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Abstract

Background: The Egyptian health system is characterized by the multiple entities in charge of service regulation, financing and provision. Moreover, health outcomes in Egypt mirror epidemiologic transition; increasing prevalence of noncommunicable diseases (NCDs) and persistent high levels of selected communicable diseases (CDs) place a huge financial burden on the health system's limited resources. This together with financial inefficiencies aggravate inequality in health services coverage and health outcomes.

Aims: We aimed to map and link health services with key health outcomes to support efficient utilization of scarce resources and achieving Universal Health Coverage (UHC).

Methods: Data on health services and health outcomes were obtained from the Ministry of Health and Population and key national surveys for the year 2014. Data on health services' availability and coverage were compared in different geographical regions. Correlation analysis was used to test the relation between selected service availability indicators and mortality rates from key NCDs.

Results: There was a high coverage of key maternal and child health services. However, there was in general low achievement of national targets for service availability as well as wide geographical disparities. Cardiovascular diseases were the leading cause of death and there was a marked reduction in the incidence of major CDs in Egypt, particularly vaccine preventable diseases.

Conclusion: Wide geographical disparities and increased burden of NCDs and their risk factors are identified as key challenges facing the healthcare system in Egypt. Priority setting in the light of these findings is crucial to support national efforts to attain health equity and UHC.

Keywords: Health systems, morbidity, mortality, fertility, Egypt

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Introduction

Egypt has a highly pluralistic healthcare system with many different public and private providers and financing bodies (1). The governmental health sector comprises primarily the Ministry of Health and Population (MoHP) and university hospitals. MoHP manages the primary healthcare centres and units, general hospitals, district hospitals, and integrated and specialized hospitals (1). The level of government health expenditure is low, representing only 2% of Gross Domestic Product (GDP). However, the 2014 constitution affirmed the universal right to healthcare and that the state shall allocate a percentage of GDP on health not less than 3%, a value that represents almost twice the current governmental expenditure on the health sector (2).

Increased budgetary allocations for health are dependent on the health sector's ability to demonstrate good use of its resources including equitable distribution of available resources (2). Information on health system performance and on key factors that explain performance variation can strengthen the scientific foundations of health policy, provide important insights into

effective policies and consequently pave the road for Universal Health Coverage UHC (3).

The aim of the current study was to map health service availability, coverage and key health outcomes and examine the association between health services availability indicators and mortality rates including Maternal Mortality Ratio (MMR). The ultimate goal was to identify major gaps in health services and outcomes for better allocation of scarce resources , promotion of health equity and attaining UHC.

Methods

The main sources of data were the Health Information Center at MoHP, the Egyptian Demographic Health Survey (EDHS) 2014, and National Cancer Registry Program of Egypt (NCRPE) (4,5). Indicators were defined based on the World Health Organization (WHO) World Health Statistics 2015: Indicator compendium (6). These included general service availability (6,7), health services coverage (6–8), health systems statistics (8), and mortality, morbidity and fertility indicators (6).

General service availability and coverage indicators were calculated from data collected from all sectors except for general hospitals (only available at MoHP), intensive care units (ICUs), neonatal intensive care unit (NICUs) and ambulances (disaggregated data available only from MoHP). They were compared relative to national benchmarks developed by MoHP (internal documents) and included:

One General hospital / 500 000 population

One intensive care unit / 15 000 population

One neonatal intensive care unit /400 live births

One ambulance / 25 000 population

MoHP Institutional Review Board approval was obtained prior to data collection and analysis. Indicators were disaggregated by geographical area in Egypt; either a governorate or region depending on the availability of data (9). Skewed data were identified using Kolmogorov-Smirnov test. ANOVA test or Kruskal-Wallis test was conducted to examine differences in service availability indicators as well as mortality indicators across different geographical regions. Correlation analysis was used to test correlation between selected service availability indicators and mortality rates from key NCDs and MMR. P- value

Results

General service availability

Overall, there was 0□23 health facility per 10 000 population in 2014 compared to 0□37 in the year 2001, representing a 38% reduction over the past 14 years (data are not shown). The number of beds in the public sector represented nearly three quarters of the total number of beds in 2014 and there were 15 beds for every 10 000 Egyptians in 2014. For primary healthcare (PHC) facilities, there were 0□59 PHC facility/ 10 000 of the population.

There were approximately 35%, 65%, 27% and 38% achievement of national targets regarding general hospitals, ambulances, ICUs and NICUs respectively. Wide geographical disparities were clearly evident (Table 1) and demonstrated by the statistical significant differences in the percent achievement of the national benchmarks in the different geographical regions. (Table 1a)

Health service coverage

There was a high coverage of maternal and child health (MCH) care services and immunization services (4). However, only 57% of women during child bearing period use modern methods of contraception (Table 2). (Table 2a)

Health system statistics

The labour force in the public sector was estimated at 72 900 physicians (8□4 physicians / 10 000 population), and 126 200 nurses (14□5 nurses / 10 000 population) (9). Data on health expenditure highlighted a stagnation of relevant indicators. For example, total health expenditure (THE) as a percentage of GDP and out of pocket (OOP) stood at 6% and 56% respectively (10,11).

