal et leur gravité ont été comparés entre les groupes et le taux de STG avant et après la vaccination a été examiné dans le groupe vacciné.

**Résultats :** Le taux d'utilisation du vaccin contre la grippe parmi les 1180 membres du personnel de santé était de 41 %. Les groupes vaccinés (n = 300) et non vaccinés (n = 300) comptaient respectivement 28 (9,3 %) et 51 (17 %) personnes atteintes de STG. Le groupe non vacciné présentait un taux de STG significativement plus

élevé que celui du groupe vacciné. La vaccination, le jeune âge et l'absence de comorbidité constituaient des facteurs protecteurs indépendants contre le STG.

**Conclusions :** Le vaccin antigrippal confère une protection importante et réduit l'incidence et la gravité des STG. Cependant, il s'agit d'une étude rétrospective sur des données sanitaires ; par conséquent, l'association du vaccin aux résultats devrait être considérée comme une preuve peu solide. La faible utilisation du vaccin contre la grippe par le personnel hospitalier et les personnes à leur charge est préoccupante et devrait être traitée par une sensibilisation et une éducation accrues. Ces données peuvent être utilisées pour améliorer la couverture vaccinale globale.

## تأثير لقاح الأنفلونزا في خفض معدل الإصابة بالاعتلالات الشبيهة بالأنفلونزا ووخامة تلك الاعتلالات

روحي خان، أنوار أحمد، راشد زيتوني، راجيف خاندكار

### الخلاصة

**الخلفية:** التطعيم مفيد للحماية من الأنفلونزا الموسمية، لكن الإقبال عليه ضعيف. أيضًا، سيكون تقديم بيِّنات على التأثير الوقائي للقاح الأنفلونزا بين سكان البلدان العربية أداةً مفيدةً للدعوة إلى التطعيم.

**الأهداف:** هدفت هذه الدراسة إلى تقييم تأثير اللقاح في خفض معدل الإصابة بالاعتلالات الشبيهة بالأنفلونزا، ووخامة تلك الاعتلالات في صفوف العاملين الصحيين في أحد مستشفيات الرعاية التخصصية للعيون في المملكة العربية السعودية.

**طُرق البحث:** أُجريت هذه الدراسة الأترابية الاسترجاعية في الفترة بين عامَيْ 2018 و2019. وقُسِّم العاملون في المستشفى إلى مجموعتيْن، تلقَّت إحداهما التطعيم ولم تتلقَّه الأخرى. وقورنت نوبات الاعتلالات الشبيهة بالأنفلونزا ووخامتها بين المجموعتيْن، واستُعرض معدل الإصابة بتلك الاعتلالات قبل التطعيم وبعده في المجموعة التي تلقَّت التطعيم.

**النتائج:** بلغ معدل استخدام لقاحات الأنفلونزا بين 1180 من العاملين الصحيين 41٪. وكان هناك 28 شخصًا (9.3٪) و51 شخصًا (17٪) مصابين بالاعتلالات الشبيهة بالأنفلونزا في المجموعة التي تلقَّت التطعيم (العدد = 300) والمجموعة التي لم تتلقَّه (العدد = 300) على التوالي. وكان معدل الإصابة بالاعتلالات الشبيهة بالأنفلونزا أعلى كثيرًا لدى المجموعة التي لم تتلقَّ التطعيم منه لدى المجموعة التي تلقَّته. وكان التطعيم، وصِغر السن، وعدم وجود حالات مراضة مصاحبة، عواملَ حماية مستقلة من الاعتلالات الشبيهة بالأنفلونزا.

**الاستنتاجات:** يمنح لقاح الأنفلونزا حماية كبيرة، ويحد من الإصابة بالاعتلالات الشبيهة بالأنفلونزا ووخامتها. غير أن هذا كان استعراضًا استرجاعيًا للبيانات الصحية؛ ولذا، ينبغي اعتبار الارتباط بين اللقاح والنتائج شكلًا ضعيفًا من أشكال البيِّنات. ويُعد انخفاض الإقبال على لقاح الأنفلونزا في صفوف العاملين بالمستشفيات ومُعاليهم مسألة تبعث على القلق، وينبغي معالجتها بزيادة الوعي والتثقيف. ويمكن استخدام هذه البيِّنات لتحسين التغطية الشاملة باللقاحات.

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# Implementation of e-health innovative technologies in North Lebanon hospitals

Jalal Halwani[1] and Doris Mouawad[1]

[1]Lebanese University, Faculty of Public Health, Dam & Farz, Tripoli, Lebanon (Correspondence to: J. Halwani: jhalwani@ul.edu.lb)

## Abstract

**Background:** E-health is considered the single most important revolution in health care since the advent of modern medicine. It is an emerging field of medical informatics, used in the organization and delivery of health services and information. It is expected to improve various aspects of health care.

**Aims:** To achieve universal health coverage in Lebanon, and to explore e-health implementation in Northern Lebanese hospitals and factors influencing the adoption of recent specialized technology in e-health.

**Methods:** We adopted an exploratory research method based on a semi-structured questionnaire. The main 14 hospitals in Northern Lebanon were chosen for face-to-face interviews to assess and measure behaviour and knowledge regarding e-health and its implementation. Data were analysed using SPSS software, followed by SWOT analysis.

**Results:** The hospitals surveyed had partly implemented and continuously tried to apply some e-health technologies, but there were no real medical records for patients. Various challenges were faced for full e-health technology implementation in Lebanon: primarily cost, followed by some personnel resistance, lack of legislation and common standards, and the necessity for continual training.

**Conclusion:** The majority of hospitals are conscious of the importance of e-health technology and the urgent need to implement these new methods. After the legislative rules are issued, the financial aspects remain the major handicap to full implementation. A major role must be played by the academic institutions to provide appropriate education on e-health in their programmes for future graduates.

## Introduction

After the United Nations General Assembly's meeting in September 2015, in which it adopted the 2030 Agenda for Sustainable Development, member states renewed their commitment to promote the health and well-being of their populations with health care of good quality and affordable prices, and governments began working on attaining universal health coverage. However, they were faced with various issues regarding the choice of heath technology because it should satisfy the ethical, economical and organizational facets, and requires changes in health systems and the way they work. Additionally, the World Health Organization (WHO) has been working since 2015 on assisting countries to implement health technology assessment (HTA), which covers efficacy, cost, safety and legal aspects (1).

Lebanon, with the help of WHO, drafted its first HTA strategy in 2014 and is working on implementing both HTA and e-health within healthcare centres (2). Consequently, Hôtel-Dieu de France (HDF), a private hospital located in Beirut, became in October 2018 the first e-hospital in Lebanon with an integrated hospital information system (HIS). This system's major advantage combines 3 of the hospital's main components: the patient's complete medical files, financial operations files, and human resources management files. This helped HDF to optimize its internal processes and patient safety by: (1) applying and conforming to local and international accreditation and standards; (2) tracking patient progress from day 1 until discharge; (3) customizing care based on patient needs; and (4) automating and linking all ancillary departments to the centralized comprehensive HIS.

Lebanon is one of the most dynamic healthcare markets and has one of the best quality healthcare sectors in the Arab Region. It enjoys a growing health tourism and cosmetic surgery sector. Although the government does not accord the medical field a high proportion of GDP in comparison with other Arab countries, Lebanon continues to provide high-quality medical care at affordable prices (3). Medical procedures in Lebanon cost less than they do in Europe or the United States of America (4).

The adoption of e-health in Lebanon is still in its early phases; therefore, the rates of usage remain low, and the shift to e-health is necessary even if the country is not fully ready for it (5). This requires examination of the major factors interfering with implementation of e-health while stating its economic and social benefits.

e-Health can also affect health outcomes as well as indicators; therefore, its implementation is crucial.

On the social level, HTA is required in countries that are undergoing economic transition such as Lebanon, due to the fact that e-health provides quality care to all patients. According to the Lebanese Ministry of Public Health (6), implementing this technology can have a major impact on poor people who will be able to receive healthcare services, especially as e-health allows contact between patients and doctors through text and voice messages, which reduces the costs. According to Lewis et al., 47% of the programme is donated by funders, and 34% of patients tend to use applications that allow voice messaging and 31% use text messaging (7). The regular healthcare procedures have created a clash between rich and poor people within the same society. Private hospitals have the best medical services at the expense of high costs, while public hospitals have lower costs but unfortunately do not provide the best treatments. However, information and communication technology plays a major role in finding solutions for health equity problems. Thus, substituting healthcare procedures with e-health processes will allow more citizens to receive appropriate services. E-health allows better communication between medical staff and patients, and offers homeless and poor people quality care at affordable prices.

Artificial intelligence is mostly used in e-health; therefore, a large number of people can contact doctors, schedule appointments and run tests at the push of a button. Additionally, in developing countries, e-health offers children and uneducated women access to vaccines and medicine at low prices.

The implementation of technology in hospitals has allowed hospital systems to record all patients' information on digital systems. These electronic health records (EHRs) are automatically updated after every patient's visit and after receiving test results. Patients can

contact doctors living in a different continent and have consultations without moving from their homes (8). The EHR system is computerized and allows medical staff to enter patients' data in a digital manner to be accessed by the patients themselves or their doctors. HISs also keep records of patients' data, including data gathered by nurses before and after surgery and during recovery, and even allow billing and appointment scheduling (9).

Many countries, such as Lebanon, have paper-based medical records (10). Following e-health implementation, data recording uses computer systems that can be accessed by doctors at any time. Furthermore, it is possible to share the information with other doctors or healthcare centres upon request from the patient (11). E-health technology brings patients closer to healthcare centres, as they can contact laboratories through the laboratory information system, which transfers information directly to the patient's phone (12). This shift from paper-based to digital recording is beneficial for the environment too as it reduces paper consumption (13).

One of the benefits of e-health is that it allows hospital systems to record all patient information in EHRs. The difference between HISs and EHRs is important; the former refers to systems designed to manage healthcare data. This includes systems that collect, store, manage and transmit EHRs, a hospital's operational management, or systems supporting healthcare policy decisions. HISs also include those systems that handle data related to the activities of providers and health organizations. The shift from paper-based medical records to EHRs cannot be considered purely beneficial. For example, computer downtime, planned or unplanned, can put the entire electronic medical data and patient safety at risk (14).

## Methods

In Lebanon, there are 147 hospitals contracted to the Ministry of Public Health (117 private and 30 public); 29 of them (21 private and 8 public) are in North Lebanon (20%) (15). We selected 14 main hospitals and conducted face to face interviews with relevant staff (general managers, medical directors and information and communication technology managers) in March 2020. The study sample represented ~50% of the total healthcare institutions in North Lebanon.

The interviews lasted for 30 minutes and tackled issues such as the impact of e-health on the community in general and on the relationship between patients and doctors, the risks and benefits of e-health, as well as future strategic plans to be implemented by the hospitals. We also distributed a semi-structured questionnaire to the representatives of the hospitals. Since the concept of e-health is new in Lebanon, and especially in North Lebanon, we assessed behaviour and knowledge regarding e-health and its implementation in healthcare facilities with the following main questions. (1) Can the implementation of e-health technologies affect the quality of a medical organization as well as its workflow? (2) Can the implementation of e-health

**Table 1 Names and localization of hospitals**

| Number | Hospital | City | Caza |
|---|---|---|---|
| 1 | Tripoli Governmental | Tripoli | Tripoli |
| 2 | Mazloum | Tripoli | Tripoli |
| 3 | Nini | Tripoli | Tripoli |
| 4 | Al-Chifaa | Tripoli | Tripoli |
| 5 | Monla | Tripoli | Tripoli |
| 6 | Islamic | Tripoli | Tripoli |
| 7 | Haykal | Ras Maska | Koura |
| 8 | Koura | Aba | Koura |
| 9 | Centre Hospitalier du Nord | Zgharta | Zgharta |
| 10 | Saydet | Zgharta | Zgharta |
| 11 | Family Medical Center | Zgharta | Zgharta |
| 12 | Notre Dame Maritime | Jbail | Jbail |
| 13 | Notre Dame de Secours | Jbail | Jbail |
| 14 | El Youssef | Halba | Akkar |

influence the behaviour and attitudes of employees towards learning more about innovative technologies in the medical field? (3) Are positive results seen through the introduction of innovative technologies such as e-health and personal health records in medical organizations? (4) Can education, learning and training affect the implementation process in North Lebanon?

A SWOT analysis (strengths, weaknesses, opportunities, threats) on e-health implementation in North Lebanese hospitals was done to identify the impact of this new technology on health care and its acceptance by involved professionals.

All interview forms were verified and entered into an online database designed using XLS forms uploaded to ONA web forms for research surveys. All data were processed using SPSS version 22, and frequency tabulation of the total sample was provided. Excel charts based on the processed data were also generated.

The research methods and procedures used in this study conformed to ethical research standards and were approved by the Faculty Director. The research team adopted strict quality measures to ensure the reliability of their findings. In addition, this study respected the confidentiality of the data and protected the anonymity of the participants.

# Results

## Implementation of e-health

E-health has been partially applied in 13 of the 14 hospitals, depending on the hospital's sectors. It was mostly applied in healthcare services (31%) as well as in hospital departments (23%) (Figure 1). As a result, 13 of 14 hospitals already have a specialized department for e-health.

E-health applications are primarily represented by electronic health records (EHR) in hospital reception services (17%), and the other applications such as pharmacy, laboratory services and radiography use only 8%. Accordingly, we have found that all of them have partly implemented and have continuously tried to apply e-medicine and adopt EHRs, while telemedicine is still far behind with 8% only. More than 90% of patients have

no digital card about their medical records (Figure 2), as digital cards are not operational in all hospitals, and patients who want a copy of their medical records can only obtain some information on paper.

Legal oversight of e-Health applications was highest for accreditations, with 7 of 14 hospitals abiding by them, while the Health Insurance Portability and Accountability Act (HIPPA) came last with only 1 hospital abiding by it. Each reimbursement fund (social security, cooperative of state officials, army, insurance company, etc.) has its own regulations. Eight of 14 hospitals had supervision over e-health by the Ministry of Public Health to ensure compliance with the system. Various other challenges are faced when implementing e-health in hospitals, such as cost, which was the leading challenge (50%) followed by resistance of physicians (14%) (Figure 3).

## SWOT analysis

The SWOT analysis, by which we assess the strengths, weaknesses, opportunities and threats of e-health, is a useful and time-tested management tool. This technique has been adopted by hospitals due to its effective and simple methods, and it is appropriate to use in strategic planning in healthcare systems or medical innovations (16). Variables are divided into internal and external. Internal variables can be controlled within the hospital, such as strengths and weaknesses. External factors are typically things we do not control, but influence and affect the functioning of the system, whether they are connected directly or indirectly to an opportunity (O) or threat (T), and it is important to note and document each one. SWOT analysis makes it possible to clarify and distinguish these different variables in a list divided into grids 2 by 2. Therefore, it allows medical centres to visualize and take advantage of threats and opportunities to improve their strengths and weaknesses.

To be well run and high performing, hospitals must be data driven. The first step of SWOT analysis in e-health is to collect and assess important data. This can range from patient health records and disease registries to claims statuses and funding sources. SWOT analysis is not entirely data driven, but data can be helpful in thinking about what we are good at and what areas need

**Figure 1 Place of e-health activities. All services: everything in the hospital from reception to patient discharge. Hospital departments: nursing, accounting, human resources, etc.**



- Special departments for e-health implementation
- All services
- Hospital departments
- Hospital services
- Specialized clinics
- Medical offices
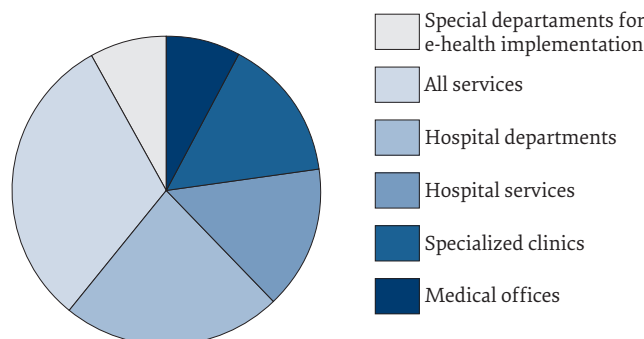
**Figure 2 Chart of medical tools in hospitals**
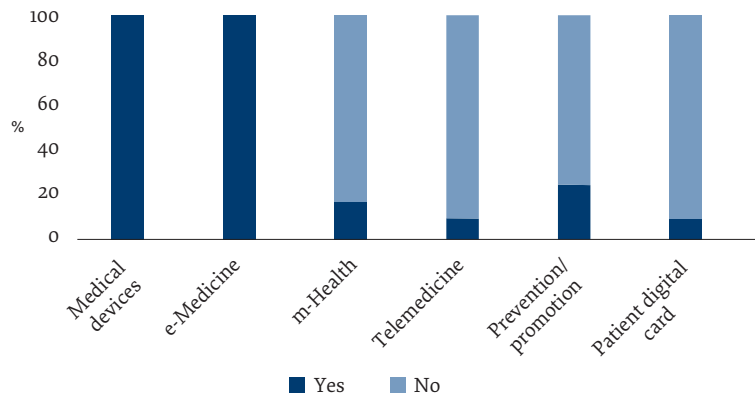


improvement. Figure 4 briefly presents our findings for the e-health implementation in North Lebanon.

## Discussion

Our results are proof that e-health implementation is still in its early phases in Lebanon, and health professionals need to learn more about the technology in order to accept it. Hospitals need to provide adequate equipment to allow localized data recording through internet access. Our results can be generalized since many Lebanese hospitals, around 50%, have not yet implemented e-health, HISs or EHRs. The Lebanese Government as well as the Lebanese Ministry of Health do not impose on hospitals the implementation of such tools. These results apply to all hospitals except for the 3 biggest hospitals in Beirut, namely, Hôtel Dieu, Clemenceau Medical Center and American University of Beirut Medical Center.

HTA can be used to evaluate sustainable healthcare systems (17). Since HTA is considered a new concept in Lebanon, a large number of medical staff lack fundamental knowledge about e-health. Therefore, Lebanon should conduct special training for medical

and administrative staff to learn from those who have experience in this field. Academic institutions in Lebanon do not yet include e-health in their curricula, although the American University of Beirut has begun building an EHR system and relying on it (18). To train medical staff capable of implementing and working with e-health, academic institutions should introduce the concept of e-health in their academic programmes; a new e-health master's degree should be created for former graduates as part of lifelong learning (19). To move from classical to technology-based health care, the staff in Lebanese hospitals should learn about EHRs. An important measure would be to train medical staff, especially doctors, to use new technology and learn how to save the data and link them to digital medical records (20).

e-health innovation technologies provide various benefits for patients, medical centres, medical staff and stakeholders, such as providing quality care equally to all patients, and digital medical data recording, which can be considered a green solution.

The implementation of e-health cannot be carried out quickly, and many studies have explored the barriers

**Figure 3 Challenges concerning e-health**

**Figure 4** SWOT analysis concerning e-health. AI = artificial intelligence; MoPH = Ministry of Public Health

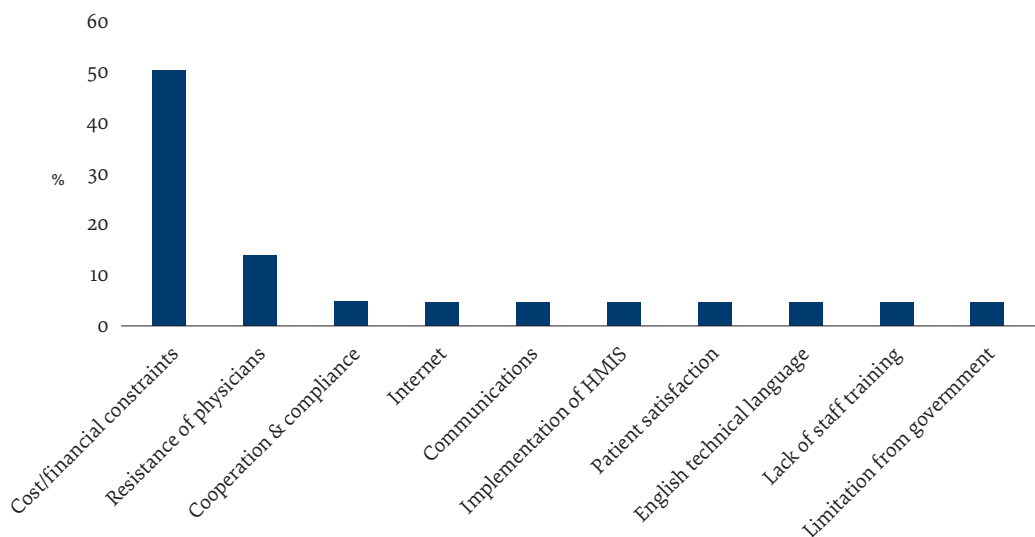| Strengths | Weaknesses | Opportunities | Threats |
|---|---|---|---|
| • Advanced IT skills<br>• Use of programs such as EHR apps<br>• High level of networking and communication<br>• Funding capacity for training and installation<br>• Classification of hospitals according to specialism and range of services<br>• Hospital administration interested in the main topics | • Poor financing for devices; high cost and new generation network purchase<br>• Weak experience & knowledge of medical staff in the field<br>• Weakness in educational & technical skills in AI domain | • Support from MoPH and medical professional associations<br>• Implementation of deep learning & machine learning in AI<br>• Funds to finance this project; e.g., from individual donors and industry grants<br>• Presence of companies and institutions working on implementing digitization & training skills | • Difficulties in socioeconomic conditions and political situation<br>• Policy and legal protection<br>• Negative patient attitude concerning privacy<br>• Hacker and denial-of-service attack<br>• Weakness in network for information sharing |

to e-health adoption (21). One such barrier concerns the education and training of staff. In Lebanese academic institutions, there is no postgraduate diploma in e-health, and health disciplines do not include any e-health modules in their curricula. E-health is more than just electronic records; it is multidisciplinary in nature and concerns all people involved in health care. Therefore, it is important to create a postgraduate qualification in e-health for health professionals who wish to enhance their understanding and ability to work effectively with information and communication technologies. Another challenge for implementation of e-health is computer downtime for electronic data recording, which can be planned or unplanned; either way it puts the entire electronic medical data, as well as patient safety at risk.

E-health has great benefits in the medical sector, It has been shown that EHRs generate better quality of care and ambulatory services (22). However, the implementation of e-health and allowing automatic updates of medical data and sharing among physicians without the agreement of patients could have implications for patient privacy. Additionally, this new technology is in constant

development; therefore there is a need for continual technical supervision.

## Conclusion

The purpose of this study was to gather data about the information technology infrastructure in healthcare systems in North Lebanon hospitals. An explicit political commitment by the Lebanese Ministry of Public Health to adopting e-health is required. This commitment needs to be backed by sustainable funding for the implementation of e-health and actions for capacity building and evaluation that are aligned with a national strategy for e-health. Without the financial support and a legislative framework, the implementation of e-health in Lebanese hospitals will be compromised. The WHO Lebanon Office could play a major role in e-health implementation by supporting local initiatives or through capacity building in e-health technologies and sharing of global best practices and standards derived from successful e-health implementations.

