The Egyptian health map: a guide for evidence-based decision-making

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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.

Conclusions: 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

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 < 0.05 was considered statistically significant. SPSS version 21 was used for data analysis.

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.

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).

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).

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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Table 1: Service availability indicators and percent achievement of the target benchmarks by governorates, 2014

Governorates	Percent achievement of the target General Hospital‡	Percent achievement of the target Ambulances‡	Percent achievement of target ICUs‡	Percent achievement of target NICUs‡	Health Facility/10000 population	Beds/10000 population	Primary Health Care Facilities/10000 Population‡
Cairo	70.1	70.3	16.7	19.8	0.5	34.4	0.2
Alexandria	31.2	38.4	8.7	12.2	0.3	27.1	0.3
Port-Said	75.0	161.3	184.5	141.6	0.4	22.0	0.5
Suez	80.3	244.8	40.9	42.3	0.5	17.8	0.5
Ismailia	42.4	161.2	35.6	58.4	0.5	33.4	0.5
Damietta	75.1	93.9	71.0	126.1	0.4	14.5	0.7
Dakahlia	25.2	32.8	40.3	70.9	0.1	4.6	0.8
Sharkia	23.1	50.9	31.0	45.6	0.3	14.2	0.7
Kalyoubia	9.8	36.7	11.8	13.4	0.2	12.8	0.4
Kafr-ElSheikh	31.5	52.0	23.6	49.3	0.3	24.0	0.8
Gharbia	42.1	30.5	29.4	22.1	0.1	5.5	0.6
Menoufia	25.4	35.5	29.3	26.7	0.3	17.2	0.6
Behera	8.6	31.4	19.4	37.8	0.1	8.7	0.7
Giza	33.0	49.1	17.6	17.4	0.3	11.9	0.3
Beni-Suef	17.5	57.8	23.6	52.5	0.1	8.4	0.7
Fayoum	15.8	48.9	22.7	32.3	0.1	6.5	0.5
Menia	19.4	34.4	18.3	30.6	0.1	8.0	0.7
Asyout	35.3	50.6	25.4	38.4	0.2	17.1	0.6
Suhag	32.6	44.5	20.2	35.8	0.1	8.4	0.7
Qena	32.8	58.3	26.6	43.0	0.1	5.3	0.8
Aswan	34.9	139.7	24.1	55.0	0.2	14.1	1.5
Matrouh	111.7	547.1	130.6	24.5	0.3	9.7	1.2
El Wadi ElGidid	221.8	787.4	113.1	128.7	1.0	35.9	2.3
Red Sea	144.6	629.0	99.8	110.3	0.4	17.9	0.8

North Sinai	115.0	460.0	113.9	110.0	0.3	11.3	1.9
South Sinai	298.6	1403.6	250.9	347.3	0.8	66.8	1.4
Luxor	43.6	152.6	57.5	89.2	0.2	9.2	1.0
Total	34.7	64.5	27.1	37.8	0.23	14.9	0.59

Table 1a: Differences in percent achievement of the target benchmarks by geographic region

Region(# of Governorates/region)		Percent achievement of the target General Hospitals#*	Percent achievement of the target Ambulances#*	Percent achievement of the target ICUs#*	Percent achievement of the target NICUs#	Health Facility/10000 population#*	Primary Health Care Facilities/10000 Population +*
Urban (6)	Mean	55.3	120.9	50.7	48.6	0.42	**0.38**
	SD	22.3	81.4	66.7	48.8	0.09	0.13
Upper Egypt(7)	Mean	**26.9**	**62.0**	**23.0**	**41.1**	**0.13**	0.78
	SD	8.9	35.2	2.9	9.6	0.04	0.33
Lower Egypt(8)	Mean	30.1	**45.5**	32.0	49.0	0.23	0.66
	SD	21.2	21.3	17.9	35.9	0.12	0.13
Frontiers(6)	Mean	155.9	663.3	127.6	135.0	0.50	1.43
	SD	90.7	419.6	65.2	110.1	0.32	0.56
Total(27)	Mean	62.8	203.8	55.1	66.0	0.30	0.80
	SD	67.1	314.6	58.5	67.7	0.22	0.48

