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Original Article

Strengthening the Health Care System to Address the New Challenge of Non-Communicable Diseases in the Kingdom Of Saudi Arabia: A Systematic Review

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Abstract

Background: The Kingdom of Saudi Arabia has a three tire health system in the country which includes primary, secondary and tertiary. In the recent years there is a shift from communicable to non-communicable diseases in the kingdom of Saudi Arabia because of the lifestyle changes and behavioral modifications.

Methods: A recently published article from various databases between the year 2005 and 2015 were identified. 21 scholarly peer reviewed literatures and 5 world health organization and ministry of health documents were included in the study.

Results: The study relieved the burden due to non-communicable diseases are high in the country and has an impact on the health care delivery system so this study suggested nine detailed strategies for strengthening the health care delivery system to prevent the non-communicable diseases and also for providing better care for the patients with non-communicable diseases.

Conclusion: The burden of disease pattern has been changed over a period of years in the kingdom of Saudi Arabia so there is a need to strengthen the health care delivery system for facing the new challenges.

Key words: Non-communicable diseases, Health Care system, Saudi Arabia

INTRODUCTION

Globally, non- communicable diseases (NCDs) cause death to 38 million people annually, and 17 million NCDs patients die before they reach 70, with 82% of premature and 75% of all NCDs deaths in low- and middle-income families [1]. Within this global epidemic, Saudi Arabia is experiencing an increased burden on healthcare services largely as a consequence of the changing patterns of disease from communicable to non-communicable diseases [2]. An alarming increase in cardiovascular diseases, diabetes, cancer and chronic respiratory diseases, for which the treatment is costly, accounts for 78% of all mortality [1].

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Cardiovascular diseases are the leading cause of NCDs deaths with 46% of total death, followed by cancer 10%, then diabetes 5%, respiratory diseases 3% and other NCDs 14% [1]. The population proportion of those aged between 30 and 70 is 42.7%, and the probability of this age group dying from the four main NCDs is 17%, while tobacco, alcohol, physical inactivity and unhealthy eating increase the risk of NCDs death[1]. In Saudi Arabia, NCDs are estimated to be the largest contributor to the illness burden for the population and the healthcare system, and their prevalence is expected to continue to rise [1]. NCDs are also an enormous drag on economic development and workplace productivity, while the healthcare system takes the greatest burden in terms of attaining people and takes care of all these things [3]. Most NCDs deaths are premature, but would be preventable if the healthcare system's response was more effective and equitable to the NCDs patients' needs, and more supportive of the public policies related to the use of tobacco and alcohol, unhealthy eating and lack of physical activity [4].

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AIM

The aim is to explore the impacts of NCDs on the healthcare system in Saudi Arabia.

METHODOLOGY

In the literature search conducted on " Non-communicable diseases and the healthcare system" in Saudi Arabia, firstly, a review of the relevant literatures published in English from March 2005 to March 2015 was carried out, by using different databases. Medline, CINAHL, SCOPUS, PubMed, the Saudi Ministry of Health (MOH) database, the World Health Organization (WHO) database and public health websites were searched. The keywords and phrases used were synonyms, i.e. 'burden of chronic non-communicable diseases', 'prevalence of cardiovascular diseases', 'ischemic heart disease', 'cancer', 'chronic respiratory diseases', 'asthma', 'diabetes', 'hypertension', 'males', 'females', 'behavior', 'interventions', 'risk factors', 'Saudi Arabia' and 'healthcare system'. The search involved breaking down the research question into its core concepts and alternative terms, and then constructing an effective search strategy. The search strategy has been saved for further use, if needed. In total, twenty-six publications in peer-reviewed journals were identified.

In this systematic search of literature, the source type was limited to academic and peer-reviewed journals, and publications dated to the last 10 years and to Saudi Arabia.

The inclusion criteria allowed fourteen references to be linked to the issue of NCDs, while seven articles were related to the healthcare system in Saudi Arabia. The remaining five publications were the relevant MOH and WHO documents. Following the systematic search, the literature was reviewed and analyzed to identify the main themes relevant to the topic of "The impacts of non-communicable diseases on the healthcare system". Furthermore, data about the per-capita healthcare expenditure and the total healthcare budget were obtained directly from the MOH databases. This study is based on the, only accessible, MOH database (MOH provides 59.5% of the healthcare services). This study does not account for the private sector (which provides 31.5%) and semi-governmental healthcare services (which provide 9%), as they are not accessible.

RESULTS AND DISCUSSION

The results obtained from the literature search of "the impacts of NCDs on the Saudi healthcare system" reveala need for strengthening the healthcare system towards improving the prevention of NCDs and the care of people with NCDs in Saudi Arabia.