## Mise en œuvre de technologies innovantes en cybersanté dans les hôpitaux du Liban-Nord

### Résumé

**Contexte :** La cybersanté est considérée comme la plus importante révolution dans le domaine des soins de santé depuis l'avènement de la médecine moderne. Il s'agit d'un domaine émergent de l'informatique médicale, utilisé dans l'organisation et la prestation de services et la fourniture d'informations sanitaires. Elle devrait permettre d'améliorer divers aspects des soins de santé.

**Objectifs :** Atteindre la couverture sanitaire universelle au Liban, et examiner la mise en œuvre de la cybersanté dans les hôpitaux du Liban-Nord et les facteurs influençant l'adoption d'une technologie spécialisée récente dans la cybersanté.

**Méthodes :** Nous avons adopté une méthode de recherche exploratoire basée sur un questionnaire semi-structuré. Les 14 principaux hôpitaux du Liban-Nord ont été choisis pour des entretiens en présentiel afin d'évaluer et de mesurer le comportement et les connaissances concernant la cybersanté et sa mise en œuvre. Les données ont été analysées à l'aide du logiciel SPSS, suivies d'une analyse AFOM (atouts, faiblesses, opportunités, menaces).

**Résultats :** Les hôpitaux enquêtés ont partiellement mis en œuvre certaines technologies de cybersanté et essayent continuellement de les appliquer, mais il n'existe pas de véritables dossiers médicaux pour les patients. La mise en œuvre complète des technologies de cybersanté au Liban s'est heurtée à plusieurs obstacles : il s'agit en premier lieu du coût, suivi d'une certaine réticence du personnel, de l'absence de législation et de normes communes, et de la nécessité d'une formation continue.

**Conclusions :** La majorité des hôpitaux sont conscients de l'importance des technologies de cybersanté et de la nécessité urgente de mettre en œuvre ces nouvelles méthodes. Après la promulgation des règles législatives, les aspects financiers restent le principal frein à une mise en œuvre complète. Les établissements universitaires doivent jouer un rôle majeur pour fournir aux futurs diplômés un enseignement approprié sur la cybersanté dans leurs programmes.

## تنفيذ تكنولوجيات الصحة الإلكترونية المبتكرة في مستشفيات شمال لبنان

جلال حلواني، دوريس معوض

### الخلاصة

**الخلفية:** تُعد الصحة الإلكترونية أهم ثورة في مجال الرعاية الصحية منذ ظهور الطب الحديث. وهو مجال ناشئ للمعلوماتية الطبية يُستخدَم في تنظيم الخدمات والمعلومات الصحية وتقديمها. ومن المتوقع أن تُسهم الصحة الإلكترونية في تحسين جوانب مختلفة من الرعاية الصحية.

**الأهداف:** هدفت هذه الدراسة إلى تحقيق التغطية الصحية الشاملة في لبنان، واستكشاف تنفيذ تطبيقات الصحة الإلكترونية في مستشفيات شمال لبنان، والعوامل التي تؤثِّر في اعتماد أحدث التكنولوجيات المتخصصة في مجال الصحة الإلكترونية.

**طُرق البحث:** اعتمدنا أسلوب البحث الاستكشافي الذي يستند إلى استبيان شبه مُنظَّم. واختيرت المستشفيات الرئيسية البالغ عددها 14 مستشفى في شمال لبنان لإجراء مقابلات وجهًا لوجه لتقييم وقياس السلوك والمعرفة المتعلقة بالصحة الإلكترونية وتنفيذها. وخضعت البيانات للتحليل ببرمجية SPSS، وأعقب ذلك إجراء تحليل نقاط القوة والضعف والفرص والأخطار.

**النتائج:** نفَّذت المستشفيات التي شملتها الدراسة الاستقصائية بعض تكنولوجيات الصحة الإلكترونية تنفيذًا جزئيًّا، وحاولت تطبيقها باستمرار، ولكن لا سجلات طبية حقيقية للمرضى. وواجه لبنان تحديات مختلفة فيما يتعلق بالتنفيذ الكامل لتكنولوجيا الصحة الإلكترونية: التكلفة في المقام الأول، تلتها مقاومة بعض العاملين، وغياب التشريعات والمعايير المشتركة، وضرورة التدريب المستمر.

**الاستنتاجات:** تُدرك غالبية المستشفيات أهمية تكنولوجيا الصحة الإلكترونية والحاجة المُلِحَّة لتنفيذ هذه الأساليب الجديدة. وبعد إصدار القواعد التشريعية، تظل الجوانب المالية هي العائق الرئيسي أمام التنفيذ الكامل. ويجب أن تضطلع المؤسسات الأكاديمية بدور رئيسي في توفير التثقيف المناسب بشأن الصحة الإلكترونية في برامجها المقدَّمة لخريجي المستقبل.

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# Public health practitioners' perspective on the sustainability of the tuberculosis control programme at primary health care level in Pakistan

Syed Mustafa Ali[1] and Satwinder Rehal[1]

[1]Faculty of Health and Life Sciences, University of Liverpool, Liverpool, United Kingdom. (Correspondence to: Syed Ali: mustafa_30_84@yahoo.com)

## Abstract

**Background:** In resource-limited settings, national tuberculosis (TB) control programmes are highly dependent on external funds, which may pose a challenge to programme sustainability. There is a recognized need for developing guidance around sustainable programming of current TB control initiatives.

**Aims:** The aim of this study was to explore public health practitioners' perspectives on the sustainability of TB control initiatives in Pakistan at the primary health care (PHC) level.

**Methods:** Guided by an interpretive epistemology, online in-depth interviews were conducted with 10 public health practitioners who had experience as resource planners in the TB control programme in Pakistan. Thematic content analysis was employed to the textual data as the analytical approach.

**Results:** Three themes were inductively derived from the thematic analysis: community involvement, stakeholder engagement and efficient use of the PHC system. Community involvement was a determinant in sustaining TB control initiatives. This was attributed to the nature of the disease and prevalent health seeking behaviour. Stakeholder engagement was associated with funding arrangements between public and private partners and considered important in how new initiatives can be made part of the routine structure. Overall, having an efficient PHC system was deemed critical in sustaining current TB control initiatives at the PHC level in Pakistan.

**Conclusion:** Fostering an enabling operational environment through regulations, supporting the utilization of existing resources, expanding the network of providers, inclusive planning, increasing spending on research and cost–effective testing are pivotal for sustaining the TB control initiatives.

## Introduction

According to the Global TB Report of 2020, Pakistan is one of 30 high tuberculosis (TB) burden countries with an incidence rate of 570 000 cases per year and 357 893 new and relapse cases (2018 cohort) (*1*). This means that a significant proportion of cases (~200 000) are missed, posing a significant threat to public health in Pakistan.

Over the past few decades, Pakistan's National TB Control Programme has achieved a remarkable improvement in notification and successful treatment rates. These can be attributed to the adoption of the directly observed treatment short-course (DOTS) strategy from 1995 onwards, revival of the National TB Control Programme in 2001 and to financial contributions of government and its partners (*2*). However, adaptation in the managerial set-up of the National TB Control Programme and the continuation of technical and donor support will be important in achieving the sustainability of the programme.

Sustainability refers to the continuation of a programme after the initial efforts implementing it

(*3,4*). In the public health discourse, sustainability of public health initiatives refers to the evaluation of long-term effects of public health programmes because they are implemented over a longer period (*5*). As Altman contends, sustainability remains a key challenge as most public health interventions are discontinued after the initial funds are exhausted (*6*).

The sustainability of public health programmes has gained attention among various stakeholders (researchers, donors, community partners, etc.) in the recent past (*7*) with the focus on understanding contextual factors in which interventions are embedded (*5*). Evidence suggests that sustainability of public health initiatives can only be achieved if primary health care (PHC) is adequately emphasized, which is also true for Pakistan (*8*).

With the increasing global interest in sustainability of public health initiatives, programme managers in the TB control programme in Pakistan have recognized the need for developing understanding and guidance around sustainable programming of public health initiatives and have called on the government in regard to developing a

sustainable approach (*9*). Therefore, the aim of this study is to explore public health practitioners' perspectives on the sustainability of TB control initiatives in PHC settings in Pakistan. This study will guide policy and programmatic decisions to support sustainable TB programming at the PHC level in Pakistan.

## Methods

### Study design

This research utilized an interpretivist approach, which acknowledges that reality is socially constructed within a context (*10*) through natural-style conversation (*11*). That is why we adopted an exploratory qualitative research design (*12*): it allowed us to explore the perceptions of public health practitioners regarding the sustainability of the TB control programme.

### Sampling and eligibility criteria

Purposive sampling was employed to recruit public health practitioners from different types of organization, including governmental (national and provincial TB control programmes) and not-for-profit nongovernmental organizations. Purposive sampling was deemed appropriate for the study as it intends to yield in-depth understanding of information-rich cases (*13*).

Potential participants who met the following eligibility criteria were invited to take part in the study: having more than 5 years of work experience, either previously or currently, in programming of TB control and strategic health planning in Pakistan; either working or having worked at the national or provincial level; fluent in English or Urdu; able to take part in *Skype*-based interviews. The exclusion criteria included: having no or little experience of TB programming in Pakistan; and having no access to *Skype*.

### Recruitment

E-mail invitations were sent to participants who met the inclusion criteria. A participant information sheet was shared and informed consent was sought via e-mail. A *Skype* interview was scheduled with the participants at a time and place of their convenience. Out of nineteen potential participants who were invited to take part in the study, 10 public health practitioners participated in the in-depth interviews. While some of the invited participants did not answer multiple reminders, 2 declined to take part in the study because of their work commitments. Ten in-depth interviews were conducted. The profile of the participants is given in Table 1.

### Data collection

A semi-structured, in-depth interview was conducted with the use of an interview guide (available on request), which was developed from the relevant sources (*3–5,7,8,14,15*). Key questions are listed below.

- In pursuit of the Sustainable Development Goals, what is the importance of primary health care, with focus on tuberculosis control?

Table 1 **Profile of the participants: 10 public health practitioners with experience in programming of tuberculosis control and strategic health planning in Pakistan**

| Participant ID | Sex | Organization type | Years of experience |
|---|---|---|---|
| GO20191130 | Male | Governmental | 20 |
| GO20191201 | Male | Governmental | 25 |
| GO20200111 | Male | Governmental | 16 |
| N4PNGO20191116 | Male | Nongovernmental | 08 |
| N4PNGO20191207 | Female | Nongovernmental | 14 |
| N4PNGO20191230 | Male | Nongovernmental | 24 |
| N4PNGO20200201 | Male | Nongovernmental | 06 |
| GO20200205 | Male | Governmental | 23 |
| N4PNGO20200205 | Male | Nongovernmental | 11 |
| N4PNGO20200219 | Male | Nongovernmental | 15 |

- What do you think sustainability is and why is sustainability important in today's world?
- What is your opinion of the sustainability of the TB control programme in Pakistan?
- What kind of sustainability challenges is national TB control facing and how can they be managed?
- Based on the discussion and in your opinion, can you name one or a few critical factors which are required for sustainability?

Skype interviews were conducted between November 2019 and February 2020. These interviews were video/audio recorded with participant consent, and lasted between 30 and 45 minutes.

### Analytical approach

Thematic analysis was employed to analyse the interview transcripts. This involved immersion into textual data and identification of emerging themes or ideas relevant to the area of inquiry (*16*).

### Ethical considerations

Ethical clearance for the study was granted from the review board of the International Research Force in Pakistan and from the University of Liverpool's ethical review committee. Participants were allowed to withdraw from the study at any time without giving any reason. They were assured in regard to their privacy and the confidentiality of the data. Relevant records were anonymized (Table 1). No monetary compensation was given to participants.

## Results

### Conceptions of sustainability

The thematic content analysis included interviews with 10 public health practitioners with knowledge and experience of resource planning in the TB programme. The analysis of textual data highlighted 3 broad themes in

relation to the understanding of the sustainability of TB control initiatives at the PHC level in Pakistan (Table 2).

Respondents tried to deconstruct the concept of sustainability based on their conceptualization. Most of the respondents viewed sustainability as the continuation of financial resources until TB is eliminated from Pakistan. However, an alternative conception of sustainability was elaborated as the maintenance of existing control efforts, as reflected in the quote below:

"Sustainability is more referring to continuity of that [existing] service … about rest of 30–35% missing cases, how to reach this population is more of an innovation and expansion rather than sustainability." [N4PNGO20191230]

Given the conceptions on what sustainability meant to participants, this was constructed around the following 3 themes: an efficient PHC system, community involvement and stakeholder engagement.

### Efficient primary health care system

Pakistan has an extended primary health care system that forms the backbone of the overall health care system. The importance of the PHC setup was also recognized in the Sustainable Development Goals by prioritizing PHC services and thinking beyond vertical programmes (17). One of the respondents reflected this as:

"… services at the grassroots level … are normally curative and preventive in nature … these services actually proved beneficial to reach out the targeted population when you try to integrate the vertical programmes, just like TB or malaria." [N4PNGO20200219]

An efficient PHC system is elaborated through 2 subthemes: significance of the PHC system and health care system strengthening. The PHC system in Pakistan is the first level of health care, and comprises both public and private sector facilities. Most of the respondents recognized that the PHC system is critically important and without strengthening it further, sustainability in the TB control programme cannot be achieved.

"Primary health care set up is important … [because] it is approachable and affordable to community … and is a first point of contact … strengthening this level is important for sustainability." [N4PNGO20191207]

The role of the PHC system is also significant in running advocacy campaigns that will allow for capacity-

building among the community. One respondent gave an example:

"… they engaged schoolgirls and then they made them their TB advocates. They were given training on how to screen and later they were asked to do screening in their respective areas …" [N4PNGO20191207]

### Health care system strengthening

Most of the respondents mentioned the significance of reforms to develop and implement relevant guidelines. The need for building the capacity of health care professionals and improving referral linkages between health care facilities were recognized as important factors for identifying missing TB cases and sustaining the control efforts. One of the respondents said:

"… what type of patient, at what level of care and when to access specialized care … so … this type of [inequitable] system is not sustainable until we do reforms." [N4PNGO20191116]

For health system strengthening, innovations were accorded immense importance by the majority of the respondents. One respondent representing a government organization suggested:

"… private sector is needed to make interventions … here the innovations are needed … new experiments can be performed so this can be executed by the private sector … at many times, we are so much restricted by regulations and also due to HR constraints that we cannot travel far and cannot leave facilities." [GO20191201]

### Community involvement

From the analysed data, community involvement in TB control initiatives was conceptualized in the following 2 subthemes: health seeking behaviour and contributions towards health care.

### Health seeking behaviour

Low education level, poor health awareness and the stigma associated with TB in Pakistan result in the development of negative health seeking behaviour.

Given the stigmatization of TB in Pakistan, raising disease awareness is considered particularly important for generating the demand for treatment. However, several of the respondents articulated that meaningful participation of community members is lacking in the current programming. One of the respondents said:

"A representative from the patient community … is usually a handpicked person from the HIV community … because CCM [forum] represents all 3 disease areas [malaria, TB and HIV] … and I think there is little representation from the TB world … Managers sort of making a call of what is needed rather than having a forum where … you have some way of feeling back what is needed from the patients in their own perspectives." [N4PNGO202200205]

Table 2 **List of themes and subthemes related to the study topic: sustainability of the tuberculosis control programme at primary health care (PHC) level in Pakistan**

| Theme | Subtheme |
|---|---|
| Community involvement | Health seeking behaviour |
| | Contributions towards health care |
| Stakeholder engagement | Nature and institutionalization of interventions |
| | Funding arrangement |
| Efficient primary health care system | Significance of PHC system |
| | Health care system strengthening |

## Contributions towards health care

The cost of TB care is considered an important factor in the accessibility and acceptability of the TB care and prevention services in Pakistan. Increasingly, the published literature supports social protection schemes and policies; hardly any respondents had opposing views.

A few respondents had the opinion that community members exhibit non-responsible behaviour as they do not acknowledge the availability of free-of-cost services. Therefore, they supported the idea of a nominal contribution from the community towards health care costs.

"... we need to make our community realise that if they are provided with free-of-cost services, then they should acknowledge them rather than to condemn services and discourage continuity of treatment." [N4PNGO20191116]

In Pakistan, TB is prevalent among those who have low socioeconomic status and a low education level (18). Therefore, there is a need for raising awareness so that the demand for TB care and prevention services is created.

## Stakeholder engagement

The End TB Strategy demands actions beyond the health ministry and emphasizes that the National Strategic Plan should be developed and implemented in close coordination and collaboration with all stakeholders (19). After stakeholders are identified, their roles and responsibilities and funding arrangements should be defined based on the nature of the interventions.

## Nature and institutionalization of interventions

Sustainability concerns the institutionalization of the newly implemented interventions, and institutionalization depends on the extent of shared understanding of sustainability among different stakeholders (7). The majority of respondents considered the government of Pakistan, or the National TB Control Programme, as a prime stakeholder. The involvement of other functionaries, such as finance, economics, planning and development, was considered equally important. Other nongovernmental stakeholders identified were community-based organizations, faith-based organizations, professional associations, and global and bilateral donors, thus suggesting a multisectoral approach to planning and implementation.

Nearly all respondents agreed that the government's commitment has to be increased and funds allocation on the TB control programme should be prioritized, as illustrated by one respondent thus:

"... government says that health and education are our priorities in Pakistan and they allocate the lowest budgets for health and education sectors. So, now you [we] must have a clear idea about their priorities." [GO20200205]

In terms of sustainable TB control programmes, most of the respondents acknowledged the importance of the private health care sector and identified the need for utilizing existing resources, for which regulation is an important step. Therefore, programme design was given importance and expressed as:

"One key dimension of sustainability would be the programme design," and explained further as "Roles and responsibilities are assigned to individuals and [their] settings, which are regular structures, rather than project structures." [N4PNGO20191230]

Although respondents representing the government considered innovations as a means of engaging private sector organizations, they criticized the disproportionately high operational and human resource costs. An experienced resource planner within the TB control programme said:

"... active case finding ... there should be criteria about how long we are going to do this ... it should be decided which innovations are cost–effective ... and sustainable ... you [we] have not harvested low hanging fruits and instead we went for [cost-intensive] active case finding ... so we have to balance this specifically in the countries like us." [GO20191201]

Generally, innovations and research were ranked high among respondents, but one respondent expressed concern about the research situation in the TB control programme and said:

"If you start prioritizing funding/priority areas, then the component of research goes very down in that priority list ... and this is [the] reality of all low and middle income countries ..." [N4PNGO20200219]

## Funding arrangements

With inadequate domestic funding and system-level inefficiencies, dependence on donors is recognized as a potential limiting factor for sustaining the TB control programme.

Implementation of the National Strategic Plan became challenging because of the competing interests among the public and private implementation organizations. This took away from the programme the opportunity to allow partners to complement each other.

Moreover, politicization of the funding process and donors supporting their own funding mechanism were seen as potential hindering factors in the implementation of the National Strategic Plan. One of the respondents explained this analogously:

"If you ask Coke and Pepsi to sit down and figure out nicely, they would laugh out and would say we don't want to figure everything out. Coke don't want Pepsi in the market and Pepsi don't want Coke in the market." [N4PNGO20200205]

Owing to this situation, few of the respondents supported the idea of role distributions among national and provincial partners (both public and private) so that pooled money is distributed based on their roles, hence promoting resource efficiency.

## Discussion

Having an efficient PHC system is a key aspect of sustaining the TB control initiatives at the primary care level in Pakistan. Utilization of existing resources, integration of services and capacity-building of health care providers are some examples. Moreover, stakeholder engagement and management should be guided by the national strategy, while recognizing community as an important stakeholder.

Inclusive planning, in which the government of Pakistan is a prime stakeholder, is critical for the sustainability of TB control efforts. The WHO has recognized the importance of government and community and defined sustainability as the ability of a project to continue delivering services with high treatment coverage, integration into existing health care services, strong community ownership and community- and government-driven resource mobilization (14). However, respondents expressed concern over the lack of involvement of communities in the planning process. The capacity of the community to continue with programmes is also seen as favourable to their sustainability (15,20). Financial support is an important factor in enhancing the community's capacity to sustain the programme. For example, in Myanmar the contribution of local nongovernmental organizations fell due to the diminishing involvement of community members in the absence of a payment or financial support mechanism (21).

Insufficient government funding allocation increases dependence on donors (e.g. the Global Fund) for even basic services such as TB drugs. The same trend has been noted in many other developing countries, putting sustainability at risk (22). Similarly, policy-makers in Pakistan see the donor's influence on priority-setting negatively for both policy formulation and programme implementation (23).

There is a recognition that strengthening at the PHC level will help in sustaining existing TB control efforts in Pakistan as in 90% of TB cases at the national level, the contact is with the private sector, forts including the community-level informal sector (24). China has set an example in the fight against TB because of its increasing focus on the PHC system (25).

Despite the recognition of the importance of research, lacking a research agenda at the national level is a concern for formulating evidence-informed resource allocation decisions. The need for increased funding on research and development was accepted at a high-level meeting of the UN (26). Similarly, the need for increasing the research capacity and utilizing the evidence for various decisions in a more sustained and effective manner are also stressed (27).

Sustainability of health interventions is needed to allow the assessment of the long-term effects of health interventions (28) and to enable the detection of changes in community health status (29). There is a need to ensure a sustained funding mechanism to sustain evidence-supported interventions (30). Therefore, prioritizing assessment of the sustainability of the TB control programme is essential for the efficiency of the programme.

## Conclusion

There is a clear need for investing more in sustaining the TB control programme at the primary health care level in Pakistan. Financial resources alone will not help achieve sustainability. Rather fostering an enabling operational environment through legislation and regulations, utilizing existing resources and expanding the network of providers at the PHC level are also needed. In consideration of these factors, inclusive planning with various government functionaries and communities, and increasing spending on research, cost–effective testing and evidence-informed innovation are all pivotal for sustaining the programme. Going forward, there should be an increased focus on innovation and research for guiding relevant investment and management decisions aimed at improving the efficiency of the programme at the PHC level.

## Le point de vue des praticiens de santé publique sur la pérennité du programme de lutte contre la tuberculose au niveau des soins de santé primaires au Pakistan

### Résumé

**Contexte :** Dans les contextes où les ressources sont limitées, les programmes nationaux de lutte contre la tuberculose sont fortement tributaires de fonds externes, ce qui peut compromettre la pérennité des programmes. Il existe un besoin reconnu d'élaborer des orientations concernant la programmation durable des initiatives actuelles de lutte contre la tuberculose.

**Objectifs :** La présente étude avait pour but d'explorer le point de vue des praticiens de santé publique sur la pérennité des initiatives de lutte contre la tuberculose au Pakistan au niveau des soins de santé primaires (SSP).

**Méthodes :** Grâce au recours à une épistémologie interprétative, des entretiens approfondis en ligne ont été menés avec dix praticiens de la santé publique ayant une expérience en tant que planificateurs de ressources dans le programme de lutte contre la tuberculose au Pakistan. L'analyse thématique de contenu a été utilisée pour les données textuelles en tant qu'approche analytique.