‡Data for MOHP facilities

*=P-value < 0·05

Kruskal-Wallis Test

+ ANOVA Test

Source: MOHP and CAPMAS Health Statistics, 2014

Governorate	Regular antenatal care (4 visits or more) (%)	Births delivered by skilled provider (%)	Use modern Contraceptive method (CPR) (%)	Total Fertility rate (TFR) (Child/ woman)	Age at first marriage (Mean)	All vaccines and HBV (%)
Cairo	89.9	97.8	61.7	2.6	22.8	88.0
Alexandria	92.7	96.0	58.9	2.2	23.4	97.3
Port-Said	96.8	99.6	56.7	3.0	23.2	95.9
Suez	89.0	99.3	60.1	3.2	22.5	88.9
Damietta	94.6	98.9	64.2	3.0	21.0	89.9
Dakahlia	93.1	98.9	63.2	3.1	20.4	92.5
Sharkia	83.5	92.2	57.4	3.6	20.5	82.3
Kalyoubia	80.1	94.2	61.7	3.8	20.9	87.2
Kafr-ElSheikh	91.0	98.5	62.1	3.4	21.0	100.0
Gharbia	83.3	95.7	62.0	3.1	21.4	90.6
Menoufia	89.0	95.1	65.6	3.5	21.2	93.0
Behera	88.0	92.8	65.5	3.5	20.6	90.8
Ismailia	85.3	95.7	58.8	3.7	22.2	93.8
Giza	79.6	93.1	62.4	3.3	20.3	86.1
Beni-Suef	74.8	80.7	55.3	3.9	19.5	91.8
Fayoum	75.6	84.5	55.5	4.6	19.3	96.1
Menia	70.2	73.5	48.5	3.9	19.0	88.5
Asyout	76.7	82.4	39.5	4.2	20.2	91.9
Suhag	70.3	87.3	29.4	4.3	20.4	75.2
Qena	73.2	90.6	37.1	3.7	19.9	78.3
Aswan	85.7	98.1	47.8	3.6	20.8	92.8
Luxor	83.7	97.9	47.2	3.4	20.4	85.2
Red Sea	86.0	94.0	55.3	3.4	22.1	91.3
ElWadi	90.2	98.3	64.5	3.7	20.9	84.2

Table 2: Distribution of key service coverage indicators by governorates, 2014‡

ElGidid						
Matrouh	59.9	78.0	40.0	4.8	19.7	93.7
Total	82.8	91.5	56.9	3.5	20.8	88.7

Table 2a: Differences in key service coverage indicators by geographic region

Region(# of Governorates/region)		Regular antenatal care (4 visits or more) (%)+*	Births delivered by skilled provider (%)+*	Use modern Contraceptive method (CPR)#*	Total Fertility rate (TFR)#*	Age at first marriage (Mean)+*	All vaccines and HBV (%)+
Urban (6)	Mean	88.9	96.9	59.8	3.0	22.4	91.7
	SD	6.0	2.5	2.1	0.5	1.1	4.6
Upper Egypt(7)	Mean	**75.2**	**85.3**	**44.7**	**4.0**	**19.9**	**87.8**
	SD	5.3	7.8	9.8	0.4	0.6	7.9
Lower Egypt(8)	Mean	87.8	95.8	62.7	3.4	20.9	90.8
	SD	5.1	2.7	2.6	0.3	0.3	5.0
Frontiers(4)	Mean	80.0	92.1	51.8	3.8	20.8	88.6
	SD	13.6	9.6	10.6	0.7	1.0	4.6
Total(25)**	Mean	83.3	92.5	55.2	3.5	20.9	89.8
	SD	9.0	7.3	9.9	0.6	1.2	5.7