This study groups findings according to the following emerging themes related to these impacts:

- Healthcare financing and leadership for healthcare,
- Healthcare service delivery and human resources for healthcare,
- Healthcare technologies and medical products, healthcare information system, and
- Community education and partnerships for healthcareand research in healthcare.

This study will discuss in detail nine factors to strengthening the Saudi healthcare system, and consequently improve prevention, care and treatment of NCDs.

Healthcare Financing

The Article 31 of the Basic Role of Governance requires that the Saudi government ensure free healthcare for all citizens [5]. The MOH's budget represents 6.8 % of government's expenditure, and the total expenditure on health is 4.9% of the Gross Domestic Product [6].

As the population, its aging group, long-tern NCDs and, consequently, the increased demand for healthcare services are increasing, [7] it has forced the government to increase its budget allocation on healthcare from US$ 6.7 billion in 2008 to US$16 billion in 2014 [6]. The treatment of NCDs is costly; for example, only the economic burden of Diabetes Mellitus is estimated at about $2.4 billion in 2015, which accounts for 13.1% of the public healthcare spending [8]. The rapid increase in healthcare costs in general, and NCDs in particular, is exerting big pressure on the government. There is a need to decrease the government's spending on healthcare due to the increased burden on healthcare services largely as a consequence of the changing patterns of disease from communicable to non-communicable diseases. Thus, alternative sources for financing healthcare, and inter-sectoral cooperation are essential. In 1999, the government started implementing a cooperative health insurance (CHI) over three phases to support financing healthcare [5, 9]. In the first phase, the CHI would be applied to Saudis and non-Saudis working in the private sector, in which employers pay health insurance costs for their employees. In the second phase, the CHI would be applied to citizens and non-citizens working in the government sector, paid by the government. In the third phase, the CHI would be applied to other groups, such as tourists [5]. However, the final decisions on the second and third phase of this programme are yet to be made. The national health insurance programme is seen by researchers and policy-makers as vital for improving accessibility and the finance of the Saudi healthcare

system [10,2]. Approval and implementation of the CHI would be an important source of financing health, and may decrease the government's spending on healthcare.

Healthcare Leadership

The MOH is responsible for managing the Saudi healthcare system through 13 healthcare directorates [11]. The structure of its organization and administration is well-defined and decentralized, and its functions include strategic planning, formulation of healthcare policies, supervision of all healthcare services, and monitoring of all healthcare-related activities [9]. Over the past few decades, the MOH has developed strategies for service delivery, including preventive, rehabilitative curative and promotive programmes [12]. Furthermore, to decrease pressure on the MOH, the regional directorates have been given more autonomy to plan and recruit staff, and limited financial discretion [7]. Insufficient spending authority and individual budgets have badly affected the regional directorates [7], which affects their autonomy, and hinders effective decision-making.

A study suggests more planned action towards creating national healthcare workforce [13]. Improving leadership at national and subnational levels will facilitate effective engagement with the MOH and the healthcare directorates to ensure appropriate coverage.

The primary healthcare (PHC) lacks evidence-based national standards, guidelines and protocols for addressing NCDs [1]. Thus, leadership and strong actions on preventative healthcare is needed for driving and coordinating actions to reduce the prevalence of NCDs. Improving management methods is also necessary for raising the level of performance, efficiency and adequacy of preventive and curative healthcare services [14]. The MOH governance system needs restructuring and reorganizing. The Saudi public healthcare sector is overwhelmingly operated, controlled, financed, managed and supervised by the MOH. This model of administration is less likely able to meet health needs in the future without thoughtful and well-planned actions that separate the multiple roles of the MOH.

Therefore, possible solutions are granting more authority to the regional directorates, and implementing a cooperative health insurance [7].

Healthcare Information System

The MOH is encouraging the use of information technology towards improving the quality of data, and evolving to paperless management [15]. However, the MOH lacks not only coordination between primary and other healthcare institutions, but also the information held by the private and semi-government healthcare sectors [16]. Another challenge that the Saudi healthcare system faces is thus the lack of an established and efficient national healthinformation system [17]. The MOH is adopting e-health systems too slowly, as a number of information systems used in central hospitals and regional directorates are isolated [12]. In 2008, the e-health services began to be centralized, and a 5-year plan was implemented to connect all healthcare providers, assess the performance of the services, and raise them to a standardised level [18].

Slow uptake of e-health systems and disconnected information systems in the MOH institutions, regional directorates and private sectors obviously have implications for efficiency of healthcare delivery. Thus, a high level of coordination is essential toprovide accurate data for coordinating, integrating, planning, monitoring and evaluating.