Mortality

Nearly half of deaths were attributed to cardiovascular diseases including ischemic heart diseases, hypertension, and cerebrovascular diseases. Geographical distribution of NCDs

deaths / 100 000 population revealed significant geographical differences. There were negative correlations between all service availability indicators and deaths from NCDs and MMR. For example, deaths attributed to ischemic heart diseases were significantly negatively correlated with percent achievement of the target number of general hospitals, ambulances and ICUs (Table 3 , Table 4).

(Table 3a , Table 3b , Table 4a).

Morbidity

Data for 2014 revealed that the majority of CDs under MoHP surveillance had an incidence rate below one case/ 100 000 population (16 diseases out of 30). Only two CDs had incidence rates above 10 cases/100 000 population (urinary and intestinal bilharziasis, at 54 cases/ 100 000 and 26 cases/ 100 000 respectively; data are not shown).

The overall prevalence rates of HBV and HCV were 1% and 4.4% respectively in the population aged 1–59 years. HCV showed the highest prevalence in Lower Egypt region reaching nearly 6% (Table 5).

The crude cancer rate for Egypt was 113/100 000 population with the highest cancer incidence rate reported in Lower Egypt 134/100 000 population (Table 5). Nearly half of the adult men were current smokers (46.4%) compared to a very low percentage among women (0.2%). However, nearly half of women (50.3%) and one third of men (26.4%) suffered from obesity. One in five Egyptians suffered from elevated blood pressure (Table 5).

Fertility

A total fertility rate (TFR) of 3.5 child/ woman was reported in Egypt in 2014, and 20.8 years old was the mean age at first marriage for Egyptian females (4) (Table 2).

In almost all examined service coverage and availability indicators, the poorest performance was observed in Upper Egypt governorates (Table 1a, Table 2a).

Discussion

This study portrayed health services and outcomes in different geographical areas in Egypt, which is crucial to provide evidence for informed policy actions and for promoting health equity. There was a reduction in the number of health facilities/10 000 population compared to 2001, which could be explained by the rapid population growth (9). The Egyptian population is growing at a rate of 2□1% – higher than rates found in other Arab countries (2%) (11). Furthermore, there were 15 beds for every 10 000 population in 2014, which equals a bed for every 672 Egyptians compared to a bed for every 455 Egyptians in 2001 (1). This national average is higher than in some countries such as Pakistan and Iraq and lower than many middle-income countries (11). It is noteworthy that the bed capacity of the MoHP sector is coupled with bed occupancy rates (50%), which places significant financial burden on the healthcare system and prevents the MoHP from allocating necessary resources to primary and preventive care (1).

There was in general a low achievement of national targets for service availability as well as wide geographical disparities. The least service availability and coverage was generally observed in the region of Upper Egypt. Furthermore, the number of ambulances, ICUs and NICUs were very high in governorates such as North and South Sinai and Red Sea, where the numbers exceeded the needs of these regions. However, careful assessment of coverage is crucial given the large surface area of such governorates coupled by the specific characteristics of the population served (12).

There was a high coverage of key MCH services examined in the current study attributed to the ongoing political commitment to improving MCH. However, the last 6 years witnessed a decrease in the contraceptive prevalence rate which resulted in an increase in TFR and crude birth rate. In 2014, TFR increased to 3.5 live births, which is equivalent to the rate reported during 1990s (4). Inequitable coverage of MCH services was noted and was consistent with previous research (1,4,12). In addition, early marriage was widespread in Egypt with approximately 6% of women in the age group 15–17 years currently or ever married (4). Increased fertility, increased population growth rate and persistent high level of early marriage highlight the utmost need to adopt and implement evidence-based strategies to reduce population growth and improve population characteristics.

There was a tangible increase in the MoHP workforce in 2014 (12). For example, the number of physicians increased from 6.5 in 2005 to 8.4 physicians / 10 000 population in 2014 (12). Furthermore, there was nearly one physician / bed at MoHP services, which if combined with bed occupancy rate of 50%, equals more than two physicians / occupied bed; this is much higher than many countries of similar economic status (1). This finding discounts claims regarding shortage in the number of physicians and underscores the problem of shortages in

certain areas an indication of maldistribution of physicians rather than an actual shortage (1,12).