+ ANOVA Test

Kruskal-Wallis Test

*= P-value < 0·05

**Two Governorates (North and South Sinai) were not included in EDHS, 2014

‡ Source: EDHS 2014

Governorates	Cancer	Chronic Respiratory Diseases	Ischemic Heart Diseases	Hypertensive Diseases	Cerebro-vascular Diseases	Liver Cirrhosis	Road Accidents
Cairo	83.0	42.4	44.0	70.2	51.0	22.0	17.0
Alexandria	107.0	26.5	51.0	114.4	55.0	17.0	18.0
Port-Said	77.0	48.3	19.0	9.0	70.0	8.0	5.0
Suez	42.0	4.7	12.0	149.0	38.0	24.0	48.0
Ismailia	41.0	17.7	15.0	31.1	17.0	16.0	37.0
Damietta	75.0	2.6	6.0	145.6	51.0	69.0	12.0
Dakahlia	37.0	10.5	20.0	40.7	46.0	49.0	12.0
Sharkia	16.0	5.0	10.0	35.5	51.0	33.0	10.0
Kalyoubia	22.0	14.5	39.0	19.7	39.0	43.0	5.0
Kafr-ElSheikh	25.0	36.3	16.0	39.0	28.0	65.0	7.0
Gharbia	24.0	70.1	14.0	40.3	46.0	41.0	4.0
Menoufia	18.0	25.7	27.0	30.9	46.0	23.0	9.0
Behera	33.0	11.9	17.0	14.5	37.0	25.0	15.0
Giza	41.0	26.1	17.0	19.4	45.0	20.0	14.0
Beni-Suef	19.0	17.9	39.0	5.9	85.0	48.0	11.0
Fayoum	19.0	30.2	10.0	20.8	31.0	15.0	4.0
Menia	26.0	24.2	61.0	18.7	53.0	41.0	12.0
Asyout	30.0	40.9	14.0	12.0	47.0	31.0	17.0
Suhag	21.0	25.5	29.0	14.6	48.0	29.0	10.0
Qena	13.0	11.7	10.0	22.1	52.0	18.0	6.0
Aswan	19.0	33.3	8.0	22.1	33.0	15.0	19.0
Matrouh	8.0	14.1	2.0	2.9	14.0	0.0	1.0
El Wadi	19.0	21.3	4.0	7.1	39.0	6.0	20.0

Table 3: Deaths / 100 000 Population from Key Noncommunicable Diseases by governorates, 2014

ElGidid							
Red Sea	11.0	59.9	12.0	4.6	48.0	4.0	44.0
North Sinai	11.0	18.4	18.0	4.4	39.0	5.0	12.0
South Sinai	2.0	118.9	10.0	3.0	14.0	2.0	90.0
Luxor	17.0	54.0	8.0	26.9	73.0	15.0	10.0
Total	37.0	26.5	26.0	36.5	47.0	30.0	12.0

Table 3a: Differences in Deaths/100 000 Population by geographical region, 2014

Region(# of Governorates/region)		Cancer deaths #*	Chronic Respiratory Diseases #	Ischemic Heart Diseases #	Hypertensive Diseases #*	Cerebro-vascular Diseases+	Liver Cirhosis +*	Road Accidents#
Urban (6)	Mean	**65.2**	27.6	**26.3**	**65.5**	**46.0**	17.8	23.2
	SD	28.0	16.0	16.7	56.4	17.8	5.7	16.0
Upper Egypt(7)	Mean	21.0	26.2	24.4	16.6	49.9	28.1	11.3
	SD	5.5	9.7	19.9	6.1	17.8	13.0	5.4
Lower Egypt(8)	Mean	31.3	22.1	18.6	**45.8**	43.0	**43.5**	9.3
	SD	19.0	22.3	10.4	41.5	7.9	17.0	3.8
Frontiers(6)	Mean	11.3	**47.7**	9.0	8.1	37.8	5.3	**29.5**
	SD	6.2	39.8	5.8	9.3	22.3	5.2	33.0
Total(27)	Mean	31.7	30.1	19.7	34.2	44.3	25.3	17.4
	SD	25.4	24.6	14.9	40.1	16.3	18.4	18.5

Kruskal-Wallis Test

+ ANOVA Test

*=P-value < 0·05

Table 3b: Correlation analysis between the deaths/100 000 population from the major Non Communicable Diseases and Percent achievement of the target number of general hospitals, ambulances and Intensive Care Units, 2014