MOH hospitals are using the International Classification of Diseases – Tenth Revision in order to code the causes of morbidity and mortality, but still 25.6% of total deaths in 2012 were registered under the group of ill-defined symptoms and conditions [6]. However, as morbidity and mortality data are not always accurate [17], a comprehensive surveillance programme is needed for the high burden of NCDs. A national study reports that 57.8% and 43.6% of hypertensive and diabetic Saudis, respectively, are undiagnosed [19]. A surveillance programme will provide data on a scientific basis, and enable the relevant authorities to recommend a comprehensive national plan for improving the healthcare system. Surveillance is a crucial monitoring tool for evidence-based decision making about public healthcare and the success of its interventions for containing the emerging epidemic of NCDs [4] . Thus, measurement should be monitored, evaluated and improved, as availability of information is vital to combat, prevent and improve the management of NCDs.

Healthcare Service Delivery

The MOH provides healthcare services through 259 hospitals distributed around the country, and through a network of 2,259 PHC centres located in both large cities and small towns. Other governmental agencies also provide healthcare services through 39 hospitals, while the private sector provides services in 137 hospitals [6] . The MOH delivery model is organized into five tiers, i.e. PHC centres, district hospitals, general hospitals, central hospitals and medical cities [12]. The PHC centres have a gatekeeping function for referrals to general and specialized hospitals [20]. In general, citizens can only access the PHC centres in their areas of residence [21]. Accessibility to healthcare services, cost-effectiveness and equity form an integral part of early detection and management of NCDs,

and reduction of risk behaviors. The improvement of accessibility to healthcare services requires the equity of healthcare facilities around the country, and equal access to healthcare services, which also includes transport [22].

The current MOH statistics reveal a maldistribution of healthcare services across geographical areas [6].

Healthcare facilities in major urban centres, such as Riyadh and Makkah, attract most of the human resource in 46 and 37 hospitals, respectively [6].Also, availability of hospitals for secondary and tertiary healthcare in these areas tends to bypass PHC centres. Such utilization patterns exert not only an excessive burden on the hospital emergency department and underutilization of PHC services, but also significantly higher costs for healthcare [21]. The PHC centres are effective in managing the risk factors, and coordinating care and medication for NCDs through PHC professionals [23]. For instance, diabetes control in the PHC centres requires monitoring blood glucose regularly, hypertension management requires monitoring blood pressure, chronic obstructive pulmonary disease (COPD) requires smoking cessation, and all these require medication and lifestyle changes, such as adopting healthy diet and increasing physical activities. To increase accessibility to healthcare centres throughout the country, the MOH needs to implement a more holistic strategy for redistributing healthcare services in the hospitals and the PHC centres. Finally, increasing awareness by improving access to healthcare facilities helps the promotion of healthy lifestyles [24].

Human Resources for Healthcare

The increase in population and NCDs requires more doctors, nurses and hospital beds [7]. Saudi Arabia relies heavily on expatriates (61% of all healthcare staff) to provide healthcare services, resulting in large turnover and instability in the healthcare system [25]. Not only does the government continue developing the Saudi healthcare workforce through the establishment of healthcare institutions, but there are also 73 colleges for medicine, healthcare and nursing, as well as 4 healthcare institutes [7]. The purpose of establishing such colleges is to substitute the vast expatriate workforce with highly qualified Saudi nationals in healthcare sectors [26]. Furthermore, the MOH has increased the scholarships and training budget in order to offer opportunities to employees to continue their studies abroad [27]. These strategies will contribute to improving the skills of the current employees, raising the quality of healthcare, and decreasing the rate of turnover amongst healthcare professionals. Yet, these strategies may not be sufficient to cope with the challenges, especially with the increasing trend of NCDs and the group aged 15-64 representing 64.8% of the population [12]. It is still highly likely that the government will continue recruiting expatriate healthcare workers in order to meet the needs of the rapidly increasing population. The number of Saudi healthcare professionals in the MOH will probably decrease due to the expanding of healthcare facilities in the country following the population growth [26]. The ability to formulate and apply effective strategies for retaining and attracting more Saudis into healthcare professions is a priority for an effective improvement of the Saudi healthcare system. The government has been taken numerous efforts for teaching and training Saudis for healthcare professional jobs, which is evidence of problems in communication. The MOH should cooperate with both the government and private sectors in consolidating long-term strategies and more realistic plans; for example, more medical colleges and further training programmes are urgently needed. Also, educating expatriate nurses about the cultural heritage of the Saudi people is necessary for increasing cultural harmony [28].