**Résultats :** Trois thèmes ont été dérivés de façon inductive de l'analyse thématique : la participation communautaire, la collaboration avec les parties prenantes et l'utilisation efficace du système de SSP. La participation communautaire était un facteur déterminant dans le maintien des initiatives de lutte contre la tuberculose. Ce constat a été attribué à la nature de la maladie et au comportement prévalent en matière de recours aux soins. La collaboration avec les parties prenantes était associée aux accords de financement entre les partenaires publics et privés ; elle était considérée comme importante dans la façon dont les nouvelles initiatives peuvent être intégrées à la structure habituelle. Dans l'ensemble, il a été jugé essentiel de disposer d'un système efficace de soins de santé primaires pour pérenniser les initiatives actuelles de lutte contre la tuberculose au niveau des soins de santé primaires au Pakistan.

**Conclusion :** La promotion d'un environnement opérationnel favorable par le biais de réglementations, le soutien apporté à l'utilisation des ressources existantes, l'élargissement du réseau de prestataires, la planification inclusive, l'augmentation des dépenses consacrées à la recherche et aux dépistages d'un bon rapport coût-efficacité sont essentiels pour soutenir les initiatives de lutte contre la tuberculose.

## وجهات نظر ممارسي الصحة العامة بشأن استدامة برنامج مكافحة السل على مستوى الرعاية الصحية الأولية في باكستان

سيد مصطفى علي، ساتوندر رحال

### الخلاصة

**الخلفية:** تعتمد البرامج الوطنية لمكافحة السل اعتمادًا كبيرًا على الأموال الخارجية في الأماكن المحدودة الموارد، الأمر الذي قد يُشكِّل تحديًا أمام استدامة البرامج. وهناك حاجة مُسلَّم بها لوضع توجيهات بشأن وضع البرامج المستدامة للمبادرات الحالية لمكافحة السل.

**الأهداف:** هدفت هذه الدراسة إلى استكشاف وجهات نظر ممارسي الصحة العامة بشأن استدامة مبادرات مكافحة السل في باكستان على مستوى الرعاية الصحية الأولية.

**طُرق البحث:** أُجريت مقابلات متعمِّقة عبر الإنترنت مسترشدة بنظرية المعرفة التفسيرية مع 10 ممارسين في مجال الصحة العامة من ذوي الخبرة في تخطيط الموارد في برنامج مكافحة السل في باكستان. وأجري تحليل المحتوى المواضيعي للبيانات النصية بصفته نهجًا تحليليًّا.

**النتائج:** استُمدت ثلاثة مواضيع من التحليل المواضيعي من خلال الاستقراء؛ وهي إشراك المجتمع المحلي، وإشراك أصحاب المصلحة، وكفاءة استخدام نظام الرعاية الصحية الأولية. وكان إشراك المجتمع المحلي أحد مُحدِّدات الحفاظ على استمرارية مبادرات مكافحة السل. ويُعزَى ذلك إلى طبيعة المرض وسلوك التماس الرعاية الصحية السائد. وارتبط إشراك أصحاب المصلحة بترتيبات التمويل بين الشركاء من القطاعيْن العام والخاص، واعتُبر إشراكهم أمرًا مهمًا في إدماج المبادرات الجديدة في الهيكل الروتيني لنظام الرعاية الصحية. وإجمالًا، يُعتبَر وجود نظام فعَّال للرعاية الصحية الأولية أمرًا بالغ الأهمية لاستدامة مبادرات مكافحة السل الحالية على مستوى نظام الرعاية الصحية الأولية في باكستان.

**الاستنتاجات:** من الضروري للحفاظ على مبادرات مكافحة السل تعزيز البيئة التشغيلية التمكينية من خلال اللوائح، ودعم الاستفادة من الموارد المتاحة، وتوسيع شبكة مقدمي الخدمات، والتخطيط الشامل، وزيادة الإنفاق على البحوث والاختبارات العالية المردودية.

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# Health research funding and its output in Pakistan

Muhammad Arif Nadeem Saqib[1,2] and Ibrar Rafique[1]

[1]Pakistan Health Research Council, Islamabad, Pakistan. [2]Associate Professor, National Skills University, Islamabad, Pakistan.   (Correspondence to: Ibrar Rafique: ibrarpmrc@gmail.com).

## Abstract

**Background:** Health research is very important for formulating evidence-based policies.

**Aims:** To assess the health research funding and its output in the last 5 fiscal years (2013/14 to 2018) in Pakistan.

**Methods:** Information about health research funding was retrieved from 3 major local agencies, the Higher Education Commission, the Pakistan Science Foundation and the Pakistan Health Research Council. Details of funding from international donors were retrieved and the number of publications was estimated from Pubmed and Pakmedinet.

**Results:** A total of 1261.6 million Pakistan rupees (Rs) (US$ 8.4 million) was spent on health research in the last 5 fiscal years, the majority from local donors ($P < 0.02$). Overall funding increased from Rs 104.7 million in 2013–2014 to Rs 349.8 million 2017–2018. In publications data, 24 796 original articles were published, including 16 137 Medline and 8659 non-Medline indexed. Overall there was a gradual increase in the number of publications per year, statistically significant for Medline indexed journals. Research funding had a strong correlation (Cronbach $\alpha$=0.88) with publications.

**Conclusion:** Health research funding directly affects health research output. The funding on health research should be considered an investment rather than expenditure.

Keywords: health research, funding, investment, Pakistan

## Introduction

Health research is of paramount importance and plays a pivotal role in the improvement of existing health systems, framing evidence-based health care policy, and in generating new initiatives and advancing knowledge about problems relating to public health and their solutions (1,2). It has an important role in identifying the economic and social determinants of health, and ultimately forms the basis for improvement in health programmes and policies (3). This is beneficial to a country in many ways ranging from reducing the direct cost of disease to the development of techniques/products for treatment of disease, and is recognised as an important aspect of economic development and an evidence-based, informed approach to population health (1,2,4,5).

It is imperative for developing countries to recognise the importance of health research and gain momentum in this field (4,5). According to the World Health Organization (WHO), in low- and middle-income countries health research must address local needs, and the evidence generated should be incorporated into policy (1,2). However, the WHO Global Observatory on Health Research and Development showed that there are 73 times more health researchers in the high-income countries than in low-income countries (6). A quarter of the world's population is living in South Asia, where health infrastructure is weak. Due to low investment, there is a dearth of health research in South Asia to determine the gaps between disease and health delivery systems (7). It has been reported that researchers from South Asia contribute only 1.2% to the annual research.

As in many other countries of the Region, the health research situation in Pakistan is not satisfactory (8). Pakistan has only 25 full time equivalent public health researchers per million population (6). The poor status of health research in Pakistan is due to lack of a research culture, lack of demand for research, low capacity, unavailability of funds and improper dissemination (9). This study describes the spending on health research in Pakistan in the last 5 fiscal years and its impact on research output.

## Methods

We collected information about the spending on health research during the last 5 fiscal years, July 2013–June 2018, from 3 major Pakistani funding agencies, Pakistan Health Research Council, Islamabad, Pakistan Science Foundation, Islamabad, and the Higher Education Commission, Pakistan. For the Pakistan Health Research Council the information was retrieved from the records of the Research, Development and Coordination section using a pre-designed proforma. Letters were sent to the Higher Education Commission and the Pakistan Science Foundation asking them to provide the required information. Letters were also sent to about 63 health research institutions in the country asking them to provide de-

tails of funding other than the Pakistan Health Research Council, the Higher Education Commission and the Pakistan Science Foundation. Besides this, information about international funding was retrieved from the National Bioethics Committee Pakistan, which gives ethical clearance to internationally funded projects in Pakistan (*10*).

The research output, i.e. number of publications in local and international journals, was collected from Pakmedinet (http://www.pakmedinet.com/) and PubMed (https://www.ncbi.nlm.nih.gov/pubmed). For PubMed, an advance search was conducted with medical subject headings (MeSH) (www.ncbi.nlm.nih.gov/pubmed) as described earlier (*11*). In the MeSH tree, the major topic includes all the communicable and noncommunicable diseases and health disciplines. We used the following pattern of search terms:

- MeSH major topic (list of communicable and non-communicable diseases, list of all medical and health disciplines separated by word OR),
- AND,
- affiliation Pakistan,
- publication date (year).

Pakmedinet was developed in 2001 and indexed about 85 health journals published in Pakistan. The list of all these journals was retrieved along with their publications and filtered for consistency, i.e. regular publication in the last 5 years. About 40 journals had regular issues, therefore their publications were counted on a yearly basis. All other local journals which did not meet the criteria of regularly publication or indexing in Pubmed were excluded.

All data were entered into *MS Excel* and analysed using *SPSS*, version 20. Pearson correlation was used to assess the correlation between funding and publication. *P*-value < 0.05 was considered statistically significant.

## Results

A total of 1261.6 million Pakistan rupees (Rs) (US\$ 8.4 million) was spent on health research during the last 5 fiscal years, 2013–14 to 2017–18. The spending made by the Pakistan Health Research Council, the Pakistan Sci-

ence Foundation and the Higher Education Commission along with the international donors is detailed in Table 1. The mean annual spending was Rs 252 (standard deviation 157) million (US\$ 1.68 million). Overall a statistically significant increase was observed for funding with an increasing pattern for local funding, Rs 104.7 million in 2013–14 to Rs 349.8 million in 2017–18 ($P < 0.02$). However, the pattern for international funding was inconsistent (Figure 1). A sharp increase in health research spending was seen in 2015–16 whereas there was only a gradual increase in number of publications during that period (Figure 2).

Overall, 24 796 original research articles were published during 2013–2018. Of these, 16 137 were in Medline indexed and 8659 in non-Medline indexed (local) journals. The overall number of publications annually per 100 000 population was 2.3, while publication in Medline indexed journals was 1.52 per 100 000 population annually. A gradual increase was seen in the number of publications over the years. This trend was significantly greater in Medline indexed journals compared with local non-Medline indexed journals (Figure 2) ($P < 0.04$).

The comparison of funding with the number of publications showed a strong correlation, Cronbach α 0.88 indicating that increasing funding had a positive impact on the research output. However, the correlation between funding and pattern of publication, i.e. Medline indexed and non-Medline indexed, was not statistically significant.

## Discussion

Our findings showed that health research output, i.e. number of publications, was directly associated with adequate resources. It has been reported that increasing expenditure on health has a direct effect on increasing publications (*12*). Health research is important for any country to identify health-related problems and gaps for improvement, and provides evidence-based information to the policy-makers to frame health policies. It is equally important for all countries, however, it attains greater significance in the developing and resource-poor countries. It has been reported that health research in South Asia is scarce and has little role at policy level (*13*).

**Table 1 Details of local and international health research spending in Pakistan, July 2013–June 2018**

| Year | Spending (million Pakistan rupees) | | | | | |
|---|---|---|---|---|---|---|
| | Local | | | | International | Total |
| | Higher Education Commission | Pakistan Science Foundation | Pakistan Health Research Council | Institutional | | |
| 2013–14 | 7.43 | 1.23 | 4.10 | 4.08 | 87.86 | 104.7 |
| 2014–15 | 8.21 | 2.69 | 2.62 | 51.11 | 8.50 | 73.13 |
| 2015–16 | 129.45 | 6.53 | 10.2 | 57.15 | 95.42 | 298.75 |
| 2016–17 | 241.88 | 8.83 | 14.77 | 71.82 | 97.89 | 435.19 |
| 2017–18 | 259.86 | 4.03 | 2.85 | 64.28 | 18.81 | 349.83 |
| Total | 646.83 | 23.31 | 34.54 | 248.44 | 308.48 | 1261.6 |

**Figure 1 Spending [Pakistan rupees (Rs)] on health research during 2013-2018**
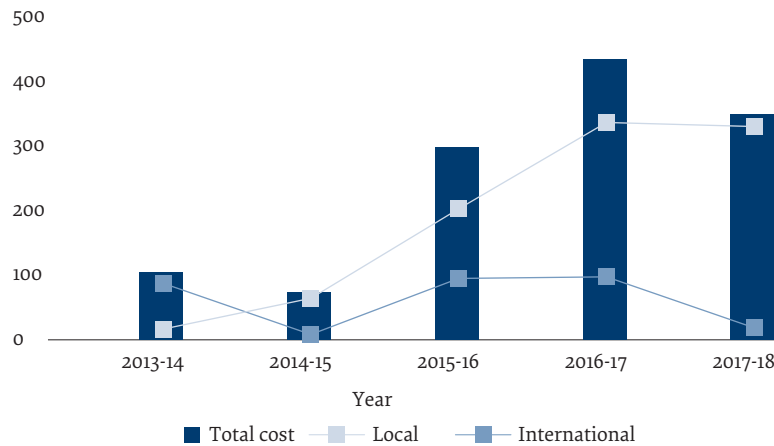


Pakistan is a developing country with a double burden of communicable and noncommunicable diseases, and ranks among the top 10 countries having a high burden of tuberculosis, hepatitis, diabetes, etc. (14). The overall health budget is low and health research is not on the list of priorities. In our study, total spending on health research for the last 5 years was US$ 1.68 million, about 0.000003% of GDP (2018) in Pakistan. The health research funding in India was US$ 1.42 billion, about 0.09% of GDP (13). The research and development expenditure was 0.68% of GDP in Egypt, 0.47% in Qatar and 0.49% in the United Arab Emirates (15). In the current study, we saw a gradual increase in the number of publications, with a significant rise in articles in Pubmed indexed journals, which has a significant association with health research funding. It has been shown that research output has a direct relation with polices and health research funding (16). It has been reported that Pakistan has contributed 8% of the PubMed indexed publications made from the countries of the WHO Region for the Eastern Mediterranean. Further comparison of Medline publications in Pakistan gave a value of 1.52 per 100 000 population per year, less than

Kuwait (12.5), Tunisia (10.5) and Qatar (9.5), but greater than Syria (< 1), Sudan (< 1) and Yemen (< 1) (15).

In order to reduce the burden of disease and provide quality services to the public, there is a need to generate scientific evidence for proper utilization of the available resources. The current findings are a positive indication for health research in the country but there are potential challenges, including the low priority given to research at government level and consequent poor funding and lack of incentive, resulting in a constant brain drain and absence of a national priority list. Further, there is no uniform funds dispersal system as the Pakistan Health Research Council, Higher Education Commission and Pakistan Science Foundation working in isolation, resulting in duplication and waste of money. Similarly, the majority of international donors have their own priorities for research and only a few of them are actually funding the country's needs-based research.

As is evident, major health research funding is derived from the public sector, thus, the current economic crisis might have a direct impact on health research. The

**Figure 2 Number of publications on health research in Pakistan during 2013–2018**
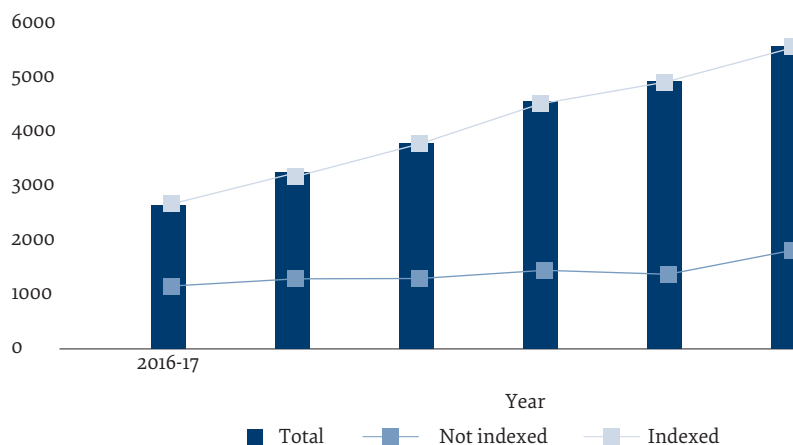
government has already slashed many development projects. There are growing fears of low funding for the Higher Education Commission and other research organizations, ultimately affecting the research output. To maintain the momentum and face the challenge, the mindset needs to change from "research as spending" to "research as investment". The government should enhance funding in research with proper allocation in the budget. Allocated funds should be dispersed through a uniform and coordinated mechanism for rational utilization. The international donors could be sensitized on the key health issues to increase inflow; researchers should also explore international funding opportunities. It will be disastrous for Pakistan if it fails to maintain the momentum of health research in the country.

Although it is mandatory for all institutions to obtain ethical clearance from the National Bioethics Committee for international grants and for those at national level, in some cases the institution may take ethical clearance from the local institutional ethical review board for small scale studies. Therefore, it is possible that information from some of the projects may have been missed and this constitutes a limitation of our study.

## Le financement de la recherche en santé et ses résultats au Pakistan
### Résumé

**Contexte :** La recherche en santé est très importante pour élaborer des politiques fondées sur des bases factuelles.

**Objectifs :** Évaluer le financement de la recherche en santé et ses résultats au cours des cinq derniers exercices fiscaux (de 2013 à 2018) au Pakistan.

**Méthodes :** Les informations sur le financement de la recherche en santé ont été obtenues auprès de trois grands organismes locaux – la Commission de l'enseignement supérieur, la Fondation pakistanaise des Sciences et le Conseil pakistanais de la recherche en santé. Les données concernant le financement par des donateurs internationaux ont été collectées et le nombre de publications a été estimé à partir de PubMed et PakMediNet.

**Résultats :** Un total de 1261,6 millions de roupies pakistanaises (8,4 millions de dollars des États-Unis) a été dépensé pour la recherche en santé au cours des cinq derniers exercices fiscaux, provenant en grande partie de donateurs locaux (*p* < 0,02). Le financement global est passé de 104,7 millions de roupies en 2013-2014 à 349,8 millions de roupies en 2017-2018. Dans les données relatives aux publications, 24 796 articles originaux ont été publiés, dont 16 137 indexés et 8659 non indexés dans Medline. Dans l'ensemble, on constate une augmentation progressive du nombre de publications par an, celle-ci est statistiquement significative pour les revues indexées dans Medline. Le financement de la recherche présentait une forte corrélation (alpha de Cronbach de 0,88) avec les publications.

**Conclusion :** Le financement de la recherche en santé a une incidence directe sur ses résultats. Il doit être considéré comme un investissement et non comme une dépense.

## تمويل البحوث الصحية ونواتجها في باكستان

محمد عارف نديم سقيب، إبرار رفيق

### الخلاصة

**الخلفية:** للبحوث الصحية أهمية بالغة في صياغة السياسات المُسنَدة بالبيِّنات.

**الأهداف:** هدفت هذه الدراسة إلى تقييم تمويل البحوث الصحية ونواتجها خلال السنوات المالية الخمس الماضية (2013–2014 حتى 2018) في باكستان.

**طُرق البحث:** حصلنا على معلومات عن تمويل البحوث الصحية من ثلاث مؤسسات محلية رئيسية، هي: هيئة التعليم العالي، ومؤسسة العلوم الباكستانية، ومجلس البحوث الصحية الباكستاني. وحصلنا على تفاصيل التمويل من الجهات المانحة الدولية، وقُدِّر عدد المنشورات الواردة في قاعدة بيانات PubMed وPakmedinet.

النتائج: أُنفق ما مجموعه 1261.6 مليون روبية باكستانية (8.4 ملايين دولار أمريكي) على البحوث الصحية في السنوات المالية الخمس الماضية، ومعظمها من جهات مانحة محلية (القيمة الاحتمالية > 0.02). وارتفع إجمالي التمويل من 104.7 ملايين روبية باكستانية في الفترة 2013–2014 إلى 349.8 مليون روبية باكستانية في الفترة 2017–2018. وبالنسبة لبيانات المنشورات، فقد نُشرت 24796 مقالة أصلية، منها 16137 مقالة مُفهرسة في قاعدة بيانات مدلاين، و8659 مقالة غير مُفهرسة في قاعدة البيانات ذاتها. وعمومًا، كانت هناك زيادة تدريجية في عدد المنشورات سنويًا، وهي ذات دلالة إحصائية للمجلات المُفهرسة في قاعدة بيانات مدلاين. وكانت هناك علاقة قوية بين تمويل البحوث (معامل ألفا كرونباخ 0.88) والمنشورات.

الاستنتاجات: يؤثِّر تمويل البحوث الصحية تأثيرًا مباشرًا في ناتج تلك البحوث. وينبغي اعتبار التمويل المخصَّص للبحوث الصحية استثمارًا وليس إنفاقًا.

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# مَعارِف وسُلوكيَّات الأفراد تجاه الفَواصِد نَاقِلات الليشمانيات بمدينة الحَاجب وسَط المَغرِب

كريمة المهدي،[1] محمد فخاوي،[2] مريم رزق،[3] يسرى الناصح،[3] عبد القادر شهلاوي[4]

Karima El-Mouhdi,[1] Mohammed Fekhaoui,[2] Mariam Rzeq,[3] Yousra Ennassih[3] and Abdelkader Chahlaoui[4]

[1]Laboratoire de la Géo-biodiversité et Patrimoine Naturel, centre GEOPAC, institut scientifique-Rabat, Université Mohamed V. Maroc (Correspondence to: karimaelmouhdi@gmail.com) [2]Institut Scientifique, Rabat, Maroc. [3]Institut Supérieur des Professions Infirmières et Techniques de Santé Annexe Meknès. [4]Equipe de Gestion et valorisation des ressources naturelles, Laboratoire Santé et environnement, Faculté des Sciences, Université Moulay Ismail, Meknès, Maroc

## الخلاصة

**الخلفية:** تُعدُّ الفَواصِد نَواقِل نشيطة لعدَّة أمْراض، ومنها الليشمانيات التي يَعْتزِمُ المَغرِبُ القضاءَ عَليها بِحُلُول 2030. وَرُغمَ الجُهود المَبذُولة للحدِّ مِن انتشارها، ما زَالَت تُمثِّل مشكلة صِحيَّة عامَّة في البلاد، ذلك أن لِسُلوك الأفرَاد تُجاه الفَواصِد دَورًا مُهِمًّا في استِمرَارية حَلقَة الوَباء.

**الأهداف:** هدفت هذه الدراسة إلى كَشفُ وتَحديد المَعارف والسُّلوكيَّات المُتعلِّقة بالفَواصِد.

**طرق البحث:** الاعتِمَادُ علَى المَنهَج الكَمِّي الاستقصائي باستخدام أُسْلوب المُقابَلة الشَّخصية، ومُعطيات الحَالة الوَبائية لِّيشْمانيَّات بمدينة الحاجب لإجراء البَحث الميداني خلال أبرَيل/ نيسان ومايو/ أَيَار 2019، وشمل 281 شخصًا.

**النتائج:** 61.6٪ من المغاربة يُسَمُّون الفَواصِد باسْم "الشنيولَة"، و44.1٪ يَعتقدون أنَّها غير ناقلة للأمرَاض، وأنَّها تَتَكاثر في المياه المُلوَّثة (41.3٪)، و52.7٪ يَظنُّون أنه لا يُمكِن تَجنُّب لدَغاتها، و6.4٪ أقرُّوا بدَوْر الأفراد في محَاربة النَّواقِل.

**الاستنتاجات:** ضرورة التَّوعية الجَماهيريَّة بمَخاطِر الفَواصِد والاستفَادة مِنَ المَفَاهيم الشَّعْبية التي خلص إليها البحث لتَبْسيط المُصطلحات العِلْمية وبَلوَرَة سياسَات تَثْقيفيَّة صِحِّية هَادفة تَجعَل الفَرْدَ طَرَفًا فَاعلًا في مُكَافحة النَّواقِل.