	Cancer deaths	Hypertensive Diseases deaths	Cerebro-vascular Diseases deaths	Ischemic Heart Diseases deaths	Liver Cirrhosis deaths
Percent achievement of the target of General Hospitals	-0·178	-0·226	-0·167	**-0·491**[*]	**-0·598**[*]
Percent achievement of the target Ambulances	-0·343	-0·376	-0·198	**-0·548**[*]	**-0·675**[*]
Percent achievement of the target ICUs	**-0·415**[*]	-0·311	-0·177	**-0·605**[*]	**-0·475**[*]

Spearman's Rho Correlation Coefficient
*P- value < 0·05
Source: MoHP Health Statistics

Table 4: Maternal Mortality Ratio (MMR) and Child Mortality by governorates, 2014			
Governorates	Neonatal mortality Rate*	Under 5 mortality Rate*	MMR by place of Residence **
Cairo	11.0	17.0	84.0
Alexandria	19.0	27.0	50.0
Port-Said	11.0	22.0	35.0
Suez	16.0	21.0	32.0
Damietta	8.0	15.0	42.0
Dakahlia	13.0	22.0	57.0
Sharkia	21.0	35.0	54.0
Kalyoubia	19.0	39.0	59.0
Kafr-ElSheikh	9.0	22.0	53.0
Gharbia	17.0	29.0	60.0
Menoufia	9.0	17.0	50.0
Behera	11.0	19.0	56.0
Ismailia	22.0	38.0	37.0
Giza	10.0	25.0	53.0
Beni-Suef	26.0	43.0	69.0
Fayoum	14.0	25.0	59.0
Menia	17.0	42.0	62.0
Asyout	28.0	50.0	65.0
Suhag	27.0	47.0	53.0
Qena	16.0	38.0	58.0
Aswan	26.0	35.0	51.0
Luxor	25.0	48.0	24.0

Red Sea	17.0	28.0	61.0
ElWadi ElGidid	8.0	28.0	32.0
Matrouh	9.0	21.0	71.0
***North Sinai			34.0
***South Sinai			0.0
Total	14.0	27.0	52·5

* Source: EDHS, 2014
** Source: MOHP statistics, 2014
***Not included in EDHS, 2014

Table 4a: Correlation analysis between MMR, Number of PHC/10 000 population and percent achievement of the target of General Hospitals and Ambulances, 2014				
		PHC/10000 population	Percent achievement of the target of General Hospitals	Percent achievement of the target of Ambulances
MMR	Spearman's Rho Correlation Coefficient	-0·44	-0·59	-0.61
	P-value	0·022	0·001	0.001

Table 5: Incidence and prevalence of key morbidities (Communicable and Non Communicable Diseases and Risk Factors) by geographical region in Egypt, 2014		
Prevalence of HBV and HCV *	Hepatitis B virus (%)	Hepatitis C virus (%)
Urban Governorates	1.7	3.0
Lower Egypt	0.7	5.6
Upper Egypt	1.2	3.4
Frontier	0.6	1.6
Total 1-59 Yrs	1.0	4.4
Cancer**	Crude Incidence Rate / 100 000	
Lower Egypt***	133.5	
Middle Egypt***	101.6	
Upper Egypt***	105.5	
Calculated rates of Egypt	113.1	

Smoking, Obesity and Hypertension*	Current Smoking Prevalence (%)		Obesity Prevalence (%)		Prevalence of Hypertension (%)	
	Female	Male	Female	Male	Female	Male
Urban Governorates	0.7	51.2	56.5	26.9	18.1	17.1
Lower Egypt	0.1	44.3	55.4	30.5	18.0	16.7
Upper Egypt	0.2	47.5	41.4	20.6	15.8	16.7
Frontier	0.1	44.4	39.4	19.9	12.4	14.0
Total 15-59 yrs	0.2	46.4	50.3	26.4	17.2	16.7
	20.9				17.0%	

*Source: EDHS, 2014

** Source: Cancer Registry Program, 2014

*** Egypt was stratified into 3 geographical strata (regions) namely Lower Egypt (north of Cairo), Middle Egypt (south of Cairo) and Upper Egypt (further south, reaching the southern frontier of the country)