Healthcare Technologies and Medical Products

The Saudi Food and Drug Authority established in 2011 have improved the governance of healthcare technology, as it autonomously oversees both governmental and non-governmental sectors [12]. However, the treatment of NCDs costs the pharmaceutical industry enormous amounts of money, and may even be ineffective [29]. Healthcare technology is the second biggest cost in the Saudi healthcare system, such as medication, vaccines, biomedical equipment, and the networks of laboratory and blood safety, with an increase of 2.7% in imported pharmaceuticals worth US$ 2.63 billion between 2009 and 2010 [12]. The Saudi industry manufactures generic pharmaceutical products, and can supply only about 15% of the pharmaceutical market [30]. The regulations for pharmacies and medical products are loosely implemented, and intended for Saudi control of this national market [30].

Concerns should be voiced about such increased costs related to the growing rate of NCDs, and an increase in the use of expensive technology to manage and treat NCDs. Pharmacies are largely unregulated and almost all medicinal products can be bought over the counter without a prescription. Better accessibility to medication means more demand from the pharmaceutical industry to supply the population with medication without seeing a medical professional, or accessing the PHC services. Such an unsafe distribution chain requires stricter controls of drug supply by the Saudi Food and Drug Authority, as well as encouraging people to obtain a prescription from the PHC professionals, which will also encourage individuals to monitor their own health, and seek medical care.

Research in Health

MOH is only dealing with few specialized medical research [11].The MOH established and finances only one research centre at the King Faisal Specialist Hospital and Research Centre, only for genetics, environmental health, cancer, and cardiovascular and infectious diseases [2]. Despite ranking second in biomedical publications among Arab countries, the citation of Saudi research publications is poor, which indicates its low impact [31]. Continuation of limited research centres and absence of inter-sectoral collaboration will affect the population's health. Despite almost 6 decades since the MOH was established, the number of research centres is still very limited. There has been some sharp criticism of the MOH's lack of efforts to create more research centres which would increase the management of NCDs, such as cancer. Encouraging and supporting health research would provide the required professionals to studyanalyze and reduce the epidemic of NCDs. The MOH should not only establish more research centres, but also conduct research in collaboration with other research centres i.e. universities. Promoting research in the medical and healthcare sciences to improve health and wellbeing in Saudi Arabia is highly recommendable. It is vital to promote and support high-quality research into the prevention and control of NCDs.

Community Education

Currently, the MOH provides PHC services which promote community education through a network of 2,259 centres. The total number of PHC centres provided by the MOH increased by 17.4%, i.e. from 1,986 centres in 2008 to 2,259 centres in 2012 Studies reveal a low quality of interpersonal care due to language barriers and cultural gaps, as most PHC providers are expatriates, and may not clearly communicate with the majority of their patients [20]. Primary prevention needs to be improved, so that it can increase the population's awareness and community programmes (e.g. anti-smoking, healthy eating and physical activity) promoting healthy behaviours [19]. Studies reveal a decrease in cancer mortality through early detection and advances in treatment [32]. Furthermore, healthcare education programmes carried out in the PHC centres need to be reviewed and evaluated with a special emphasis on activities for people suffering from chronic diseases [33].

Similarly, community education promotes health awareness, and fosters the adoption of healthier lifestyles. Early prevention is the most effective way to reduce the rate of NCDs and difficulties associated with treatment in the later stages of disease [34]. It is vital to support programmes for the prevention and control of NCDs with suitable expertise and resources. Raising community awareness and encouraging action are an important direction for NCDs reduction. Basic general public knowledge about controlling cancer is as valuable as diagnostic tools, screening, new approaches to prevention, early diagnosis and treatment [35]. Moreover, efficient community education gives strong anti-smoking messages, increases adoption of healthy lifestyles and physical activities, and provides ongoing support to individuals and families.

Partnership for Healthcare

The lack of integration and coordination of the public healthcare sector's activities is a major waste contributing to the escalation of costs of Saudi healthcare services [5]. Although few ministerial committees help strengthen inter-sectoral action and promote healthcare policies, inter-sectoral collaboration is better at the subnational level thanks to local government and local stakeholders [12]. Most NCDs deaths are largely preventable, but prevention requires a multi-sectorial approach [4]. Approximately 80% of heart diseases, type II diabetes and stroke can be prevented by elimination of the shared modifiable risk factors, such as unhealthy diet, tobacco use, the harmful use of alcohol and physical inactivity [36]. Saudi Arabia is ranked the fourth in the world in tobacco import, which raises a major concern about the hidden health problems related to its use [37]. The high consumption of tobacco would indirectly project the magnitude of COPD, lung cancer, cardiovascular diseases and other related diseases [38].