## مقدمة

تُشكِّل الحشرَات النَّاقلة للأمرَاض عامِلًا رَئيسيًّا في المَراضَة والوفيات عَبر العَالَم، إذ إنَّ أكثر من 80٪ من سكان العالَم مُعَرَّضون لخَطر واحد مِنَ الأمراض المَنْقولة بواسطة النَّواقِل (1). وتُعتَبر الفَواصِدُ، أو ما يُعرف بذباب الرمل، نَواقِل نشيطة لعدة أمراض أهمُّها الليشمانيات التي صَنَّفَتها مُنظَّمة الصِّحة العالمية على أنَّها أمراضٌ مَداريَّة مهملةٌ تُصيبُ أفقَرَ الفُقَراء في العَالَم، وتمثل مُشكلة صحِّية عامَّة في بُلدان إقليم شرق المتوسط، ومن بينها المَغرِب (6 –5، 4، 3، 2). وتشير الإحصاءات الأخيرة لوزارة الصحة إلى تزايد الإصابة بالليشمانيات، كما أن عدد الحالات المسجلة على الصعيد الوطني لا يتجاوز 35٪ من مجموع حالات الإصابة المعلن عنها (7).

وعلى الرغم من توافر المعلومات فيما يخص المرض، لا تتوفر معلومات كافية عن سلوك الأفراد وتعامُلهُم مع مُسَبِّبه. كَما أن فهمَ السِّياق المحلِّي لكل مجتمع بكشف سُلوكيَّات أفراده تُجاه النَّواقِل يُمكِن المسؤولين من معرفة مَواطِن القوة والضَّعف في حلقة تَدبير الأمْراض الوبائية المنقولة بواسطة الحشرات. وضمن هذا الإطار تندرج هذه الدراسة، التي تهدف إلى تقديم فكرة عن مدى معرفة الأفراد بالفَواصِد وسُلوكيهم تُجاهَها في التصدِّي لخطرها ومكافحتها.

## تصميم الدراسة وطرق البحث

أُجريت الدراسة وسط المغرب بمدينة الحَاجب التي يبلغ عدد سكانها 247016 نسمة (8)، وتعتبر موقعًا فلاحيًّا وزراعيًّا بامتياز وقطبًا لاستقطاب الأيدي العاملة، إذ تساهم وحدها بنسبة 63٪ من المحصول الوطني لنبتة البصل.

لقد تم تصميم الدراسة بهدف الكَشف عن معارف وسلوكيات الأفراد تجاه الفَواصِد ناقلات الليشمانيات بالاعتماد على المنهج الكمي الاستقصائي. ومن أجل ذلك، تَمَّ الرُّجوع إلى مُعطيات الحالة الوبائية الأخيرة للمرض بالمدينة في الفترة (2013–2017) التي كشفت عن وجود كلا النوعين من الليشمانيات، خاصة في المناطق القروية (9). ثُمَّ استهَدَفنا المناطق التي سجلت فيها حالات الليشمانيات، والتي غالبًا ما يكون سكانها على دِرايَة بالمرض، ممَّا يَرفَعُ حُظوظنا في الحصولِ على إجابات تَتعلَّق بمَعرفة الفَواصِد.

وقد أُجرِيَت الدِّراسة خلال شهري أبريل/ نيسان ومايو/ أيار 2019، وشمَلت 281 شخصًا. وقد كانت المنهجية المتبعة لتصميم الدراسة هي نفسها التي اعتمدها خان وزملاؤه (10). أما جمع المعلومات، فقد كان عن طريق المقابلة الشخصية بواسطة الاستمارة التي تم تصميمها على طريقة فراري (11)، وتَمَّت تَجربَتُها مُسْبَقًا على خمسة أشخاص مع إجراء تعديلات طفيفة عليها قبل استخدامها، وشملت الجوانب الآتية: (أ) المعطيات الاجتماعية والديمغرافية؛ (ب) معارف وسلوكيات الأفراد تجاه الفَواصِد؛ (ج) الطرق التي يستعملها الأفراد لمكافحتها.

وقد أجريت المقابلات بمساعدة فريقين من طلبة الإجازة (البكالوريوس) في مهن التمريض وتقنيات الصحة، الذين يتقنون اللهجتين المحليتين المتداولتين (العربية والأمازيغية)، ويعرفون جيدًا كيفية إجراء المقابلات بطريقة علمية وأخلاقية، وجمع المعلومات وتدوينها في الاستمارات. وقد أجرينا المقابلات في المنازل، وكانت معايير تضمين المشاركين هي أن يكونوا بالغين، ومن السكان الأصليين للمدينة، وأن يمثل كل فرد منزلًا، وأن يوافق على المشاركة

في الدراسة، وفي حالة الرفض يَتمُّ الانتقال إلى المنزل التالي. أما النتائج المُتحصَّل عليها، فقد تَمَّ جمعها وإدْخالها في برنامج إكسل (Excel) وتحليلها إحصائيًا وتقديمُها في جداول.

## الاعتبارات الأخلاقية

من الجدير بالذكر أنه قد تم احترام جميع المعايير الأخلاقية والأدبية في جمع المعلومات خلال هذا البحث، حيث قمْنا بداية بأخذ رُخْصَة المُوافقة من مصالح المندوبية َللصحة بالإقليم لإجراء البحث الميداني لدى ساكني المدينة. وأخذنا الموافقة الشفهية من جميع المشاركين، الذين جرى إطلاعهم على أهداف الدِّراسة والاحْترامِ الكامل لسرِّيَة هُوِيَّاتهم وإجَاباتهم. وفي نهاية كُلِّ مقابلةَ، تَمَّ تقديم اَلمعلومَات الكافية لِلمشاركين عن الفواصد وخَطرها ودورها في نَقْل اللَيشانيات وطُرُق الوقايَة مِنها.

## نتائج الدراسة

### خصائص المشاركين

يوضح الجدول رقم 1 الخصائص الاجتماعية والديمغرافية للمشاركين من حيث العمر، والجنس، ومستوى التعليم، والمهنة، ومكان الإقامة. ويلاحظ أن أعمار المشاركين قد تَراوَحت بين 16 و67 سنة، حيث شَكَّلت الفئة العمرية [41-50] أعْلى نِسْبة في المشاركة 26.7٪. و55.2٪ من المشاركين يَقطنون البادية، وأغلبُهم يَنتمون إلى أسَر فقيرة ذات مستوى اجتماعي ضعيف لا يتعدَّى دخل أسرهِم ما يُعادِل 300 دولار أمريكي في الشهر، وَ53.4٪ لهُم نِظامُ المُساعَدة الطبية للفِئات المُعوزَة.

### معرفة المواطنين بالفواصد وبقدرتها على نقل الأمراض

يعرض الجدول رقم 2 نتائج البحث حول معارف وتصورات المواطنين تجاه الفواصد وأماكن عيشها وتكاثرها، وكذلك قدرتها على نقل الأمراض. وعن التسمية المحلية للفواصد بالمنطقة سألناهم، فَكان جوَاب 62٪ منهم يُطلقونَ عليها اسم ‘‘الشَّنيولَة’’، و35٪ يسمونها ‘‘اَلنَّامُوس’’. وعندما سألناهم: ‘‘هل في نظركم، يوجد فرق بين الفواصد والبعوض؟’’ اتضح أن أغلبيتهم (70٪) يَعتقدونَ أنَّهُ لا يوجَد فَرْق.

وفيما يُخص معرفة أماكن توالد الفواصد وتكاثرها، فقد تبين أن هناك مَن يظن أن ذلك يكون في المياه (41٪)، وخاصة الملوثة منها (23٪)، وهناك من يعتقد أن ذلك يكون في الأماكن الوَسخة (29٪)، لكن نسبة قليلة فقط

الجدول رقم 1 توزيع عينة الدراسة (العدد و النسبة المئوية) حسب المستوى التعليمي، الفئة العمرية و النوع و الحالة الاجتماعية، الدخل الشهري و نسبتهم المئوية، الحالة الاجتماعية، الهيئة، التغطية الصحية و مكان الإقامة

| المتغير | عدد الذين أجابوا و نسبتهم المئوية | | | | | | المجموع |
|---|---|---|---|---|---|---|---|
| وسط العيش | حضري 126(44.8٪) | قروي 155(55.2٪) | | | | | 281(100٪) |
| الفئة العمرية | [16-20] 17(6.0٪) | [21-30] 61(21.7٪) | [31-40] 69(24.6٪) | [41-50] 75(26.7٪) | فما فوق 50 سنة 54(19.2٪) | بدون إجابة 5(1.8٪) | 281(100٪) |
| المستوى التعليمي | أمي 79(28.1٪) | ابتدائي 97(34.5٪) | إعدادي 62(22.1٪) | ثانوي 23(8.2٪) | جامعي 17(6.0٪) | بدون إجابة 3(1.1٪) | 281(100٪) |
| المهنة | ربة بيت 76(27.0٪) | موظف 33(11.7٪) | فلاح / مزارع 58(20.6٪) | مستخدم 28(10.0٪) | تلميذ 45(16.0٪) | مهن أخرى 41(14.6٪) | 281(100٪) |
| النوع الاجتماعي | النساء 191(68.0٪) | الرجال 91(32.0٪) | | | | | 281(100٪) |
| الحالة الاجتماعية | عازب 46(16.4٪) | متزوج 210(74.7٪) | أرمل 16(5.7٪) | مطلق 9(3.2٪) | | | 281(100٪) |
| الدخل الشهري للأسرة | أقل من 3000 درهم 157(55.9٪) | [3000-5000] 69(24.6٪) | [5000-7000] 38(13.5٪) | فوق 7000 درهم 17(6.0٪) | | | 281(100٪) |
| التغطية الصحية | الصندوق الوطني لمنظمات الاحتياط الاجتماعي 23(8.2٪) | الصندوق الوطني للضمان الاجتماعي 44(15.7٪) | نظام المساعدة الطبية 150(53.4٪) | بدون 64(22.8٪) | | | 281(100٪) |
| نوع السكن | منزل تقليدي مصنوع من الخشب و الطوب و القصدير 64(22.8٪) | منزل تقليدي مصنوع من الأسمنت 121(43.1٪) | منزل عصري حديث 71(25.3٪) | ثكنة 23(8.2٪) | فيلا 2(0.7٪) | | 281(100٪) |

الجدول رقم 2 توزيع المواطنين حسب معرفتهم للنفوسد و القدرة على نقل الأمراض

| السؤال | الجواب | العدد | النسبة المئوية (٪) | السؤال | الجواب | العدد | النسبة المئوية (٪) |
|---|---|---|---|---|---|---|---|
| هل وجود الحشرات من حولك يضايقك؟ | نعم | 176 | 62.6 | هل أخبرت من قبل عن الأمراض التي تنقلها القوارض؟ | نعم | 99 | 35.2 |
| | لا | 105 | 37.4 | | لا | 182 | 64.8 |
| إذا كان الجواب بنعم في التي يضايقك منها (يمكن الإجابة بعدة اختيارات)؟ | كثيرا | 36 | 20.5 | إذا كانت الإجابة بنعم فمن طرف من؟ | الإنترنت | 47 | 47.5 |
| | لدرجة | 72 | 40.9 | | صديقي / الجار | 45 | 45.5 |
| | طبيعي | 68 | 38.6 | | التلفاز | 39 | 39.4 |
| في نظرك هل يوجد فرق بين القوارض و اليعسوب؟ | نعم | 196 | 69.8 | | مهني الصحة | 24 | 24.2 |
| | لا | 76 | 27.0 | | راديو | 6 | 6.1 |
| | لا أعرف | 9 | 3.2 | | الدراسة | 2 | 2.0 |
| ما هي النسبة الحالية للقوارض عندكم؟ | الشبرلة | 173 | 61.6 | أن ينقل في نظرك هل يمكن للقوارض الأمراض؟ | نعم | 95 | 33.8 |
| | الناموس | 97 | 34.5 | | لا | 124 | 44.1 |
| | لا أعرف | 11 | 3.9 | | لا أعرف | 62 | 22.1 |
| هل تعرف وقت نشاط وبعض القوارض (يمكن الإجابة بعدة اختيارات)؟ | عند الغسق و الفجر | 37 | 13.2 | إذا كانت الإجابة بنعم، فلمن يمكنكم نقل الأمراض؟ | الإنسان | 67 | 70.5 |
| | خلال منتصف الليل | 58 | 20.6 | | الحيوان | 26 | 27.4 |
| | خلال النهار | 47 | 16.7 | | الإنسان و الحيوان معا | 76 | 80.0 |
| | في كل الأوقات | 50 | 17.8 | | الأشجار و النباتات | 4 | 4.2 |
| | لا أعرف | 89 | 31.7 | | لا أعرف | 19 | 20.0 |
| هل تعرف اماكن توالد القوارض؟ | البيء بكل أنواعها | 116 | 41.3 | و ما هي هذه الأمراض؟ | الإسهال | 7 | 7.4 |
| | البيء الراكدة | 32 | 11.4 | | الملاريا | 3 | 3.2 |
| | البيء الملوثة | 64 | 22.8 | | الحمى | 23 | 24.2 |
| | الأماكن الرطبة | 19 | 6.8 | | الحساسية | 36 | 37.9 |
| | الأماكن بخفة | 3 | 1.1 | | الأمراض الجلدية | 87 | 91.6 |
| | الأماكن الباردة | 22 | 7.8 | | الليشمانيات | 21 | 22.1 |
| | الأماكن الوسخة و الملوثة فيها يتم التخلص | 81 | 28.8 | | أمراض العين | 17 | 17.9 |
| | فيها من النفايات و القمامة | 128 | 45.6 | | الربو | 2 | 2.1 |
| | فضلات الإنسان و فضلات الحيوانات | 62 | 22.1 | | أشعر بالدوار | 2 | 2.1 |
| | لا أعرف | 48 | 17.1 | | أجل لكني لا أعرف اسم المرض | 7 | 8.4 |
| | | 47 | 16.7 | | | | |

جدول رقم 3  الطرق المتبعة من طرف المواطنين للحماية من لدغات الحشرات نواقل الأمراض ووجهة نظرهم في مسؤولية القضاء عليها

| النسبة المئوية (٪) | العدد (n=281) | الجواب | السؤال |
|---|---|---|---|
| 26.0 | 73 | وزارة الصحة فقط | في رأيك، هل القضاء على الحشرات نواقل الأمراض يتطلب تدخل: |
| 18.5 | 52 | وزارة الفلاحة فقط | (ممكن الإجابة بعدة اختيارات) |
| 10.7 | 30 | وزارة الداخلية فقط (البلدية) | |
| 8.4 | 24 | الوزارات الثلاث | |
| 6.4 | 18 | الشخص نفسه | |
| 3.6 | 10 | الجمعيات والمنظمات غير الحكومية | |
| 21.4 | 60 | مسؤولية مشتركة ما بين الجميع | |
| 2.8 | 8 | المجتمع المدني و المحلي | |
| 2.1 | 6 | لا أعلم | |
| 42.7 | 120 | نعم | في رأيك، هل يمكن تجنب الفواصد؟ |
| 52.7 | 148 | لا | |
| 4.6 | 13 | لا أعرف | |
| 90.8 | 109 | الحبق أو الريحان | إذا كانت الإجابة بنعم، فكيف يمكن ذلك؟ |
| 60.0 | 72 | الخل | |
| 55.8 | 67 | سم الحشرات (مسحوق) | |
| 45.8 | 55 | الحامض | |
| 15.8 | 19 | النعناع | |
| 9.2 | 11 | الشيح | |
| 20.0 | 24 | النظافة | |
| 7.5 | 9 | زيوت | |
| 2.5 | 3 | اللواية | |
| 1.7 | 2 | الازير | |
| 1.7 | 2 | السالمية | |
| 69.8 | 196 | قنينة أو مضخة المبيدات الحشرية | للحماية من لدغات الحشرات ، هل تستخدم: |
| 52.3 | 147 | نباتات | |
| 46.6 | 131 | شبكات النوافذ | (ممكن الإجابة بعدة اختيارات) |
| 24.9 | 70 | ارتداء القمصان ذات أكمام طويلة | |
| 23.1 | 65 | ستائر عند الأبواب | |
| 20.3 | 57 | ارتداء السراويل | |
| 17.8 | 50 | موزعات كهربائية للمبيدات الحشرية | |
| 17.1 | 48 | الناموسيات في الأبواب والنوافذ | |
| 12.8 | 36 | مروحة (مكيف الهواء) | |
| 8.9 | 25 | ناموسيات مشربة بالمبيدات الحشرية | |
| 1.8 | 5 | الناموسيات حول الأسرة | |
| 13.5 | 38 | طرق أخرى | |

(17.1٪) أشارت إلى رَوْثِ البَهائمِ ومَطارِحِ النُّفاياتِ كَمَكانٍ لتوَالُدِ الفَواصِدِ.

أما معرفة المواطنين بقُدْرَة الفواصد على نَقْل الأمراض، فقد تبين أن ما يُقارب نصفَ المشاركين (44٪) يعتقد أنّ هذه الحَشرات غير قادرة على نقَل الأمراض، في حين أن 34٪ فقط أشاروا إلى أنها ناقلة للأمراض. ومن بين هذه الأمراض نجد الأمراض الجلدية (31٪)،

والحساسية (13٪)، والحمى (8٪)، والليشمانيات (7٪)، وأمراض العين (6٪).

### سلوكيات المواطنين لتجنب الفواصد ومسؤولية القضاء عليها

يوضح الجدول رقم 3 سلوكيات الأفراد لتجنب خطر الفواصد وأهم

وجود ثقافة الوقاية من الحشرات ''Entomoprophylaxie''، التي تنبني على قناعة أساسية مفادها أن أي شخص بإمكانه تفادي خطر لدغات الفواصد، وبالتالي تجنب الإصابة بالأمراض. لكن طرق الوقاية من لدغات الحشرات الموصى بها من جانب الخبراء تختلف تمامًا عن تلك التي ذكرها المشاركون، والتي غالبًا ما تعتمد على استعمال النباتات أو على رش المبيدات الحشرية، أما الناموسيات المشربة بالمبيدات الصامدة لأمد طويل والتي توصي بها منظمة الصحة العالمية (16)، فلم تتم الإشارة إلى استعمالها إلا من جانب نسبة قليلة جدًا من المبحوثين. ومن جهة أخرى، فقد أظهرت دراستنا أن مكافحة نواقل الأمراض لا تلقى اهتمامًا لدى الأفراد، على اعتبار أن معظمهم يعدونها من مسؤوليات وزارة الصحة وحدها، وهذا يتعارض كليًا مع توصيات المنظمة التي تؤكد أن محاربة نواقل الأمراض في المناطق المدارية يتطلب نهجًا متكاملًا بين مختلف الأطراف، يضمن تكامل أدوار القطاعات المعنية وإشراك الأفراد (2، 3-16).

## الاستنتاجات

خلاصة القول إذن أن هذه الدراسة قد كشفت من جهة عن الأفكار الخاطئة للمغاربة حول الفواصد، وعن نقص معرفتهم بها كحشرات ناقلة للأمراض، ومن جهة أخرى، عن عدم معرفتهم بدورهم الفعال في مكافحة نواقل الأمراض. وهذا يستوجب ضرورة بلورة سياسة توعية جماهيرية بخصوص ناقلات الليشمانيات بشكل يتناسب مع ثقافة المجتمع المغربي. وبمعنى آخر، يمكن استعمال هذه المفاهيم الشعبية لتبسيط المصطلحات العلمية وتكييفها بلغة المتلقي لتيسير عملية فهم واستيعاب الرسائل التربية الصحية، وبالتالي تسهيل انخراطه في عملية القضاء على الفواصد، وجعله طرفًا فاعلًا في محاربة النواقل.

## قوة وحدود الدراسة

من بين نقاط القوة لهذه الدراسة أنها تتطرق، ولأول مرة في المغرب العربي وبلدان شمال أفريقيا، للجوانب المعرفية والسلوكية للمواطنين تجاه الفواصد ناقلات الليشمانيات، التي لم يتم الحديث عنها من قبل، وأنها كشفت عن مصطلحات جديدة يمكن الاستفادة منها، وإدراجها في برامج التوعية الصحية الجماهيرية لمحاربة خطر الفواصد والحد من انتشار الليشمانيات بكل أشكالها. لكن، وبالمقابل، يمكن القول إن اعتماد المنهج الكمي وحده كان من أهم نقاط ضعف هذه الدراسة؛ ذلك أن استعمال المنهج الكيفي بالموازاة معه كان سيمكننا من فهم أكثر لأسباب ودوافع هذه السلوكيات الخاطئة.

الطرق المتبعة لمكافحتها. حيث تبين أن أكثر من نصف المشاركين (53٪) يعتقد أنه لا يمكن تجنب خطرها. في حين أن أولئك الذين أكدوا بأنه يمكن تجنبها قد صرحوا بأن ذلك يكون باستعمال نبات الريحان (39٪)، أو سم الحشرات (24٪). إلا أن استعمال الناموسيات المشربة بالمبيدات لم تتم الإشارة إليه إلا بنسبة 9٪. أما عن دور الأفراد في مكافحة النواقل، فقد تبين أن 6٪ فقط من المبحوثين أكدوا أن الشخص أيضًا مَسؤُول عن مكافحتها، و26٪ يعتقدون أنها مسؤولية وزارة الصحة وحدها.

## المناقشة

رغم أن المغرب وضع استراتيجية وطنية للإدارة المتكاملة لمكافحة النواقل، وبرنامجًا صحيًا وطنيًا لمحاربة الليشمانيات، فإنه ما زال يعاني من أضرار الفواصد على صحة المواطنين، وما زالت الليشمانيات مستوطِنة في عدة مناطق بالمملكة، بل إن عددها في تزايد مستمر(7).

إن معرفة الأفراد بالفواصد وبخطرها على صحة الإنسان والحيوان ضروري لإنجاح تحديات القضاء على الليشمانيات بحلول 2030، لكن الاعتقاد بعدم قدرتها على نقل الأمراض هو نوع من المعرفة العامية المكتسبة عن طريق التنشئة الاجتماعية التي يتم توارثها بين الأجيال، والتي تضم معارف وسلوكيات قد تكون خاطئة من الناحية العلمية، وتستوجب التدخل لتصحيحها عن طريق حملات التوعية السلوكية والتثقيف الصحي. وإذا كانت توعية الأفراد بخطر الفواصد تتطلب إيجاد قنوات للتواصل تكون فعالة وسهلة الفهم، فإن معرفة الاسم الذي يطلقونه باللغة المحلية على هذه الحشرة هو أول قناة يمكن استعمالها لرفع الوعي الصحي لدى الأفراد. وقد كشفت نتائج الدراسة الحالية عن اسمَي ''الشنيولة'' و ''الناموس'' كمرادفات للفواصد باللهجة المغربية وسط البلاد، كما أنها قد كشفت أيضًا عن وجود خلط بين الفواصد والبعوض لدى المغاربة، فكلاهما يشبه الآخر بالنسبة لمعظم المبحوثين، وقَليلٌ همْ مَن أقرُّوا بوُجُود فَرْق بَيْنَهُمَا. إضافة إلى ذلك، يمكن القول إن التسمية المحلية للفواصد بالمغرب لا تختلف فيما بين مناطقه الداخلية ومناطقه الجنوبية في جنوب شرق المغرب بمنطقتَيْ تنغير والراشيدية (12). كما أن عدم التمييز بين الفواصد والبعوض ليس حكَرًا على المغاربة، بل تم رصده أيضًا من قبل لدى سكان البنجاب بباكستان وفي أمريكا بالبرازيل والإكوادور، حيث كانت درجة الخلط كبيرة، ولا يتم التمييز بين ذباب الرمل والبعوض (15-14 ،13، 10).