Noncommunicable diseases, including cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases, are currently the leading national cause of death in Egypt. Noncommunicable diseases are estimated to account for 82% of all deaths in Egypt (12). Cardiovascular disease mortality rates were the highest among NCDs, which is consistent with previous reports as well as the overall picture in all Arab countries (13,14).

Egypt was successful in achieving Millennium Development Goal (MDG) 4 for reduction of child mortality and is on track to achieve its MDG 5a for reduction of maternal mortality (4). This decline is likely attributed to improved antenatal care and skilled birth attendance services as reported by EDHS 2014 (4). However, regional inequality in the provision of healthcare, the unequal distribution of trained health providers, the deficiency in the number of emergency obstetric care facilities, and the delay in referral for emergency obstetric services are still among the challenges threatening maternal health (15). This is supported by our finding that revealed MMR was significantly negatively correlated with both the number of PHC facilities/10 000, the percent achievement of the target number of general hospitals and ambulances.

In our study, many health outcomes were associated with health service availability indicators. For example, significant negative correlations were found between all service availability indicators and deaths due to ischemic heart disease and liver cirrhosis. Furthermore, there were evident geographical disparities in both health service availability and health outcome indicators. Putting all information together portrays a picture of inequality in health service availability which impacts health outcomes in the same inequitable pattern (15).

There is marked reduction in the incidence of major CDs in Egypt, particularly vaccine preventable diseases. However, bilharziasis incidence was the highest among all diseases under surveillance by MoHP. This is consistent with studies highlighting that Egypt is one of the countries with the highest number of cases of bilharziasis in the Middle East and North Africa region (16). Yet, it is important to highlight that the many years of efforts in Egypt have had a drastic impact on bilharziasis prevalence and endemicity. Studies in Egypt have demonstrated the effectiveness of the single dose administration of praziquantel – selective population chemotherapy that started in 1983. The MoHP reported that from 1982 to 1992 the prevalence of Schistosoma haematobium declined from around 15% to 1% in the Nile Delta and from 13% to 3% in Upper Egypt; the prevalence of Schistosoma mansoni declined from about 40% to 20% in the Nile Delta (17). In 2010, with an estimated countrywide prevalence of less than 0.3%, another elimination effort was launched integrating sanitation, environmental interventions and health education into preventive chemotherapy campaigns (18). Currently, new strategies for

combating bilharziasis based on sensitive surveillance tools need to be adopted to prevent resurgence and recrudescence.

The prevalence of hepatitis C viral (HCV) infection showed a significant reduction among people aged 15–59 years, from 9.8% in 2008 to 7.0% in 2014 (4). There were many factors behind the reduction of HCV epidemic in Egypt including the introduction of Pegylated interferon (PEG-INF) (19) and later the introduction of Sofosbuvir to treat patients at a cost lower than 1% of its international price in 2014 (12).

The national age standardized incidence rate for all cancers in Egypt was 166 6/100 000 for both sexes, which is intermediate compared to rates of higher and lower-income countries. It is noteworthy that the distribution of liver cancer in the Egypt followed the distribution of HCV, which is more frequent in the Nile Delta with decreasing prevalence when moving south (19–21).

Tobacco use is increasingly prevalent in Egypt. Tobacco prevalence increased from 19 4% in 2009 to 20 9% in 2014 with the highest prevalence reported among males (46 4%) (4,22), and is a primary cause for the rising epidemic of NCDs in the country. Several effective tobacco control policies have been adopted and enacted. However, poor enforcement remains an unresolved challenge (12).

In Egypt, as in many Arab countries, obesity in adults has increased alarmingly (14), reaching 50% in females compared to 26% in males (4). This gender difference in obesity might be reflected in the epidemiology of NCDs in Egypt with expected increasing prevalence of NCDs among females. Supporting this were the results of the EDHS 2014 that showed slightly higher prevalence of hypertension among females compared to the results of Stepwise Survey 2012, which reported higher prevalence among males (4,23).

The MoHP has made tangible efforts to reduce the burden of NCDs. A dedicated unit for NCDs was established in 2014, and an operational multi-sectoral national strategy that integrates major NCDs and their shared risk factors was developed. A national cancer committee to oversee cancer prevention and control was also established and developed evidence-based national guidelines for the treatment of the most prevailing cancers in Egypt (12). However, the surveillance system for NCDs and their risk factors is not yet institutionalized, is fragmented and relies mostly on sporadic national surveys. Furthermore, specific prevention programmes for NCD risk factors are rarely exist or implemented, since most government funds are allocated to

treatment rather than prevention services (24). Therefore, government must prioritize the prevention and control of NCDs and their major risk factors with proper budget allocation in order to effectively prevent the rise in NCD morbidity and mortality.