وفيما يتعلق بالسلوكيات المتبعة من جانب المواطنين لتجنب لسعات الفواصد وغيرها من ناقلات الأمراض، فذلك يتطلب أولًا

# Knowledge and behaviour of individuals towards sandflies' vectors of leishmaniasis in Morocco

## Abstract

**Background:** Sandflies are active vectors of several diseases, including leishmaniasis, which Morocco hopes to eliminate by 2030. Despite efforts to limit their spread, they still remain a public health problem in the country, as the behaviour of individuals in relation to sandflies plays an important role in the sustainability of the epidemiological cycle.

**Aims:** To explore and determine the knowledge and behaviours related to sandfly diseases.

**Methods:** A quantitative method was adopted using a questionnaire assisted by a personal interview. Based on the epidemiological situation of leishmaniasis cases reported in recent years in Al-Hajeb province, we conducted a field survey among 281 persons in April and May 2019 residing in the communities where the cases of the disease are registered. Results: 61.6% of Moroccans know sandflies by the name "Chniwla"; 44.1% thought that sandflies do not transmit diseases; 41.3% thought they multiplied in contaminated water; 52.7% thought sandfly bites could not be avoided; and 6.4% recognized the role of individuals in the fight against vectors.

**Conclusions:** The need to raise public awareness of the risks of sandflies, using the popular concepts obtained to simplify scientific terms and formulate targeted health education strategies that make the individual an active player in vector control.

## Connaissances et comportements des individus envers les phlébotomes vecteurs des leishmanioses au Maroc

### Résumé

**Contexte :** Les phlébotomes sont des vecteurs actifs de plusieurs maladies, dont la leishmaniose, que le Maroc espère éliminer à l'horizon 2030. Malgré les efforts déployés pour limiter leur propagation, ils constituent encore un problème de santé publique dans le pays, le comportement des individus face aux phlébotomes jouant un rôle important dans la durabilité du cycle épidémiologique.

**Objectifs :** Examiner et déterminer les connaissances et les comportements liés aux maladies transmises par les phlébotomes.

**Méthodes :** Une méthode quantitative a été adoptée à l'aide d'un questionnaire accompagné d'un entretien personnel. En nous appuyant sur la situation épidémiologique des cas de leishmaniose rapportés ces dernières années dans la province d'Al-Hajeb, nous avons mené une enquête de terrain en avril et mai 2019 auprès de 281 personnes résidant dans les communautés où des cas de la maladie sont enregistrés.

**Résultats :** Parmi les Marocains, 61,6 % appellent les phlébotomes « Chniwla » ; 44,1 % pensent que les phlébotomes ne transmettent pas de maladies et 41,3 % qu'ils se multiplient dans l'eau contaminée. En outre, 52,7 % pensent que leurs piqûres ne peuvent être évitées. Par ailleurs, 6,4 % reconnaissent le rôle des individus dans la lutte contre les vecteurs.

**Conclusions :** Il est nécessaire de sensibiliser le public aux risques liés aux phlébotomes, en utilisant les concepts populaires recueillis pour simplifier les termes scientifiques et formuler des stratégies d'éducation sanitaire ciblées qui font de l'individu un acteur actif dans la lutte antivectorielle.

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# Systematic review and meta-analysis of the most common processed foods consumed by Iranian children

Mina Babashahi,[1] Nasrin Omidvar,[1] Bahareh Yazdizadeh,[2] Motahar Heidari-Beni,[3] Hassan Joulaei,[4] Saba Narmcheshm,[5,6] Azizollaah Zargaraan[7] and Roya Kelishadi[3]

[1]Department of Community Nutrition, National Nutrition and Food Technology Research Institute, Faculty of Nutrition Sciences and Food Technology, Shahid Beheshti University of Medical Sciences, Tehran, Islamic Republic of Iran (Correspondence to: N. Omidvar: omidvar.nasrin@gmail.com). [2]Knowledge Utilization Research Center, Tehran University of Medical Sciences, Tehran, Islamic Republic of Iran. [3]Department of Pediatrics, Child Growth and Development Research Center, Research Institute for Primordial Prevention of Non-Communicable Disease, Isfahan University of Medical Sciences, Isfahan, Islamic Republic of Iran. [4]Health Policy Research Center, Institute of Health, Shiraz University of Medical Sciences, Shiraz, Islamic Republic of Iran. [5]Students' Scientific Research Center, Tehran University of Medical Sciences, Tehran, Islamic Republic of Iran. [6]Department of Community Nutrition, School of Nutritional Sciences and Dietetics, Tehran University of Medical Sciences, Tehran, Islamic Republic of Iran. [7]Department of Food and Nutrition Policy and Planning Research, National Nutrition and Food Technology Research Institute, Faculty of Nutrition Sciences and Food Technology, Shahid Beheshti University of Medical Sciences, Tehran, Islamic Republic of Iran.

## Abstract

**Background:** The trend of increasing overweight and obesity among children is a huge burden on health systems. In this regard, the growing availability of processed foods, often energy dense and nutrient poor, has become a major concern. Changing this trend will require evidence-based policies.

**Aims:** This systematic review aimed to identify the most common processed/ultraprocessed foods consumed by 4–12-year-old Iranian children.

**Methods:** We searched PubMed, Scopus and Web of science, as well as Persian scientific search engines, including Iran Research Information System, Scientific Information Database and Mag-Iran. We also assessed grey literature, that is, national studies and papers presented at relevant Iranian congresses. All data collected from studies were converted to daily servings (S/D). Mean and standard deviations of the included results were combined by performing meta-analysis with a random effects model. The $I^2$ test was used to compute heterogeneity. Egger's test was used to assess publication bias.

**Results:** Ten studies with 67 093 children were included in this review. The meta-analysis demonstrated that the highest consumption of processed foods belonged to the sugars and sweets group with 8.01 S/D, followed by oils, and biscuits and cakes with 5.58 S/D and 3.33 S/D, respectively.

**Conclusion:** Given the high consumption of less healthy processed foods, robust policies to support healthy eating and help improve Iranian children's food environment are recommended.

## Introduction

Noncommunicable diseases (NCDs) are the major cause of morbidity and mortality in developing countries (1,2). There is strong evidence of the association between childhood obesity and early onset of adult NCDs (3,4). According to the World Health Organization, the global prevalence of childhood obesity has increased from 31 million children in 1990 to 42 million in 2013 (5). It is estimated that by 2025, the prevalence of overweight in preschool children will increase to 11% worldwide (6). The Islamic Republic of Iran, as a middle-income country, is dealing with childhood overweight and obesity as a serious public health challenge (7,8). The rate of overweight and obesity in Iranian children (aged 0–18 years) has increased from 5.5% in 2000 to 15.1% in 2013 (7). Moreover, a nationwide study in 2015 showed that > 20% of students aged 7–18 years had excess weight and abdominal obesity (9).

The consumption of processed foods (PFs) or ultraprocessed foods (UPFs) in children is a predisposing factor for childhood obesity and subsequent NCDs (10,11). UPFs are energy dense with more fat, sugar and/or sodium compared to fresh or minimally processed foods (10); therefore, their consumption can play a role in developing chronic diseases (10,12) and obesity (13), as well as increased risk of metabolic syndrome and total and low-density lipoprotein–cholesterol concentrations (14,15).

Children are a key target for marketing of UPFs (16) and their largest consumers in low- and middle-income countries (17). Children often have less control over their food environment and living in unhealthy food environments can encourage them to adopt low-quality food patterns (18). Therefore, reducing their exposure to food marketing is an important prevention strategy for obesity and NCDs (19). In the Islamic Republic of Iran over

the past decade, advertising of unhealthy food products with high levels of saturated fat, sugar, salt and trans fatty acids has been banned (20). However, regulatory laws prohibiting advertisements have been passed for the general population, with little reference to children (20). Additionally, there is a ban on food marketing and advertising in kindergartens and schools (21). However, 3 studies in Kerman, Tabriz and Tehran have shown that schools do not completely control unhealthy food advertisements in their environment (22–24). Since 2014, attempts have been made to improve school food environment through national school canteen regulations to increase access to healthy snacks and prevent the supply of foods with low nutritional value (25). Despite several years of implementation of this bylaw, > 50% of food items available in school canteens do not comply with the permitted food lists (23,24). Insufficient physical and economic infrastructure, inadequate monitoring, conflict of interest due to financial profitability of selling unhealthy food, high price of healthy foods, and shortage of healthy food alternatives are the main causes of incomplete implementation of the policy (23,24). Other programmes, such as provision of school milk, are examples of attempts to promote healthy foods for children in the Islamic Republic of Iran (26), which have had little success due to poor infrastructure and implementation (27–29).

Therefore, there is a need to upgrade existing policies or develop coherent and sustainable ones that can support a healthy food environment and ultimately benefit children's health (1,13). In this regard, lack of evidence on the status of children's food consumption, specifically with regard to PFs/UPFs is an issue. To our knowledge, there is no clear estimate of consumption of PFs in Iranian children, and previous studies have shown conflicting results. To fill this gap, this study aimed to systematically review the literature regarding the consumption of PF products in Iranian children aged 4–12 years.

## Methods

The protocol of this systematic review was registered at http://www.crd.york.ac.uk/PROSPERO/ as CRD42019134151. The study was reported in accordance with the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (30). The PO (population, outcome) criteria were used to formulate the review question (31, 32). Population characteristics included healthy Iranian children aged 4–12 years, and the outcome component referred to the type and amount of consumption of PFs or UPFs.

### Inclusion and exclusion criteria

The inclusion criteria to select articles for analysis were: cross-sectional and case–control studies that surveyed type and amount of PFs consumed by Iranian children aged 4–12 years. Consumption was reported as intake amount or frequency of intake of food items. Therefore, studies that reported other consumption units, such as the percentage of students who consumed food items, or presented ≥ 2 PFs together as a food group, were excluded.

NOVA (a name, not an acronym) system is a strategy for categorizing foods according to their degree of processing (33). According to the NOVA food framework, PFs are defined convenient or packaged foods that are commercially prepared to optimize ease of consumption (33). Most PFs contain 2 or 3 ingredients such as sugar, oil and salt (34). UPFs contain at least 1 item characteristic of the NOVA UPF group, including food substances never or rarely used in kitchens (e.g., hydrolysed proteins or high-fructose corn syrup), or cosmetic additives that make the final food product more delicious or pleasing (e.g., colours, foaming, flavours, emulsifiers, and carbonating agents) (34). Due to the limited access to information on ingredients of food items in the included studies, it was impossible to distinguish between PFs and UPFs. Therefore, we used the term PF to cover both. Studies that included individuals with the defined age range of 4–12 years were not considered for this review, unless extracting related data about this age range was possible. Only healthy children were included in the review and children with specific diseases such as diabetes or coeliac disease were excluded. We included studies conducted in the Islamic Republic of Iran in various settings, including community and schools, without any restriction on race, education level and socioeconomic status. Qualitative studies, commentaries, letters, or editorial were not included.

### Search strategy

Electronic databases, including PubMed, Scopus and Web of Science, and 3 Persian scientific search engines, Iran Research Information System (www.idml.research. ac.ir), Scientific Information Database (SID: www.sid. ir) and MagIran (www.magiran.com), were searched systematically. We also searched proceedings of child and nutrition-related congresses in the Islamic Republic of Iran and national studies (grey literature), as well as reference lists of included articles. Studies were selected without language restriction.

Key words were obtained from MeSH, Emtree, suggestions of experts, or extracted from related articles. The study syntax was formed from 3 components that combined together with the AND operator. The first component referred to all PF items that were searched together by operator OR and the following keywords: processed food, ultra-processed foods, packaged food, packed food, industrial food, prepared food, junk food, energy-dense foods, nutrient-poor foods, low-nutrient-density foods, fast food, snack, snack food, unhealthy snack, sweet snack, salty snack, savoury snack, carbonated beverage, carbonated drinks, soft drink, soft beverage, soda, nonalcoholic beverage, noncarbonated beverage, sugar-sweetened beverage, industrial juice, industrial fruit juice, unnatural juice, packaged fruit juice, unnatural juice, syrup, compote, preserves, jam, cooked fruit, canned food, milk, flavored milk, chocolate

milk, milk cacao, potato chips, fried potato, French fries, chips, potato crisps, puffed corn, puffs, Cheetos, cheese puffs, cheese curls, cheese balls, cheesy puffs, corn curls, corn cheese, Mexican corn, pretzels, chocolate, candy, cacao, sweets, confectionary, pastries, pie, pudding, cheesecake, baked desserts, doughnut, donuts, cake, industrial cake, cupcake, muffin, cookies, biscuit, cracker, wafers, Gaz, Sohan, Noghl, sandwiches, hamburger, sausage, bologna, bologna sausage, hot dog, cold cut, nugget, ham, pizza, Olivier salad, Russian salad, falafel, samosa, noodle, popsicles, freezer pop, ice pop, ice lolly, ice cream, tamarind, fruit strips, fruit roll, gum, chewing gum, pastilles, dragee, gelatin dragee, taffy, toffy, toffee, pickles, salty cucumber, salty nuts, salted nuts, Nutella, sauce, mayonnaise, ketchup, candies, sugar confectionary, marshmallows, smarties, puff pastry, sugars, Nabat, bologna sausage, bologna, freezer pop, fruit leather, jellies, gelatin dessert, jelly, breakfast cereal, cornflakes, butter, cream, tea-bag, coffee mix, bread, baguette bread, toast, spaghetti, macaroni, pasta, vermicelli, Kashk, caramel cream, Danette, dough, yogurt, yoghurt, cheese, oil, non-alcoholic beer, alcohol-free beer. Two other components included Iran as the study location and date of publication (1 January 1990 to 1 January 2019).

## Article screening and study selection

Two of the authors (MB and SN) independently conducted the stages of screening and study selection. Any disagreement between them was resolved through consensus, and if disagreement was not resolved, a third opinion was sought (NO). In primary screening, the title and abstract of collected studies were reviewed according to the inclusion and exclusion criteria. In the second phase of screening, full texts of the articles were evaluated. In the case of missing data in the included studies, authors were contacted to access and complete data. If we could not gain access to sufficient data after sending 3 emails over 6 weeks, the study was eliminated from the data synthesis process. We included the data from a national survey of weight disorders (35). Since we had access to the data from this national study, articles derived from it were excluded.

## Quality assessment

Two reviewers independently assessed the quality of included studies and disagreements were resolved through consensus. The corresponding author was also consulted whenever necessary. The quality of studies was assessed by the Newcastle–Ottawa Quality Assessment Scale (NOS) (36, 37). Based on NOS, case–control studies were scored from 1 to 9 points on 3 items: case and control group selection, comparability of groups, and assessment of the exposure. Also, cross-sectional studies were scored for sample selection (representativeness of the sample, sample size, nonrespondents, and ascertainment of the exposure), comparability of the subjects (adjustment for confounders), and assessment of the outcome (using validated tool or method and statistical analysis). Each cross-sectional study could receive a maximum score of

10. Studies were considered as unsatisfactory (score < 4), satisfactory (5 or 6), good (7 or 8), and very good (9 or 10).

## Data extraction

From each of the included studies, the following information was recorded in the data extraction table: first author's name, year of publication, study city/province of study, study setting (school or health centre), study design (cross-sectional or case–control), participant characteristics (age and sex), data collection method, type of processed food items, and quantitative data [sample size, means and standard deviations (SDs) of the amount or frequency of food intake and units of consumption]. In case–control studies, only the control group's data were extracted, which were related to healthy children.

## Data analysis

PF items were categorized into 7 groups based on the new Iranian food pyramid (38). Seven food groups are presented in 4 layers from bottom to top: bread and cereals; fruit and vegetables; meats and eggs, milk and dairy products, nuts and legumes; and miscellaneous, consisting of fats and sugar. After completing the data extraction table, the consumption data units were converted to mean daily intake (g/day) and then to daily servings. For reporting the total servings of each food group, the mean value and standard deviation of daily servings of consumption between two or more food items were pooled. The value of the standardized mean difference (SMD) using means and SDs of n groups were calculated as follows:

$$\text{Cohen's } d = \text{Mean}_1 - \text{Mean}_2 \ldots - \text{Mean}_n / \text{SD pooled}$$
$$\text{SD pooled} = \sqrt{[((s_1)^2 + (s_2)^2 \ldots + (s_n)^2)/n]}$$

Meta-analysis was performed for each food group, which was reported in at least 3 studies. The metaprop command in Stata (version 14) was run to calculate the pooled serving intake of PFs in Iranian children. Meta-analysis and subgroup analysis were performed by using random-effects inverse-variance weights.

$I^2$ statistical index was used for assessment of study heterogeneity. Interaction test ($\chi^2$) was conducted to compare subgroups by repeating subgroup analyses under the fixed-effects model. If a meta-analysis included > 3 studies, publication bias was estimated based on Egger's regression test (39), and $P < 0.05$ was considered indicative of statistically significant publication bias.

## Ethical considerations

The study protocol was approved by the National Nutrition and Food Technology Research Institute's Ethics Committee and received the ethic code: IR.SBMU.NNF-TRI.REC.1397.035.

## Results

As shown in the PRISMA diagram (Figure 1), out of 67 093 studies identified by searching databases and grey literature, 10 373 were excluded after removing duplicates. The title and abstract of 56 720 studies were screened based

**Figure 1 Flow diagram for the study selection process.**
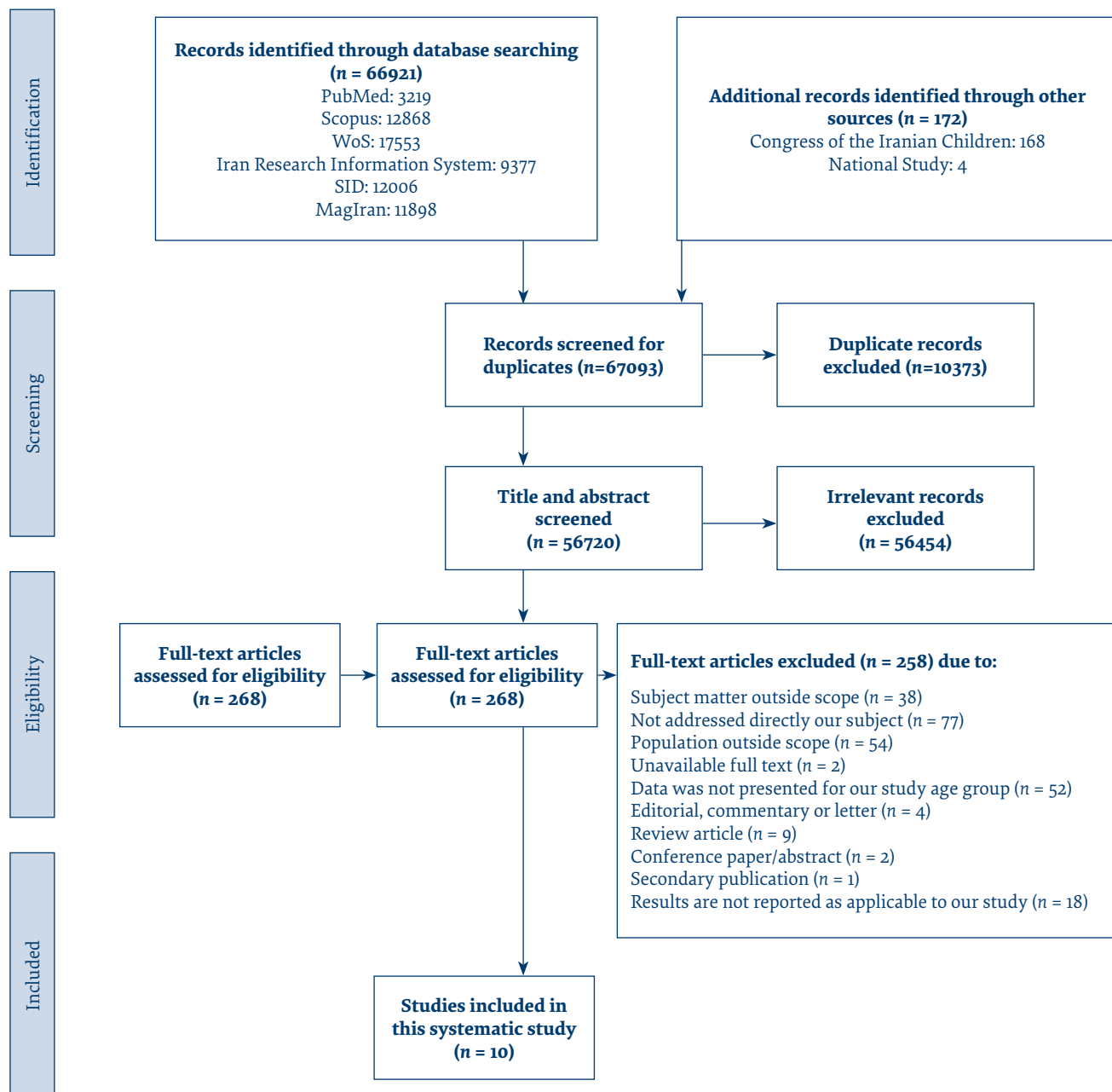


on the inclusion criteria, and 56 454 irrelevant studies were removed. Two studies were identified through hand searching of included studies' references and added to the full-text screening stage. Finally, of 268 full texts evaluated, 10 were eligible for inclusion. The characteristics of the included studies and the result of their quality assessment are presented in Table 1. The quality assessment of studies showed that 2, 3, 4 and 1 studies had very good, good, satisfactory, and unsatisfactory quality, respectively. Five studies reported food items in the bread and cereals group (35,40–43), 6 reported food items in the fruit group (35,40,42–45), 4 studies reported food items in the vegetable group (35,40,41,43), 5 studies reported food items in the meat group (35,40,42,43,45), 5 studies included food items in the nuts and legumes group (40,42–45), 5 studies included food items in the milk and dairy group

(35,40,41,43,46) and 9 studies reported food items in the miscellaneous group (35,40–45,47,48). Mean daily servings are shown in Table 2.

Based on the meta-analysis (Table 3), the highest-level consumption was for sugar and sweets (8.01 daily servings), oil (5.58 daily servings), biscuits and cakes (3.33 daily servings) and bread items (2.90 daily servings). There was substantial heterogeneity for soft drinks ($I^2 = 71.0\%$; $P = 0.004$) and a considerable heterogeneity for the other food items that reported in the minimum required number of studies for analysis ($I^2 > 94.00\%$; $P \leq 0.004$). Publication bias evaluated by Egger's regression test was considerable for bread, milk, ice cream, puffs and chips, and soft drinks ($P < 0.05$).

Subgroup analysis for sex and data obtained from forest plots are summarized in Table 4. Based

| First author, publication year | Type of study | City | Urban/ rural area | Setting | School type (public/ private) | Sample size | Age range (mean), yr | Sex | Data collection method | Data reported by | Quality assessment (score) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dorosty 2005 (47) | Case–control | Tehran | Urban | School | NA | 134 | 8–11 | Female | 24-h recall | Student | Good (7) |
| Dadkhah 2008 (41) | Cross-sectional | Tehran | Urban | School | Both | 761 | (7,66) | Both | 24-h recall and FFQ | Students and parents | Satisfactory (6) |
| Pourhashemi 2008 (48) | Cross-sectional | Tehran | Urban | School | NA | 788 | (7) | NA | FFQ | Students | Unsatisfactory (4) |
| Ghiasvand 2010 (44) | Cross-sectional | Shahinshahr va Meymeh | Urban | School | NA | 58 | 6–7 | NA | FFQ | NA | Satisfactory (6) |
| Mossaheb 2011 (45) | Cross-sectional | Tehran | Urban | Health center | – | 203 | 6–11 | Both | FFQ | Children | Very good (10) |
| Alizadeh 2012 (40) | Cross-sectional | Tabriz | Both | School | Public | 257 | 11–12 | Female | FFQ | student | Satisfactory (6) |
| Weight Disorder Study 2012 (35) | Cross-sectional | National study (31 provinces) | Both | School | Both | 3209 | 7–12 | Both | FFQ | Students and parents | Very good (10) |
| Esfarjani 2013 (42) | Case–control | Tehran | Urban | School | NA | 308 | (7) | Both | 24-h recall | Students and parents | Satisfactory (6) |
| Oghli 2016 (46) | Cross-sectional | Chabahar | Urban | School | NA | 170 | (11) | Female | Researcher-made questionnaire | parents | Good (8) |
| Amirhamidi 2017 (43) | Cross-sectional | Tehran | Urban | School | Both | 665 | 10–12 | Both | 24-h recall | student | Good (8) |

Table 1 Characteristics of the studies included in the systematic review

FFQ = Food Frequency Questionnaire; NA = not available.

on subgroup analysis, consumption of soft drinks and pickles was higher in boys (0.18 and 0.48 daily servings, respectively) compared with girls (0.15 and 0.17 daily servings, respectively). In contrast, girls had significantly higher consumption of macaroni and pasta, processed meat, milk, milk with added sugar, yogurt, ice cream, sugar and sweets, puffs and chips, butter, coffee, and sauce ($P < 0.001$).

## Discussion

This systematic review demonstrated that the highest consumption of PFs among 4–12-year-old children in the Islamic Republic of Iran was for sugar and sweets followed by oils, biscuits and cake, and bread. Iranian children have a high consumption of miscellaneous food groups, which does not correspond with the current recommendations. The Iranian food guide emphasizes reducing consumption of sugar-sweetened foods and beverages and soft drinks as low as possible (43). The findings endorse previous qualitative reports regarding the high consumption of junk foods, especially in children and adolescents in the Islamic Republic of Iran (49).

High consumption of energy-dense nutrient-poor foods, e.g., candies, sweets, biscuits, cakes, and cookies, has also been reported in children of other countries (14,50–53). Bread, candy, savoury snacks, cookies and other sweets were the main PFs and UPFs consumed by Brazilian children (14). A dietary survey in the United Kingdom of Great Britain and Northern Ireland showed that a small percentage of children followed the recommended daily intake of free sugar (51). Cereals and cereal products (33%), sugar, preserves and confectionery (23%), and nonalcoholic beverages (22%) were the main sources of free sugars in these children (51). A national health and nutrition survey in Mexico in 2012 also showed a higher energy contribution from UPFs among preschool children than other age groups, mainly due to high intake of ready-to-eat cereals, baby foods, juices and dairy drinks (53). According to a 2109 report by the United Nations Children's Fund on the state of the world's children, the diets of adolescents in low- and middle-income countries are nutritionally poor (50). Among school-going adolescents, 42% drink carbonated soft drinks at least once a day, while intake of fruit (34%) and vegetables (21%) is less than once a day (50). Almost half (46%) of children globally consume fast foods at least once a week (52).

The most important factors affecting this high consumption of nutrient-poor food items are availability, low price, media advertisements, and preference of fast food taste, diversity, attractiveness of packaging, inadequate awareness, and lifestyle changes (49,54,55). Assessment of the food products advertised on 2 major Iran national television networks during children's television programmes showed that calorie-dense foods, including chocolate, soft drinks, extruded cereals, ice cream, cookies and candies, were the most

**Table 2 Daily intake of foods in Iranian children**

| Food group | Food | Dorosty 2005 (47) | Dadlkhah 2008 (41) | Pourhashemi 2008 (48) | Ghiasvand 2010 (44) | Mossaheb 2011 (45) | Alizadeh 2012 (40) | Weight Disorder Study 2012 (35) | Esfarjani 2013 (42) | Oghli 2016 (46) | Amirhamidi 2017 (43) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bread and cereals | Bread | | 2.98 (2.68) | | | | 4.95 (3.62) | 0.4 (1.04) | 2.9 (2.13) | | 3.31(2.76) |
| | Macaroni and pasta | | 0.31 (0.1) | | | | 1.7 (1.34) | 1.35 (0.07) | | | 0.04 (0.24) |
| | Breakfast cereals | | | | | | | | | | 0.006 (0.067) |
| Fruits | Dried fruits | | | | | 0.21 | | | 0.14 (0.52) | | 0.003 (0.02) |
| | Fruit compote | | | | 0.01 (0.1) | 0.04 | 0.49(1.2) | 0.04 (0.15) | | | |
| | Fruit leather | | | | | | | | | | 0.04 (0.19) |
| Vegetables | Pickles | | 0.11 (0.05) | | | | 0.24 (0.45) | 0.20 (0.24) | | | 0.07 (0.16) |
| Meat | Processed meat | | | | | | 0.38 (0.37) | 0.13 (0.20) | | | 0.06 (0.16) |
| | Processed fish | | | | 0.12 (0.48) | | 0.12 (0.17) | 0.05 (0.33) | | | |
| Nuts and legumes | Nuts | | | | 0.33 (0.77) | | 0.79 (1.06) | | 0.27 (0.57) | | 0.43 (0.54) |
| | Nut spreads | | | | | | | | | | |
| | Seeds | | | | 0.27 (0.54) | | 0.29 (0.39) | | | | 0.05 (0.21) |
| Milk and dairy products | Milk | | 0.61 (0.71) | | | 3.85 | 1.7 (1.57) | 0.74 (0.79) | | 2.82 (2.84) | 0.005 (0.03) |
| | Milk with added sugar | | | | | 1.28 | 0.34 (0.38) | 0.10 (0.54) | | | 0.13 (0.19) |
| | Dough | | | | | | 0.99 (1.05) | 0.4 (0.45) | | 0.35 (0.32) | |
| | Yogurt | | 0.8 (1.01) | | | | 2.57 (2.41) | 1.64 (1.13) | | 0.36 (0.28) | 0.09 (1.12) |
| | Cheeses | | 0.31 (0.46) | | | | 0.73 (0.57) | 0.57 (0.50) | | 0.56 (0.42) | 0.64 (0.83) |
| | Ice cream | | 0.10 (0.20) | | 0.35(0.24) | | 0.26 (0.39) | 0.21 (0.27) | | 2.50 (1.64) | 0.02 (0.06) |
| | Kashk | | | | | | 0.03 (0.10) | | | | 0.04 (0.16) |
| Miscellaneous | Sugar and sweets | | 14.49 (11.88) | 0.25 (0.17 | 0.74 (1.06) | 3.25 | 15.74 (17.58) | 7.52 (1.41) | 17.0 (2.27) | | 0.69 (1.79) |
| | Biscuits and cakes | | | | 1.28 (0.93) | 1.33 | 2.04 (2.85) | 0.60 (0.73) | | | 9.41 (4.76) |
| | Jam | | | 0.05 (0.15 | | 0.5 | 2.67 (4.46) | 1.38 (2.63) | | | 0.63 (2.25) |
| | Fruit/vegetable juice | | | | 1.50 (2.46) | | 1.65 (2.06) | | | | 1.23 (0.41) |
| | Puffs and chips | | 0.11 (0.31) | | 0.28 (0.30) | 0.28 | 0.77 (0.89) | 0.47 (1.81) | | | 0.14 (0.32) |
| | Oil | | 8.25 (5.72) | | | | 10.02(11.81) | 3.53 (3.87) | | | 0.86 (1.94) |
| | Butter | | | | | | 3.32 (6.76) | 1.08 (1.58) | | | 0.6 (1.24) |
| | Cream | | | | | | 1.51 (2.27) | 0.41 (1.3) | | | 0.27 (1.37) |
| | Soft drinks | 0.15 (0.16) | | 0.16 (0.24) | 0.27 (0.64) | 0.73 | 0.2 (0.42) | 0.15 (0.05) | | | 0.19 (0.32) |
| | Coffee | | | | | | 0.43 (0.66) | 0.05 (0.07) | | | 0.01 (0.05) |
| | Sauce | | | | | | 3.00 (3.27) | 0.65 (1.46) | 0.86 (0.06) | | 4.4 (6.83) |

*Results presented as mean (standard deviation) daily servings.*

**Table 3 Results of meta-analysis of daily servings of foods in Iranian children and Egger's regression test for publication bias assessment**

| Food group | Food item | Results of meta-analysis | | | Results of Egger's regression test | | | Refs |
|---|---|---|---|---|---|---|---|---|
| | | Daily serving intake (95% CI) | I² (%) | P | coefficient | 95% CI | P | |
| Bread & cereals | Bread | 2.90 (1.16–4.64) | 99.8 | < 0.001 | 0.91 | 0.47–1.35 | 0.007 | (35, 40–43) |
| | Macaroni & pasta | 0.85 (1.0–1.59) | 100 | < 0.001 | 0.51 | −1.88 – 2.91 | 0.45 | (35, 40, 41, 43) |
| Vegetables | Pickles | 0.15 (0.09–0.21) | 99.4 | < 0.001 | 0.30 | −0.84 – 1.45 | 0.37 | (35, 40, 41, 43) |
| Meat | Processed meat | 0.18 (0.10–0.27) | 99.1 | < 0.001 | 0.81 | −6.21 – 7.85 | 0.37 | (35, 40, 43) |
| | Processed fish | 0.09 (0.03–0.15) | 94.2 | < 0.001 | 0.23 | −2.69 – 3.15 | 0.49 | (35, 40, 44) |
| Nuts& legumes | Nuts | 0.45 (0.28–0.63) | 94.4 | < 0.001 | 0.03 | −2.14 – 2.21 | 0.95 | (40, 42, 43, 44) |
| Milk & dairy products | Milk | 1.12 (0.65–1.59) | 99.9 | < 0.001 | 0.89 | 0.22–1.55 | 0.02 | (35, 40, 41, 43, 46) |
| | Milk with added sugar | 0.19 (0.10–0.27) | 97.7 | < 0.001 | 0.99 | −3.76 – 5.75 | 0.23 | (35, 40, 42, 43) |
| | Dough | 0.56 (0.38–0.74) | 97.7 | < 0.001 | 0.53 | −3.82 – 4.87 | 0.37 | (35, 40, 46) |
| | Yogurt | 1.08 (0.39–1.77) | 99.8 | < 0.001 | 0.88 | −1.32 – 3.09 | 0.29 | (35, 40, 41, 43, 46) |
| | Cheeses | 0.56 (0.42–0.70) | 98.3 | < 0.001 | 0.31 | −0.63 – 1.25 | 0.37 | (35, 40, 41, 43, 46) |
| | Ice cream | 0.41 (0.30–0.52) | 99.7 | < 0.001 | 1.07 | 0.65–1.49 | 0.002 | (35, 40, 43, 44, 46, 47) |
| Miscellaneous | Sugars & sweets | 8.01 (4.17–11.85) | 100 | < 0.001 | 0.60 | −0.58 – 1.25 | 0.06 | (35, 40–44, 48) |
| | Biscuits & cakes | 3.33 (0.28–6.38) | 99.9 | < 0.001 | 0.85 | −2.95 – 4.66 | 0.43 | (35, 40, 43, 44) |
| | Jam | 1.15 (0.27–2.03) | 99.7 | < 0.001 | 0.86 | −0.33 – 2.05 | 0.09 | (35, 40, 43, 48) |
| | Fruit–vegetable juice | 1.43 (1.09–1.77) | 82.1 | 0.004 | 0.31 | −0.99 – 1.05 | 0.76 | (35, 40, 43, 44) |
| | Puff & chips | 0.34 (0.20–0.49) | 98.4 | < 0.001 | 1.08 | 0.21–1.95 | 0.02 | (35, 40, 41, 43, 44) |
| | Oil | 5.58 (3.0–8.16) | 99.8 | < 0.001 | 0.58 | −0.61 – 1.78 | 0.17 | (35, 40, 41, 43) |
| | Butter | 1.32 (0.82–1.81) | 98.1 | < 0.001 | 0.58 | −1.94 – 3.11 | 0.20 | (35, 40, 43) |
| | Cream | 0.69 (0.32–1.05) | 97.0 | < 0.001 | 0.96 | −6.64 – 8.56 | 0.35 | (35, 40, 43) |
| | Soft drink | 0.17 (0.15–0.18) | 71.0 | 0.004 | 0.17 | 0.04–0.30 | 0.01 | (35, 40, 43, 44, 47, 48) |
| | Coffee | 0.09 (0.05–0.13) | 99.5 | < 0.001 | 0.89 | −3.86 – 5.65 | 0.25 | (35, 40, 43) |
| | Sauce | 1.93 (1.56–2.29) | 99.2 | < 0.001 | 0.53 | −0.25 – 1.31 | 0.09 | (35, 40, 42, 43) |

*CI = confidence interval.*

**Table 4 Results of sex subgroup analysis of daily servings of foods in Iranian children**

| Food group | Food item | Subgroup variable | Daily serving intake (95% CI) | $I^2$ (%) | $P$ | Interaction test ($\chi^2$) | $P$ |
|---|---|---|---|---|---|---|---|
| Bread & cereals | Bread | Girl | 2.77 (0.12–5.42) | 99.7 | < 0.001 | 1.72 | 0.190 |
| | | Boy | 2.02 (0–5.15) | 99.7 | < 0.001 | | |
| | | Overall | 2.39 (1.85–2.92) | 99.6 | < 0.001 | | |
| | Macaroni & pasta | Girl | 0.95 (0.03–1.88) | 99.9 | < 0.001 | 57.39 | < 0.001 |
| | | Boy | 0.54 (0.00–1.55) | 99.9 | < 0.001 | | |
| | | Overall | 0.79 (0.32–1.25) | 99.8 | < 0.001 | | |
| Vegetables | Pickles | Girl | 0.17 (0.05–0.30) | 99.4 | < 0.001 | $1.2 \times 10^5$ | < 0.001 |
| | | Boy | 0.48 (0.00–1.28) | 100 | < 0.001 | | |
| | | Overall | 0.30 (0.00–0.72) | 100 | < 0.001 | | |
| Meat | Processed meat | Girl | 0.18 (0.09–0.27) | 99.3 | < 0.001 | 48.88 | < 0.001 |
| | | Boy | 0.09 (0.04–0.13) | 95.8 | < 0.001 | | |
| | | Overall | 0.14 (0.09–0.18) | 98.9 | < 0.001 | | |
| Milk & dairy products | Milk | Girl | 1.25 (0.69–1.81) | 99.8 | < 0.001 | 6.39 | 0.011 |
| | | Boy | 0.38 (0.00–1.11) | 99.9 | < 0.001 | | |
| | | Overall | 0.54 (0.47–0.62) | 99.8 | < 0.001 | | |
| | Milk with added sugar | Girl | 0.18 (0.09–0.28) | 97.8 | < 0.001 | 24.16 | < 0.001 |
| | | Boy | 0.10 (0.06–0.15) | 95.2 | < 0.001 | | |
| | | Overall | 0.15 (0.10–0.19) | 97.1 | < 0.001 | | |
| | Yogurt | Girl | 0.98 (0.47–1.50) | 99.7 | < 0.001 | 1630.88 | < 0.001 |
| | | Boy | 0.92 (0.00–2.45) | 99.6 | < 0.001 | | |
| | | Overall | 0.97 (0.38–1.57) | 99.8 | < 0.001 | | |
| | Cheese | Girl | 0.61 (0.55–0.68) | 82.2 | < 0.001 | 5.69 | 0.017 |
| | | Boy | 0.61 (0.47–0.75) | 85.5 | < 0.001 | | |
| | | Overall | 0.61 (0.56–0.65) | 83.0 | < 0.001 | | |
| | Ice cream | Girl | 0.57 (0.40–0.74) | 99.7 | < 0.001 | 93.54 | < 0.001 |
| | | Boy | 0.11 (0.00–0.29) | 99.8 | < 0.001 | | |
| | | Overall | 0.32 (0.23–0.40) | 99.7 | < 0.001 | | |
| Miscellaneous | Sugars & sweets | Girl | 7.70 (1.85–13.56) | 99.7 | < 0.001 | 10.71 | 0.001 |
| | | Boy | 4.32 (0.00–11.39) | 99.8 | < 0.001 | | |
| | | Overall | 6.19 (3.56–8.82) | 99.7 | < 0.001 | | |
| | Biscuits & cakes | Girl | 4.01 (0.00–8.07) | 99.8 | < 0.001 | 0.10 | 0.750 |
| | | Boy | 4.99 (0.00–13.63) | 99.9 | < 0.001 | | |
| | | Overall | 4.20 (3.52–4.89) | 99.8 | < 0.001 | | |
| | Jam | Girl | 1.49 (0.76–2.23) | 95.7 | < 0.001 | 0.72 | 0.395 |
| | | Boy | 1.02 (0.22–1.83) | 97.4 | < 0.001 | | |
| | | Overall | 1.27 (0.87–1.67) | 95.4 | < 0.001 | | |
| | Puffs & chips | Girl | 0.46 (0.12–0.80) | 99.5 | < 0.001 | 6.31 | 0.012 |
| | | Boy | 0.29 (0.00–0.59) | 99.5 | < 0.001 | | |
| | | Overall | 0.39 (0.20–0.58) | 99.3 | < 0.001 | | |
| | Oil | Girl | 4.35 (2.30–6.40) | 99.4 | < 0.001 | 0.05 | 0.825 |
| | | Boy | 2.40 (0.00–5.48) | 99.8 | < 0.001 | | |
| | | Overall | 3.51 (2.09–4.93) | 99.5 | < 0.001 | | |
| | Butter | Girl | 1.39 (0.79–2.00) | 96.9 | < 0.001 | 122.99 | < 0.001 |
| | | Boy | 0.38 (0.00–0.89) | 97.7 | < 0.001 | | |
| | | Overall | 0.95 (0.49–1.41) | 98.3 | < 0.001 | | |
| | Cream | Girl | 0.71 (0.23–1.18) | 96.8 | < 0.001 | 0.37 | 0.541 |
| | | Boy | 0.34 (0.18–0.51) | 81.1 | < 0.001 | | |
| | | Overall | 0.51 (0.34–0.69) | 94.2 | < 0.001 | | |
| | Soft drink | Girl | 0.15 (0.13–0.18) | 71.4 | < 0.001 | 12.19 | < 0.001 |

**Table 4 Results of sex subgroup analysis of daily servings of foods in Iranian children** *(concluded)*

| Food group | Food item | Subgroup variable | Daily serving intake (95% CI) | I² (%) | P | Interaction test (χ²) | P |
|---|---|---|---|---|---|---|---|
| | | Boy | 0.18 (0.13–0.23) | 83.0 | < 0.001 | | |
| | | Overall | 0.16 (0.14–0.18) | 82.4 | < 0.001 | | |
| | Coffee | Girl | 0.10 (0.06–0.15) | 99.2 | < 0.001 | 4.22 | 0.040 |
| | | Boy | 0.03 (0.00–0.07) | 99.6 | < 0.001 | | |
| | | Overall | 0.06 (0.03–0.08) | 99.2 | < 0.001 | | |
| | Sauce | Girl | 2.70 (0.44–4.97) | 99.2 | < 0.001 | 17.46 | < 0.001 |
| | | Boy | 2.39 (0.00–6.05) | 98.7 | < 0.001 | | |
| | | Overall | 2.39 (0.00–6.05) | 98.8 | < 0.001 | | |

frequent (56). In another study, snacks (plum paste and fruit leather), fruit juice, and flavourings (tomato paste) were the top 3 food products being advertised during children's television programmes on 2 Iranian television channels (57). These finding endorse the necessity of developing restrictive policies on food marketing to children and monitoring their implementation (20).

There was a high level of heterogeneity in the present study, probably because of the limited number of studies and not having access to the data to find the heterogeneity sources. Future systematic reviews could benefit from focusing on the reasons behind such heterogeneity, including socioeconomic status, age, sex, nutritional literacy, parental educational level, and study setting. A study on Brazilian children has reported a higher intake of UPFs, such as cookies, pastries and sweet breads, and carbonated sugar-sweetened beverages among children of mothers with higher education levels (58). Also, children from higher-income households consumed more UPFs (59), while another study found that children from poorer backgrounds were significantly more likely to consume foods excessively high in calories, such as chips, fries, candies, and chocolate, at least once a week (60).

The overconsumption of energy-dense, nutrient-poor foods increases the risk of inadequate intake of nutrients needed by children (59,61). A study on children aged 8–18 years in the United States of America showed that increased consumption of food items with low nutritional quality (i.e., sugar-sweetened beverages and candy) was associated with decreased intake of some vitamins (e.g., vitamin A and folic acid) and minerals (e.g., zinc, calcium and iron) (61).

In the present study, the meta-analysis by sex subgroups showed that girls had a higher intake of sugar and sweets, pasta, processed meat, milk, milk with added sugar, yogurt, ice cream, puffs and chips, butter, coffee, and sauce compared with boys, while consumption of soft drinks and pickles was higher in boys. There were no significant differences between the sexes in consumption of bread, cheese, jam, biscuits and cakes, oil, and cream. This result is partly inconsistent with a study in 1441 Bangladeshi adolescents who found that consumption of ready-to-eat/instant foods, sweets, confectioneries and similar packaged products, and sugar-sweetened beverages was significantly higher in boys than in girls (62).

This systematic review showed that there are limited data on PF intake by Iranian children according to their area of residence, and only 1 study has compared food consumption in rural and urban children (35). In urban children, the highest consumption of food items was related to sugar and sweets (11.78 daily servings vs 9.91 in rural children), while in rural children, consumption of oils was significantly higher than in their urban counterparts (5.35 vs 2.56 daily servings). This observation differs from that reported in Cambodia, where consumption of fats and oils in urban school children was higher than in rural children of all ages (63). A study in Indonesian children and adolescents showed a higher percentage of coffee consumption in rural areas, while those in urban areas had a higher consumption of sugar-sweetened beverages, caffeinated soft drinks and energy drinks, fatty fried foods, refined carbohydrates, and preserved meat (55).

Our study had several limitations. Firstly, the number of included studies was low. Meta-analysis for processed meat, processed fish, butter, cream and coffee was only performed on 3 studies and may had led to unreliable results. We did not exclude them due to their importance and significance. Therefore, further research needs to address the consumption of these foods in Iranian children. Secondly, we observed a considerable publication bias across the studies for certain food items (bread, milk, ice cream, soft drink, and puffs and chips). It is suggested that future studies examine the consumption of these food items in children. Thirdly, because of the small number of studies, we could not compare the consumption between study settings, school type, and socioeconomic and demographic subgroups. Fourthly, while the present study aimed to evaluate the consumption of PFs and UPFs in children aged 4–12 years, there was a lack of data on food consumption of children aged 4–5 years. Future studies need to pay particular attention to assessing food intake in this age group.