Conclusion

This study sheds light on the current situation of health and health services in Egypt and the geographical distribution of key health services and outcomes. However, ecological fallacy, multiplicity of data sources, lack of assessment of health service quality, lack of data on the private sector, and absence of disaggregated data for some indicators due to either lack of data or limited access to such data, were among the key challenges of this study.

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La carte sanitaire égyptienne : une aide à la prise de décision fondée sur des données probantes

Résumé

Contexte : Le système de santé égyptien se caractérise par la multiplicité des entités chargées de la réglementation, du financement et de la prestation de services. En outre, les résultats sanitaires en Égypte reflètent la transition épidémiologique ; l'augmentation de la prévalence des maladies non transmissibles (MNT) et les niveaux élevés

persistants de certaines maladies transmissibles font peser une énorme charge financière sur les ressources limitées du système de santé. Cette situation, conjuguée à l'inefficacité

financière, aggrave les inégalités en matière de couverture des services de santé et de résultats sanitaires.

Objectifs : Notre objectif était de cartographier et de relier les services de santé aux principaux résultats sanitaires afin de favoriser l'utilisation efficace des ressources limitées et de réaliser la couverture sanitaire universelle (CSU).

Méthodes : Les données sur les services de santé et les résultats sanitaires ont été obtenues du ministère de la Santé et de la Population ainsi qu'à partir des principales enquêtes nationales pour l'année 2014. Les données sur la disponibilité et la couverture des services de santé ont été comparées dans différentes régions géographiques. Une analyse de corrélation a été utilisée pour tester la relation entre certains indicateurs de disponibilité des services et les taux de mortalité due aux principales MNT.

Résultats : Les principaux services de santé maternelle et infantile étaient largement couverts. Toutefois, dans l'ensemble, les objectifs nationaux en matière de disponibilité des services n'ont guère été atteints et les disparités géographiques étaient importantes. Les maladies cardio-vasculaires représentaient la principale cause de décès et l'incidence des principales maladies chroniques en Égypte, en particulier des maladies à prévention vaccinale, a nettement diminué.

Conclusions : Les larges disparités géographiques et l'augmentation de la charge des maladies non transmissibles et de leurs facteurs de risque sont identifiées comme les principaux défis auxquels le système de santé égyptien est confronté. L'établissement des priorités à la lumière de ces résultats est crucial pour appuyer les efforts nationaux visant à atteindre l'équité en santé et réaliser la CSU.

WHO EMRO | The Egyptian health map: a guide for evidence-based decisionmaking

حيث يؤدي تزايد معدل انتشار الأمراض غير السارية، والمستويات المرتفعة باستمرار
للأمراض السارية المحددة إلى إلقاء عبء مالي ضخم على الموارد المحدودة للنظام الصحي .
ويُضاف إلى ذلك عدم الكفاية المالية، ما يفاقم عدم المساواة في تغطية الخدمات الصحية
والمخرجات الصحية .

: نهدف إلى وضع خريطة للخدمات الصحية وربطها بالمخرجات الصحية الرئيسية لدعمالأهداف
الاستخدام الفعَّال للموارد الضئيلة وبلوغ التغطية الصحية الشاملة .

: تم الحصول على بيانات بشأن الخدمات الصحية والمخرجات الصحية من وزارة الصحةطرق البحث
والسكان بالإضافة إلى الاستطلاعات الوطنية الرئيسية لعام 2014. وتمت مقارنة البيانات
بشأن توافر الخدمات الصحية وتغطيتها في المناطق الجغرافية المختلفة . واستُخدم تحليل
الارتباط لاختبار العلاقة بين مؤشرات توافر الخدمات المحددة ومعدلات الوفاة الناجمة
عن الأمراض غير السارية الرئيسية .

: توجد تغطية كبيرة للخدمات الصحية المقدمة للأمهات والأطفال . ومع ذلك، مستوبالنتائ ج
الإنجاز منخفض بوجه عام بالنسبة للأهداف الوطنية الخاصة بتوافر الخدمات، بالإضافة
إلى ذلك توجد تفاوتات جغرافية واسعة . وكانت أمراض القلب والأوعية الدموية هي السبب
الأساسي للوفاة، وكان هناك انخفاض ملحوظ في معدل حدوث الإصابة بالأمراض السارية
الرئيسية في مصر، لا سيّما الأمراض التي يمكن الوقاية منها باللقاحات .

: تُشكِّل التفاوتات الجغرافية الواسعة والعبء المتزايد للأمراض غيرالاستنتاجات
السارية وعوامل الخطر المتعلقة بها تحديات رئيسية أمام نظام الرعاية الصحية في مصر .
ويعد تحديد الأولويات في ضوء هذه النتائج أمرًا بالغ الأهمية لدعم الجهود الوطنية من
أجل تحقيق العدالة الصحية والتغطية الصحية الشاملة .

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