## Conclusion

To our knowledge, this study is the first systematic review and meta-analysis to report consumption of PFs in

Iranian children, and it has valuable data that can be useful for policy-makers regarding PF consumption in Iranian children. This study revealed that Iranian children are overconsuming PFs containing a high amount of sugar and/or fat. Improving their dietary habits requires pragmatic policies and tailored programmes to support a

healthy food environment. Decreasing the dietary share of unhealthy PFs could substantially improve the nutritional quality of children's diets and contribute to the primary prevention of diet-related NCDs.

## Examen systématique et méta-analyse des aliments transformés/ultratransformés les plus couramment consommés par les enfants iraniens

### Résumé

**Contexte :** La tendance à l'augmentation du surpoids et de l'obésité chez les enfants représente une charge énorme pour les systèmes de santé. À cet égard, la disponibilité croissante d'aliments transformés, souvent riches en énergie et pauvres en nutriments, est devenue une préoccupation majeure. Pour inverser cette tendance, des politiques fondées sur des données factuelles sont nécessaires.

**Objectifs :** Le présent examen systématique visait à identifier les aliments transformés/ultratransformés les plus couramment consommés par les enfants iraniens âgés de 4 à 12 ans.

**Méthodes :** Nous avons effectué des recherches sur PubMed, Scopus et Web of Science, ainsi que sur des moteurs de recherche scientifiques en persan, notamment Iran Research Information System, Scientific Information Database et Mag-Iran. Nous avons également évalué la littérature grise, c'est-à-dire les études nationales et les documents présentés lors de congrès iraniens dans ce domaine. Toutes les données recueillies lors des études ont été converties en portions par jour. Les écarts types et moyens des résultats inclus ont été combinés en effectuant une méta-analyse à l'aide d'un modèle à effets aléatoires. Le test I² a été utilisé pour calculer l'hétérogénéité. Le test d'Egger a servi à évaluer les biais de publication.

**Résultats :** Dix études portant sur 67 093 enfants ont été incluses dans cet examen. La méta-analyse a démontré que la plus forte consommation d'aliments transformés correspondait au groupe des sucres et des produits sucrés avec 8,01 portions par jour, suivi des huiles, et des biscuits et gâteaux avec 5,58 portions par jour et 3,33 portions par jour, respectivement.

**Conclusion :** Compte tenu de la forte consommation d'aliments transformés peu sains, il est recommandé de mettre en place des politiques solides pour soutenir une alimentation saine et contribuer à améliorer l'environnement alimentaire des enfants iraniens.

## الاستعراض المنهجي والتحليل التلوي للأغذية المعالَجة/ الفائقة المعالَجة الأكثر شيوعًا التي يستهلكها الأطفال الإيرانيون

مينا باباشاهي، نسرين أوميدفار، بهاره يزدي زاده، مطهر حيدري بني، حسن جولاي، سابا نارمشيشم، عزيز الله زرجاران، رويا كليشادي

### الخلاصة

الخلفية: يمثل الاتجاه المتزايد لزيادة الوزن والسمنة في صفوف الأطفال عبئًا ثقيلًا على النُّظُم الصحية. وفي هذا الصدد، أصبح تزايد توافر الأغذية المعالَجة، التي غالبًا ما تكون كثيفة الطاقة ومفتقرة إلى المغذيات، مصدر قلق كبير. وسيستلزم تغيير هذا الاتجاه وضع سياسات مُسنَدة بالبيِّنات.

الأهداف: هدف هذا الاستعراض المنهجي إلى تحديد الأغذية المعالَجة/ الفائقة المعالَجة الأكثر شيوعًا التي يستهلكها الأطفال الإيرانيون الذين تتراوح أعمارهم بين 4 أعوام و12 عامًا.

طُرق البحث: بحثنا في قواعد بيانات PubMed وScopus وWeb of science، بالإضافة إلى محركات البحث العلمية الفارسية، ومن بينها نظام معلومات البحوث الإيرانية، وقاعدة البيانات العلمية، وموقع Iran–Mag. وأجرينا كذلك تقييمًا للمنشورات غير الرسمية، أي الدراسات والأوراق البحثية الوطنية المقدَّمة في المؤتمرات الإيرانية ذات الصلة بالموضوع. وحوَّلنا جميع البيانات التي جُمعت من تلك الدراسات إلى حصص يومية. وأجرينا تحليلًا تلويًّا بنموذج عشوائي للآثار، من أجل الجمع بين الانحرافات المتوسطة والمعيارية للنتائج التي تمخضت عنها الدراسات. واستُخدم اختبار I² لحساب التباين. واستُخدم اختبار إيجر لتقييم تحيُّز النشر.

النتائج: شمل هذا الاستعراض عشر دراسات ضمَّت 67093 طفلًا. وأظهر التحليل التلوي أن أعلى استهلاك للأغذية المعالَجة كان من نصيب فئة السكريات والحلويات بانحراف معياري 8.01، تليها الزيوت، ثم البسكويت والكعك بانحراف معياري 5.58 وانحراف معياري 3.33 على التوالي.

<div dir="rtl">

**الاستنتاجات**: نظرًا لارتفاع استهلاك الأغذية المعالَجة المتدنية من الناحية الصحية، يُوصى باتباع سياسات قوية لدعم تناول الأغذية الصحية والمساعدة على تحسين البيئة الغذائية للأطفال في إيران.

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# Associations between caesarean births and breastfeeding in the Middle East: a scoping review

Miho Sodeno,[1] Hannah Tappis,[1] Gilbert Burnham[1] and Mija Ververs[1]

[1]Department of International Health, Johns Hopkins University Bloomberg School of Public Health, Baltimore, United States of America (Correspondence to: M. Sodeno: sodenomiho@yahoo.co.jp).

## Abstract

**Background:** There is a paucity of published studies on factors influencing feeding practices for infants and young children born via caesarean section.

**Aims:** To assess whether the mode of childbirth affects early initiation and exclusive breastfeeding, and to identify factors that positively or negatively influence breastfeeding after caesarean births in selected countries in the Middle East.

**Methods:** We conducted a scoping review of publicly available population-based surveys and peer-reviewed literature on the associations between birthing mode and breastfeeding published between 2000 and 2018. The search identified 33 demographic surveys and 16 studies containing information on the mode of childbirth and breastfeeding in selected countries in the Middle East listed in PubMed, Embase, and CINAHL databases. Searches were completed in March 2019.

**Results:** Demographic surveys in 6 participating Middle Eastern countries demonstrated increased rates of births by caesarean section. All 3 countries with ≥ 3 datasets available demonstrated that early initiation of breastfeeding was less likely after caesarean section than after vaginal births. Eleven studies analysed differences in breastfeeding outcomes between caesarean section and vaginal births, and all of them identified significant differences between birthing modes. Five studies addressed factors influencing breastfeeding after caesarean births.

**Conclusion:** Caesarean births are associated with a higher risk of delayed initiation of breastfeeding as well as early cessation of exclusive breastfeeding.

Keywords: maternal health, newborn health, breastfeeding, caesarean section, Middle East

## Introduction

Caesarean section can be a life-saving intervention for mothers and newborns in the event of specific obstetric and fetal complications. However, the procedure poses increased risks of infection, haemorrhage, and postpartum depression that could cause maternal and perinatal deaths in low- and middle-income countries (1). There has been extensive debate about appropriate prevalence of caesarean births in a population, as rates in many countries have increased above the 10–15% considered to be optimal (2). The World Health Organization (WHO) has expressed concerns regarding caesarean section rates in many settings, as population-based rates > 10% are not correlated with reductions in maternal and neonatal mortality (3).

In the Middle East, the average annual rates of caesarean delivery are among the highest in the world (4). Exclusive breastfeeding rates are low compared with those in other regions, despite the fact that breastfeeding has a multitude of benefits for women and children (5). WHO recommends that breastfeeding should begin within the first hour of birth (early initiation) and that all infants should be exclusively breastfed from birth to 6 months of age (6). The early cessation of breastfeeding is proven to increase risks of infection, nutritional problems, future obesity, and asthma (7,8).

The association between the mode of childbirth and breastfeeding is an issue that deserves further exploration in the Middle East. Previous reviews have identified mode of childbirth as one of many factors associated with breastfeeding practices; others include maternal education, infant–mother separation, and maternal smoking (9,10). We are not aware of any publications examining caesarean section and breastfeeding rates in national population surveys from the Middle East, or reviews that focus specifically on factors affecting breastfeeding practices after caesarean section. The aims of this study were to explore the relationship between mode of childbirth, early initiation and exclusivity of breastfeeding, and identify factors that positively or negatively influence breastfeeding after caesarean deliveries in the Middle East.

## Methods

We conducted a scoping review of publicly available national surveys conducted between 2000 and 2018, and peer-reviewed literature published in English between 2000 and 2018. Inclusion criteria were as follows. Loca-

tions of interest: countries in the Middle East, including Bahrain, Egypt, Islamic Republic of Iran, Iraq, Israel, Palestine, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates (UAE), and Yemen. Outcomes of interest: (1) early initiation of breastfeeding: initial provision of breast milk to an infant within 1 hour after birth; (2) delayed initiation of breastfeeding: initial provision of breast milk to an infant > 1 hour after birth; and (3) exclusive breastfeeding: sustenance of the infant solely on breast milk for the first 6 months of life, without the addition of any other food or beverages including water.

For the data review, we searched the Demographic and Health Surveys (DHS) Program website (11), Multiple Indicator Cluster Surveys (MICS) website (12), and Ministry of Health and Ministry of Statistics websites of each country for population-based surveys completed between 2000 and 2018. Earlier surveys were excluded from this research because exclusive breastfeeding was categorized between 0 and 3 months in many national surveys and initiation of breastfeeding was not often evaluated. Data on caesarean delivery, early initiation of breastfeeding and exclusive breastfeeding rates were extracted from surveys meeting eligibility criteria. Chi-square tests were used to compare the proportions of women with vaginal and caesarean births who reported early initiation of breastfeeding.

For the literature review, we searched CINAHL, Embase and PubMed for studies published in English between January 2000 and December 2018. The search strategy included populations and outcomes of interest (caesarean and breastfeeding), locations of interest (selected countries in the Middle East), and time period of interest (January 2000–December 2018). Searches were completed in March 2019. The lead author screened all titles and abstracts to exclude duplicates and determine potential eligibility for inclusion, and then proceeded with full-text screening to identify observational studies (e.g., cross-sectional, cohort), quasi-experimental and experimental studies reporting on caesarean section and breastfeeding. The quality of each included study was independently assessed by 2 reviewers, using Critical Appraisal Tools developed by the Joanna Briggs Institute (13); discrepancies were discussed and resolved by a third reviewer.

The following data were extracted from all included studies: authors, year of publication, study location (country), study design, study sample size and location, measured outcomes, and findings related to caesarean section and breastfeeding. For studies comparing breastfeeding outcomes between caesarean section and vaginal birth, odds ratios (ORs) for delayed initiation of breastfeeding (not initiating within 1 hour after birth) and cessation of exclusive breastfeeding before 6 months of age were extracted from studies or calculated based on data presented. Where reported, the proportion of women who breastfed was compared across modes of childbirth. The Chi-square tests was used and point estimates and confidence intervals for the ORs were calculated.

$P < 0.05$ was considered to be statistically significant. For studies reporting on factors influencing breastfeeding practices, findings were analysed by country and theme, with a focus on factors influencing early initiation of breastfeeding and exclusive breastfeeding practices after caesarean deliveries.

## Results

### Data review

Thirty-three national population-based surveys from 10 countries in the Middle East were identified for inclusion in this review: 12 DHS surveys, 10 MICS, and 11 other national surveys (11,12,14,15). No English-language survey reports or datasets were identified from Bahrain, Israel, Kuwait, Saudi Arabia and the UAE. Table 1 shows the rates of caesarean section, early initiation of breastfeeding, and exclusive breastfeeding reported in each survey and the odds of early initiation of breastfeeding after caesarean birth in countries with ≥ 3 demographic surveys during the review period.

Eight of the 9 countries (all except Yemen) reported caesarean section rates > 15%. Egypt, Iraq, Islamic Republic of Iran, Palestine and Syrian Arab Republic reported increases in caesarean section rates over time. Only Yemen reported caesarean section rates decreasing over time: from 8.5% in 2003 to 4.8% in 2013. Over the same time period, early initiation of breastfeeding rates also increased in the Syrian Arab Republic and Yemen. Egypt, Iraq and Palestine reported increasing caesarean section rates and decreasing rates of early initiation of breastfeeding. There were no apparent patterns in the prevalence of exclusive breastfeeding. It was lowest in Yemen in 2013 (< 10%).

When comparing changes in the rates of caesarean section and early initiation of breastfeeding, there was a decrease in the rates of the early initiation of breastfeeding along with increasing caesarean section rates in Egypt, Iraq and Palestine. There was also a decrease in exclusive breastfeeding rates and an increase in caesarean section rates in Egypt. For example, the caesarean section rate in Egypt increased from 28% to 52% between 2008 and 2014, while the rate of early initiation of breastfeeding decreased from 53.8% to 27.1%, and the exclusive breastfeeding rate decreased from 52.8% to 39.5%.

Three countries conducted ≥ 3 comparable national population-based surveys during the study period: Egypt (DHS: 2000, 2003, 2005, 2008 and 2014), Iraq (MICS: 2006, 2011 and 2018) and Jordan (DHS: 2002, 2007, 2012 and 2017). Analysis showed a relationship between caesarean section and early initiation of breastfeeding rates, indicating that early initiation of breastfeeding was less likely after caesarean section than after vaginal birth. Table 1 presents data from the most recent surveys indicating that caesarean section was negatively associated with early initiation of breastfeeding in Egypt [OR: 0.48, 95% confidence interval (CI): 0.44–0.52], Jordan

**Table 1 Caesarean and breastfeeding rates reported in national surveys, 2000–2018, and odds of early initiation of breastfeeding[a] after caesarean births compared to vaginal births in the Middle East**

| Country | Survey | Outcomes of interest[b] | | | Odds of early initiation of breastfeeding after caesarean compared to vaginal births[c] |
|---|---|---|---|---|---|
| | | Caesarean rate (%) | Early initiation of breastfeeding[a] rate (%) | Exclusive breastfeeding rate[d] (%) | OR (95% CI) |
| Egypt | DHS 2000 [10] | 10.3 | 53.9 | 56.1 | 0.47 (0.41–0.53) |
| | DHS 2003 [10] | 11.5 | 49.1 | 30.4 | 0.33 (0.28–0.39) |
| | DHS 2005 [10] | 19.9 | 40.1 | 41.1 | 0.40 (0.36–0.45) |
| | DHS 2008 [10] | 28.0 | 53.8 | 52.8 | 0.42 (0.38–0.46) |
| | DHS 2014 [10] | 52.0 | 27.1 | 39.5 | 0.48 (0.44–0.52) |
| Iraq | MICS 2006 [11] | 20.6 | 30.6 | 25.4 | 0.24 (0.20–0.28) |
| | MICS 2011 [11] | 22.2 | 42.8 | 19.4 | 0.25 (0.22–0.28) |
| | MICS 2018 [11] | 33.0 | 32.4 | 25.8 | 0.11 (0.09–0.14) |
| Islamic Republic of Iran | DHS-style 2000 [10] | — | — | 44.1 | — |
| | MoH 2005 [11] | 40.4 | — | — | — |
| | IrMIDHS 2010 [10] | 45.6 | 68.7 | 53.1 | — |
| Israel | --- | — | — | — | — |
| Jordan | DHS 2002 [10] | 16.0 | 34.5 | 26.7 | 0.32 (0.27–0.38) |
| | DHS 2007 [10] | 18.5 | 37.2 | 21.8 | 0.26 (0.22–0.30) |
| | DHS 2012 [10] | 28.0 | 18.6 | 22.7 | 0.14 (0.11–0.18) |
| | DHS 2017 [10] | 25.8 | 67.0 | 25.5 | 0.44 (0.40–0.48) |
| Kuwait | — | — | — | — | — |
| Lebanon | MICS 2000 [11] | — | — | 26.6 | — |
| | PAPFAM 2004 [11] | — | 41.3 | — | — |
| | CAS 2009 [14] | — | — | 14.8 | — |
| Oman | ONS 2000 [11] | --- | 84.8 | --- | — |
| | ONS 2009 [11] | --- | 82.6 | --- | — |
| | MICS 2014 [11] | 19.4 | 71.1 | 32.8 | — |
| | NNS 2017 [11] | --- | 82.0 | 23.2 | — |
| Qatar | MICS 2012 [11] | 19.5 | 33.5 | 29.3 | — |
| Palestine | PAPFAM 2006 [11] | — | 64.6 | 24.8 | — |
| | MICS 2010 [11] | 16.7 | 61.5 | 28.7 | — |
| | MICS 2014 [11] | 20.0 | 40.8 | 38.1 | — |
| Saudi Arabia | — | — | — | — | — |
| Syrian Arab Republic | PAPFAM 2001 [11] | 15.0 | — | — | — |
| | MICS 2006 [11] | — | 32.4 | 28.5 | — |
| | PAPFAM 2009 [11] | — | 45.5 | 42.6 | — |
| | HHS 2009 [11] | 26.4 | — | — | — |
| United Arab Emirates | — | — | — | — | — |
| Yemen | FHS 2003 [11] | 8.6 | --- | 11.5 | — |
| | MICS 2006 [11] | --- | 29.6 | --- | — |
| | DHS 2013 [10] | 4.8 | 52.7 | 9.7 | — |

[a]Early initiation of breastfeeding: infants started breastfeeding within 1 hour of birth. [b]Reported in survey. [c]Calculated by authors [ratio of proportion of infants with initiation of breastfeeding after caesarean birth (no. of infants breastfed ≤ 1 hour after caesarean birth /no. of infants with caesarean birth ever breastfed) compared with proportion of infants with initiation of breastfeeding after vaginal birth (no. of infants breastfed ≤ 1 hour after birth /no. of infants with vaginal birth ever breastfed)]. [d]Exclusive breastfeeding: exclusively breastfed (infants receiving breast milk, and not receiving any other fluids or foods, with the exception of oral rehydration solution, vitamins, mineral supplements, and medicines) throughout the first 6 months of life. CI = confidence interval; OR = odds ratio.

**Figure 1 Flow diagram of the literature search**
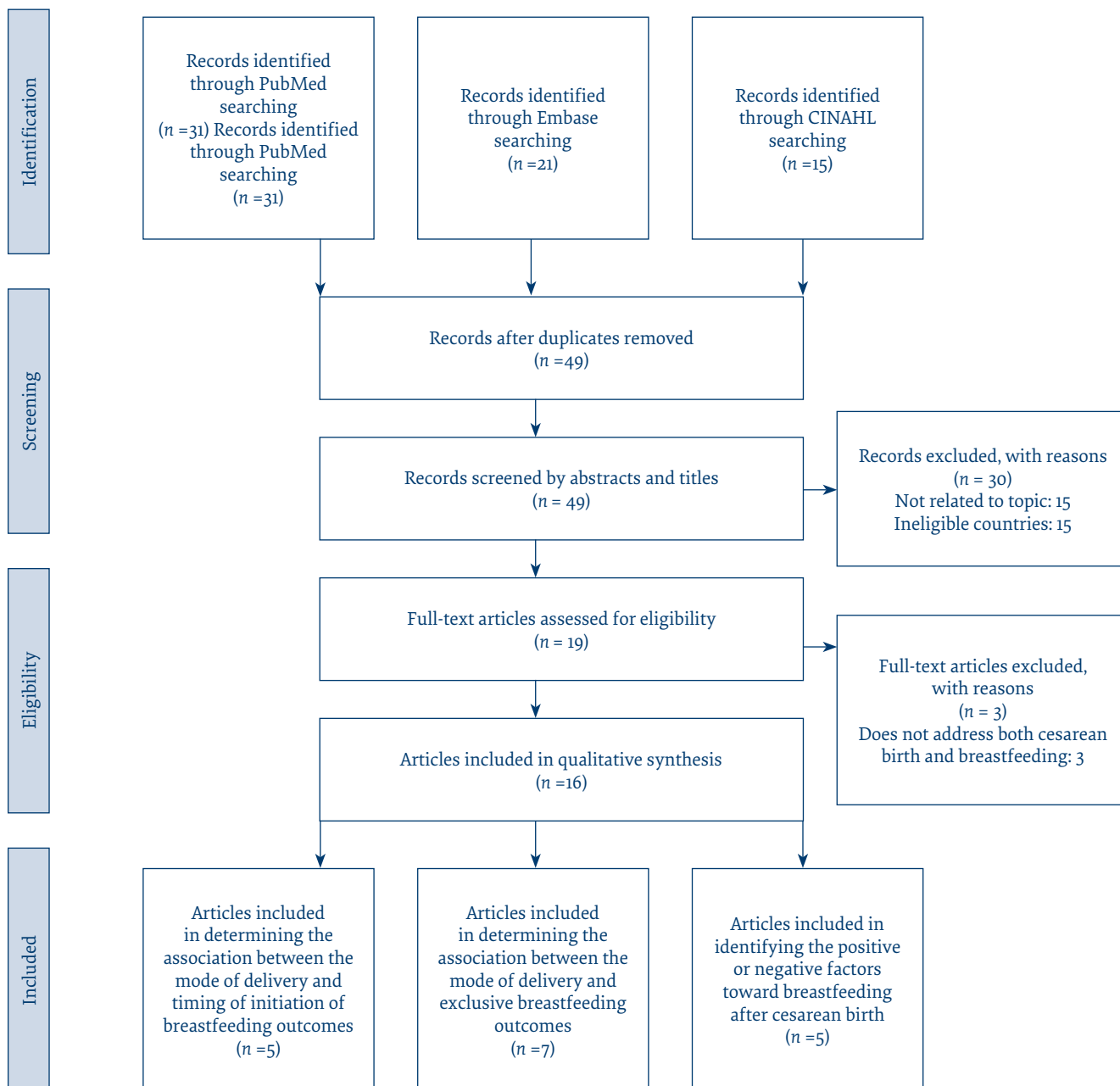


(OR: 0.44, 95% CI: 0.40–0.48) and Iraq (OR: 0.11, 95% CI: 0.09–0.14).

## Literature review

Our initial search identified 49 studies after duplicates were removed. Only 16 studies (3 randomized control trials, 3 cohort studies and 10 cross-sectional studies) were determined to be eligible for inclusion after full-text screening and critical appraisal (Figure 1).

Eleven studies reported the association between mode of childbirth and breastfeeding outcomes (16–26). These studies reported on studies conducted in Saudi Arabia (n = 5), Jordan (n = 2), Egypt, Kuwait, Lebanon and the Islamic Republic of Iran (n = 1 each). Two studies reported findings from the same longitudinal cohort in Jordan. Most (91%) studies reported on studies conducted

at health facilities, except for 1 that reported findings of a population-based survey in Jordan. Most data came from urban tertiary hospitals.

Table 2 presents characteristics of included studies and indicates where results included statistically significant associations between mode of childbirth and breastfeeding outcomes.

## Initiation of breastfeeding

Timing of initiation of breastfeeding was an outcome of interest in 5 of 11 studies (45%) (16,20,21,24,25) Two of these studies examined the association between mode of childbirth and initiation of breastfeeding within 1 hour (16,24) and 2 reported on the initiation of breastfeeding within 24 or 48 hours of birth (24,25) One study reported on the initiation of breastfeeding within a few days

**Table 2 Association between mode of birth and breastfeeding outcomes reported in studies meeting review inclusion criteria**

Odds ratio of caesarean section compared with vaginal deliveries for delayed initiation of breastfeeding 1 hour after birth and cessation of exclusive breastfeeding before age 6 months

| Study location | Author | Year published | Study type | Sample size | Timing of initiation of breastfeeding | | | Exclusive breastfeeding | | Other breastfeeding outcomes |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Initiation within 1 h of birth | Initiation within 24 h or 48 h of birth | Other metrics related to timing of breastfeeding initiation | Exclusive breastfeeding at 6 mo | Duration of exclusive breastfeeding | |
| Egypt | Sallam et al. (15) | 2013 | Cohort; facility-based | 60 (VD: 30, CS: 30) | 7.5 (1.98–31.2) a* | | | | | |
| Iraq | | | | | | No studies identified | | | | |
| Iran | Sharifi et al. (16) | 2017 | Cross-sectional; facility-based | 400 (VD: 200, CS: 200) | | | | | b* | |
| Israel | | | | | | No studies identified | | | | |
| Jordan | Khasawneh et al. (17) | 2006 | Cross-sectional; population-based | 199 (VD: 182, CS:17) | | | | 2.36 (1.17–4.78) c* | | |
| Jordan | Khasawneh et al. (18) | 2017 | Cross-sectional: facility-based | 500 (VD: 309, CS: 191) | | | | 2.03 (1.33–3.10) d* | | e* |
| Kuwait | Dashti et al. (19) | 2010 | Cohort; facility-based | 373 (VD: 235, CS: 138) | | | fNS | | | g* |
| Lebanon | Batal et al. (20) | 2006 | Cross-sectional; facility-based | 830 (VD: 640, CS: 190) | | | h* | | | |
| Oman | | | | | | No studies identified | | | | |
| Qatar | | | | | | No studies identified | | | | |
| Palestine | | | | | | No studies identified | | | | |
| Saudi Arabia | Shawky et al. (21) | 2003 | Cross-sectional; facility-based | 400 (VD: 348, CS: 52) | | | | | i* | |
| Saudi Arabia | Abusaad et al. (22) | 2011 | Cross-sectional; facility-based | 400 (VD: 326, CS: 74) | | | | | | j* |
| Saudi Arabia | Albokhary et al. (23) | 2014 | Cross-sectional; facility-based | 60 (VD: 30, CS: 30) | kNS | k* | | | | |
| Saudi Arabia | Alzaheb et al. (24) | 2016 | Cross-sectional; facility-based | 671 (VD: 502, CS: 169) | | l* | | | | |
| Saudi Arabia | Alzaheb et al. (25) | 2017 | Cross-sectional; facility-based | 589 (VD: 405, CS: 184) | | | | 1.80 (1.19–2.74) m* | | |
| Syrian Arab Republic | | | | | | No studies identified | | | | |

**Table 2 Association between mode of birth and breastfeeding outcomes reported in studies meeting review inclusion criteria** *(concluded)*

| Study location | Author | Year published | Study type | Sample size | Odds ratio of caesarean section compared with vaginal deliveries for delayed initiation of breastfeeding 1 hour after birth and cessation of exclusive breastfeeding before age 6 months | | | | | Other breastfeeding outcomes |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Timing of initiation of breastfeeding | | | Exclusive breastfeeding | | |
| | | | | | Initiation within 1 h of birth | Initiation within 24 or 48 h of birth | Other metrics related to timing of breastfeeding initiation | Exclusive breastfeeding at 6 mo | Duration of exclusive breastfeeding | |
| United Arab Emirates | | | | No studies identified | | | | | | |
| Yemen | | | | No studies identified | | | | | | |

*Indicates study reported statistical significance (P < 0.05) for the difference in breastfeeding rates among CS and VD. NS indicates study reported no significant difference at 5% significance level. BF = breastfeeding; CI = confidence interval; CS = caesarean section; EBF = exclusive breastfeeding; OR = odds ratio; RCT = randomized controlled trial; VD = vaginal delivery.

a Used BF within 1 hour as the outcome. Authors recalculated OR based on the data (OR= 7.5, 95% CI= 1.98–31.2).

b Used duration of BF (< 15 days, 15–30 days, 2–6 months, 6 months–1year, > 1year) as the outcome. Significant difference was shown between mode of delivery and duration of BF.

c Adjusted OR was stated in the paper (OR= 2.36, 95% CI= 1.17–4.78).

d Authors recalculated OR based on the data (2.03, 95% CI= 1.33–3.10). Classification as stated by authors for EBF at 6 months of age: infant fed only breast milk without any other enteral intake except for medication and vitamins at 6 months.

e Used EBF at birth, which referred to first 48 hours after birth, as the other outcome. Significant difference was shown between mode of delivery and EBF for the first 48 hours. Authors recalculated OR based on the data (OR= 1.83, 95% CI= 1.25–2.68).

f Used any BF at discharge from a health facility after birth as the outcome. Adjusted OR was stated in the paper. CS compared with VD for any BF at discharge from hospital was adjusted OR= 0.60 (95% CI= 0.33–1.06).

g Used EBF at discharge from hospital as the outcome. Adjusted OR was stated in the paper. CS compared with VD for EBF at discharge from hospital was adjusted OR= 0.15 (95% CI= 0.05–0.43).

h Used initiation of BF a few days after birth as the outcome. Authors recalculated OR based on the data (OR= 5.71, 95% CI= 3.92–8.31).

i Used BF cessation as the outcome. Hazard ratio was stated in the paper. Mothers who delivered by CS had OR= 1.9 (95% CI= 1.3–2.8, P = 0.001).

j Used EBF among children < 6 months of age at the time of the survey as the outcome. Authors recalculated OR based on the data (OR= 5.56, 95% CI= 1.73–28.4).

k Used initiation of BF within 1 hour and within 24 hours following birth as the outcomes. OR for within 1 hour was not significant and no CS case had initiation of BF within 1 hour following birth. Authors recalculated OR based on the data for within 24 hours following birth (OR= 19.3, 95% CI= 2.37–854).

l Used initiation of BF within first 48 hours of infant's life as the outcome. Authors recalculated OR based on the data (OR= 3.61, 95% CI= 1.90–6.85).

m Outcome variable (EBF for the first 6 months of life) is defined by WHO as an infant being fed only human breast milk without any other solids or liquids, including water, with the exceptions of drops and syrups that provide minerals, vitamins, and necessary medications at 6 months of age. Authors recalculated OR based on the data (OR= 1.80, 95% CI= 1.19–2.74).

of birth (*21*), and another reported on the initiation of breastfeeding before the mother and child were discharged from a health facility after birth (*20*). All 5 studies revealed lower rates of breastfeeding initiation during the time period of interest after caesarean section than after vaginal births. Four of the 5 studies, which compared timing of breastfeeding initiation after caesarean section compared with vaginal birth, demonstrated a significant difference (*16, 21,24,25*). One of these studies showed a significant delay in early initiation of breastfeeding within 1 hour after caesarean section compared with vaginal births (OR: 7.50, 95% CI: 1.98–31.2) (*16*).

## Exclusive breastfeeding

Exclusive breastfeeding was an outcome of interest in 7 of 11 studies. Three of these studies evaluated the associations between mode of childbirth and exclusive breastfeeding at 6 months after birth (*17–20,22,23,26*). Two studies examined the association between mode of childbirth and duration or continuity of exclusive breastfeeding (*17,22*). Two others reported on exclusive breastfeeding during the first 48 hours after birth or at discharge from the health facility after childbirth (*18,19*). One study examined exclusive breastfeeding practices among mothers of infants < 6 months of age who had visited their health facilities during the study period for vaccinations of their children (*23*). All 7 studies reported lower rates of exclusive breastfeeding after caesarean section than after vaginal births. Three studies reported that the odds of cessation of exclusive breastfeeding before 6 months were greater after caesarean section than vaginal births (*18,19,26*).

## Factors influencing breastfeeding after caesarean section

Five studies reported factors influencing breastfeeding outcomes after caesarean section (*27–31*). These studies were conducted at health facilities in Israel (*n* = 3), Islamic Republic of Iran (*n* = 1) and Egypt (*n* = 1). Three of these studies reported on randomized control trials among children born via caesarean section (*27,29,30*) and the other 2 reported analyses of the same longitudinal cohort in Israel (*26,28*). Factors with positive influences on early initiation and exclusive breastfeeding included oral carbohydrate consumption by mothers prior to surgery (*29*), periodic pain control (*27*), and early post-caesarean breastfeeding counselling and support (*26–28*). In contrast, use of general anaesthesia (*27*) and early discharge (24 vs 72 hours) from the health facility (*30*) were reported as having negative influences on breastfeeding practices.

**Table 3 Summary of the findings of the scoping reviews about the relationship between breastfeeding and mode of delivery in the Middle East**

|  | Initiation of breastfeeding | Exclusivity and frequency of breastfeeding |
|---|---|---|
| Data review | • Egypt, Iraq and Palestine showed trends of increasing rates of caesarean section and decreasing early initiation of breastfeeding rates.<br>• Caesarean birth was the barrier to early initiation of breastfeeding in Egypt (OR: 0.48, 95% CI: 0.44–0.52), Jordan (OR: 0.44, 95% CI: 0.40–0.48), and Iraq (OR: 0.11, 95% CI: 0.09–0.14). | • There were no apparent patterns in the prevalence of exclusive breastfeeding with increasing rates of caesarean section. |
| Literature review | • Four out of 5 studies showed that caesarean birth was significantly related to delay of initiation of breastfeeding.<br>• Factors with significantly positive influences on initiation of breastfeeding after caesarean section included early post-caesarean breastfeeding guidance and support, and oral carbohydrate consumption by mothers prior to surgery.<br>• In contrast, early discharge (24 versus 72 hours) from the health facility was reported as having a negative influence on early initiation of breastfeeding (not significant). | • All 6 studies showed that caesarean birth was significantly related to cessation of breastfeeding.<br>• Factors with significantly positive influences on exclusivity or frequency of breastfeeding after caesarean section included post-caesarean section periodic pain control, early post-caesarean breastfeeding guidance and support, and oral carbohydrate consumption by mothers prior to surgery.<br>• In contrast, early discharge (24 versus 72 hours) from the health facility were reported as having a significantly negative influence on successful breastfeeding at 6 weeks after birth. |

One study found that delays in maternal–infant contact, limited maternal mobility, and maternal pain and exhaustion affected early initiation of breastfeeding (27). One study showed the importance of postpartum pain control in allowing successful breastfeeding (27). This study compared the administration of oral analgesics for the treatment of post-caesarean pain in the first 48 hours following surgery and compared the outcomes of on-demand administration to a predetermined interval of 6 hours between doses. Mothers who received analgesics at fixed times over 5 days after caesarean section breastfed their infants more often than those who were able to access analgesics on demand. Fewer feeds of artificial formula were given to the newborns of mothers who received oral analgesics at a fixed time interval, in comparison to the mothers who could access analgesics on demand (28). Two studies on the same longitudinal cohort demonstrated that early, culturally sensitive post-caesarean feeding guidance and education by trained professionals significantly improved breastfeeding outcomes (27,29). The remaining studies explained the positive influence of preoperative oral carbohydrate consumption (30) and negative influence of early discharge on breastfeeding after caesarean section (31).

Table 3 displays a summary of the results of the reviews.

## Discussion

This scoping review summarizes available evidence on the association between mode of childbirth and breast-feeding practices in selected countries in the Middle East. Findings from secondary analyses of population-based surveys conducted between 2000 and 2018, and peer-reviewed studies published between 2000 and 2018 show an inverse relationship between caesarean section births and successful early initiation of breastfeeding. The lit-

erature reviewed also suggests that caesarean births decrease the likelihood of exclusive breastfeeding at or before the first 6 months of life, and duration or continuity of exclusive breastfeeding.

These findings are consistent with previous reviews of global evidence. However, there are no standardized criteria for measuring breastfeeding after caesarean section. Although MICS and DHS both measure breastfeeding outcomes, we found that studies used several different outcome measures and definitions. To make valid comparisons for a more detailed understanding of these issues, standardization of metrics and data collection methods may be helpful.

The increasing caesarean section rates and the decreasing rates of early initiation of breastfeeding in several countries of the Middle East deserve greater attention as a major public health concern. Several, but not all, included studies identified care practices during pregnancy and childbirth that influence the likelihood of breastfeeding after caesarean deliveries.

First, it is important to strengthen evidence-based practices that are proven to increase early initiation of breastfeeding for all women, regardless of mode of childbirth. These general practices are also effective for mothers who undergo caesarean section. The Middle Eastern region encompasses mothers who belong to varied religious and cultural backgrounds. Some cultural influences may also hinder early initiation of breastfeeding. For example, some sections of the Muslim community commonly believe that colostrum is either harmful to the baby, or that it has poor nutritional value (32). Such traditional practices must be respectfully addressed by trained personnel who can facilitate beneficial health practices for these communities and educate mothers about potentially harmful practices (29). Hospitals that followed the policy of bringing infants to mothers for night feeds and that kept mothers and infants together

delivered significantly better breastfeeding results (21). WHO and United Nations Children's Fund implemented the updated Baby-Friendly Hospital Initiative (BFHI) in 1991 to provide maternity and neonatal services in health facilities. The implementation of these policies has yielded increased breastfeeding rates worldwide, including the Middle East (33). However, BFHI does not provide specific guidance on breastfeeding after caesarean section.

Second, health personnel must be better informed of the importance of early initiation of breastfeeding to improve the care of mothers and infants born via caesarean section (34). The acute pain and the effect of anaesthesia after caesarean section make it more problematic for mothers to initiate breastfeeding within the first hour after birth. Hospitals should establish clear policies about the appropriate administration of anaesthesia and pain control medication for those undergoing caesarean section (35), and epidural anaesthesia should be prioritized. If infants are stable, they should be brought into the postoperative recovery room, and support should be provided for mothers to initiate early breastfeeding. Early initiation of breastfeeding should be supported by health personnel specifically trained to facilitate post-caesarean breastfeeding positioning that is tailored to mother's mobility limitations (27).

A strength of this review was that it incorporated analysis of both population-based surveys and scholarly research. Only a limited number of studies on post-caesarean breastfeeding have been conducted. However, there were limitations to this review. We only reviewed publicly available population-based surveys and peer-reviewed literature in English; therefore, literature published in Arabic was not included. Only studies reporting breastfeeding outcomes were included; studies examining factors related to breastfeeding outcomes, such as skin-to-skin care, may also provide valuable insights on breastfeeding practices after caesarean birth. Finally, some cross-sectional studies included were of moderate quality with a small sample size. Nevertheless, the findings of this investigation offer a valuable snapshot of the available evidence pertaining to breastfeeding after caesarean section, and a meta-analysis is desired for further evaluation.

## Conclusion

This scoping review examined the association between the mode of childbirth and breastfeeding outcomes and identified factors related to breastfeeding after caesarean deliveries in several Middle Eastern countries. Caesarean section is a risk factor of delay in the initiation of breastfeeding and for cessation of exclusive breastfeeding in this region. More attention is needed in facilities performing caesarean section.

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## Associations entre les naissances par césarienne et l'allaitement maternel au Moyen-Orient : une étude exploratoire

### Résumé

**Contexte :** Il existe peu d'études publiées sur les facteurs influençant les pratiques alimentaires des nourrissons et des jeunes enfants nés par césarienne.

**Objectifs :** Déterminer si le mode d'accouchement a une incidence sur la mise en route précoce de l'allaitement exclusif au sein, et identifier les facteurs qui influencent positivement ou négativement l'allaitement après une césarienne dans certains pays du Moyen-Orient.

**Méthodes :** Nous avons réalisé une étude exploratoire des enquêtes en population accessibles au public et de la littérature évaluée par les pairs sur les associations entre le mode d'accouchement et l'allaitement maternel publiée entre 2000 et 2018. La recherche a identifié 33 enquêtes démographiques et 16 études contenant des informations sur le mode d'accouchement et d'allaitement dans certains pays du Moyen-Orient répertoriés dans les bases de données PubMed, Embase et CINAHL. Les recherches se sont terminées en mars 2019.

**Résultats :** Des enquêtes démographiques menées dans six pays du Moyen-Orient qui y ont participé ont mis en évidence une augmentation des taux de naissances par césarienne. Les trois pays disposant de trois ensembles de données ou plus ont tous démontré que la mise en route précoce de l'allaitement au sein était moins probable après une césarienne qu'après un accouchement par voie basse. Onze études ont analysé les différences de résultats en matière d'allaitement maternel entre les accouchements par césarienne et par voie basse, et toutes ont identifié des différences significatives entre les modes d'accouchement. Cinq études ont abordé les facteurs influençant l'allaitement maternel après une césarienne.

**Conclusion :** Les accouchements par césarienne sont associés à un risque plus élevé de mise en route tardive de l'allaitement ainsi que d'arrêt précoce de l'allaitement exclusif au sein.

# الارتباط بين الولادات القيصرية والرضاعة الطبيعية في الشرق الأوسط: استعراض استطلاعي

ميهو سودينو، حنا تابيس، جيلبرت برنهام، ميجا فيرفرز

## الخلاصة

**الخلفية**: هناك ندرة في الدراسات المنشورة عن العوامل التي تؤثِّر في ممارسات تغذية الرُضَّع وصغار الأطفال الذين يولدون ولادات قيصرية.

**الأهداف**: هدفت هذه الدراسة إلى تقييم ما إذا كان نمط الولادة يؤثِّر في التبكير بالرضاعة الطبيعية والرضاعة الطبيعية الخالصة، وتحديد العوامل التي تؤثِّر إيجابًا أو سلبًا في الرضاعة الطبيعية بعد الولادة القيصرية في بلدان محدَّدة في منطقة الشرق الأوسط.

**طُرق البحث**: أجرينا استعراضًا استطلاعيًّا للدراسات الاستقصائية السكانية المتاحة لعموم الناس، والمنشورات التي استعرضها الأقران عن العلاقة بين نمط الولادة والرضاعة الطبيعية المنشورة بين عامَيْ 2000 و2018. وحدد البحث 33 دراسة استقصائية سكانية و16 دراسة شملت معلومات عن نمط الولادة والرضاعة الطبيعية في بلدان محدَّدة في منطقة الشرق الأوسط، ووردت تلك الدراسات في قواعد بيانات PubMed و Embase وCINAHL. واستُكملت عمليات البحث في مارس / آذار 2019.

**النتائج**: أظهرت الدراسات الاستقصائية السكانية في 6 من أصل 7 بلدان في الشرق الأوسط زيادة معدلات الولادات القيصرية. وأظهرت البلدان الثلاثة التي تتوفر فيها 3 مجموعات بيانات أو أكثر أن التبكير بالرضاعة الطبيعية كان أقل احتمالاً بعد الولادات القيصرية منه بعد الولادات الطبيعية. وحلَّلت إحدى عشرة دراسة الاختلافات في نتائج الرضاعة الطبيعية بين الولادة القيصرية والولادة الطبيعية، وحددت جميعها اختلافات كبيرة بين أنماط الولادة. وتناولت خمس دراسات العوامل التي تؤثِّر في الرضاعة الطبيعية بعد الولادة القيصرية.

**الاستنتاجات**: ترتبط الولادة القيصرية بزيادة مخاطر البدء المتأخر في الرضاعة الطبيعية، فضلًا عن التوقُّف المبكر عن الرضاعة الطبيعية الخالصة.

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# Regional consultation on the global health sector strategies on HIV, hepatitis and STIs, 2022–2030[1]

## Introduction

In 2016, the sixty-ninth World Health Assembly adopted three Global Health Sector Strategies (GHSS) on HIV, viral hepatitis and sexually transmitted infections (STIs) for the period 2016–2021 (1). The three strategies were aligned with Universal Health Coverage and the Sustainable Development Goals, and each were framed by a vision to ensure the epidemics would be ended as public health threats by 2030 (1). However, despite considerable progress in some areas of prevention and management, most of the interim targets for 2021 across the three strategies will not be reached. This underscores the need for a revised post-2021 strategic framework to guide the final push to achieve the 2030 goals (2). Therefore, the WHO Regional Office for the Eastern Mediterranean, Cairo, Egypt, held a virtual regional consultation during 24–26 May 2021, which was attended by regional partners and WHO staff from headquarters, regional and country levels (3).

The objectives of the meeting were to:

- inform participants about the GHSS development process, strategic approaches and draft contents;
- discuss the regional implications of the proposed GHSS and related regional considerations; and
- provide regional input to the draft GHSS.

## Summary of discussions

Dr Ahmed Al-Mandhari, WHO Regional Director for the Eastern Mediterranean, emphasized the importance of the new interlinked strategies for strengthening advocacy and guiding interventions towards elimination of the diseases by 2030, and as a step towards the regional goal of "Health for all, by all" (4). He stressed the need to integrate HIV, hepatitis and STI services within broader health systems, with universal health coverage as the way to improve primary health care services, increasing access and providing patient-centred services.

In addition, an overview was provided of the proposed framework, strategic approaches and development process of the new strategies for 2022–2030. The new framework puts people at the centre of the response, highlighting the need to leverage and advance universal health coverage (UHC) and primary health care (PHC) as key strategic directions for HIV, hepatitis and STIs. The strategies focus on the integration and alignment of the disease programmes across different health system domains, including governance, health information, essential health commodities, workforce and financing. Integrated service delivery approaches were emphasized for achieving elimination through decentralization of services, provision of community-led and community-based services, and adaptation to special settings (for example, prisons, refugee settings and humanitarian crises).

## Recommendations

### To WHO

Advocating for higher political commitment, the allocation of domestic resources and the inclusion of HIV, hepatitis and STI services in UHC essential benefit packages;

- fostering experience-sharing within countries and between WHO regions through convening networks and by documenting and sharing best practices;
- ensuring coordination between WHO headquarters, country and regional offices, so that the necessary technical support is provided to countries;
- providing context-adapted strategic guidance based on epidemiology and addressing key challenges related to complex emergency settings; and
- providing strategic guidance for integrated service delivery for HIV, hepatitis and STIs.

### To Member States

- Identifying areas for integrated service delivery and strengthening inter-programme collaboration and coordination;
- leveraging the PHC system through developing plans for the integration of elements that enable efficiencies and gains for the HIV, hepatitis and STIs responses; and
- adapting services to the needs of the most at-risk and vulnerable groups in a manner that ensures expanded equitable access and leaves no one behind, including key populations, children, women (including pregnant women), migrants, internally displaced populations and refugees.

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[1] This summary is extracted from the report on the Regional consultation on the global health sector strategies (GHSS) on HIV, hepatitis and STIs, 2022–2030, virtual meeting, 24–26 May, 2021 (https://applications.emro.who.int/docs/WHOEMSTD209E-eng.pdf?ua=1).

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