Addressing risk factors with a comprehensive andpopulation-wide approach will greatly reduce NCDs [39].

This approach should include reducing commercial availability of tobacco, increasing public awareness about the dangers of tobacco use, reducing salt consumption, increasing fruit and vegetables consumption, and improving the environment for prompting physical activates by all sectors to make the default choice healthy. Mortality and morbidity due to smoking can be reduced by banning tobacco particularly for youth [40]. Therefore, the MOH, the Ministry of Education, other governmental and non-governmental organizations and stakeholders need to collaborate more closely. Integration and coordination of activities of the public healthcare sector providers and other professionals will enable them to use resources jointly, and avoid the duplication of services. Improving partnerships at both national and subnational levels will facilitate collaboration with the private sector, and ensure adequate healthcare services coverage.

CONCLUSION

There is strong evidence of a rapid and alarming change in the burden profile in Saudi Arabia. Diabetes, obesity,

high blood pressure, cancer and cardiovascular diseases are putting an enormous toll on the healthcare system and society, which requires prevention and management through carefully planned interventions.

As NCDs are a threat to the future well-being of the Saudi population, to consider and address the future challenges, the healthcare system should be strengthened to respond appropriately. This study helps identify and tackle major obstacles to the healthcare system to effectively respond to NCDs, which can be overcome by improving leadership and research skills, separating of the MOH's multiple roles, diversifying financing sources, and developing public and private partnerships. Other obstacles can be addressed by strengthening, enhancing and sustaining community educational programmes as well as delivering equitable high-quality healthcare to all population. Among challenges are isolated health information systems in regional directorates and implementation of comprehensive national surveillance programme. To improve the Saudi healthcare system, and address the challenges, the MOH and other relevant sectors need to coordinate their activities, and ensure that new healthcare strategies are successful.

REFERENCES

[1]. World Health Organisation (2014). Non communicable diseases country profiles 2014. WHO Press, Geneva. Retrieved May 29, 2015, from http://www.who.int/global-coordination-mechanism/publications/ncds-country-profiles-eng.pdf.

[2]. Walston, S., Al-Harbi, Y., & Al-Omar, B. (2007). The changing face of healthcare in Saudi Arabia. Annals of Saudi Medicine, 28(4), 243-250.

[3]. Nikolic, I. A., Stanciole, A. E., & Zaydman, M. (2011). Chronic emergency: why NCDs matter, Retrieved June 3, 2015, fromhttp://www.ghdnet.org/sites/default/files/ChronicEmergencyWhyNCDsMatter.pdf.

[4]. World Health Organisation (2015). Global status report on noncommunicable diseases 2014. WHO Press, Geneva. Retrieved June 3 from http://apps.who.int/iris/bitstream/10665/148114/1/9789241564854_eng.pdf?ua=1.

[5]. Mufti, M. H. (2002). Healthcare development strategies in the Kingdom of Saudi Arabia: Springer Science & Business Media.

[6]. Ministry of Health (2014). Health Year Book. Kingdom of Saudi Arabia, Retrieved May25, 2015, from http://www.moh.gov.sa/en/Ministry/Statistics/book/Documents/Statistics-Book-1434.pdf.

[7]. Almalki, M., FitzGerald, G., & Clark, M. (2011). Health care system in Saudi Arabia: an overview. Eastern Mediterranean Health Journal, vol. 17, no. 10.

[8]. Alhowaish, A. K. (2013). Economic costs of diabetes in Saudi Arabia. Journal of family & community medicine, 20(1), 1.

[9]. Al Yousuf, M., Akerele, T., & Al Mazrou, Y. (2002). Organization of the Saudi health system. Eastern Mediterranean Health Journal, 8(4-5),645-53.

[10]. Alnaif, M. S. (2006). Physicians perception of health insurance in Saudi Arabia. Saudi medical journal, 27(5), 693-699.

[11]. Ministry of Health (2013). Health Year Book. Kingdom of Saudi Arabia. Retrieved May 25, 2015, from http://www.moh.gov.sa/Ministry/MediaCenter/News/Documents/healthybook.pdf.

[12]. World Health Organisation (2013). World Health Statistics 2013. WHO Press, Geneva. Retrieved May 28, 2015 from http://www.who.int/gho/publications/world_health_statistics/2013/en/.

[13]. Jannadi, B., Alshammari, H., Khan, A., & Hussain, R. (2008). Current structure and future challenges for the healthcare system in Saudi Arabia. Asia Pacific Journal of Health Management, (1), 43-50.

[14]. Diem, G., Brownson, R. C., Grabauskas, V., Shatchkute, A., & Stachenko, S. (2015). Prevention and control of noncommunicable diseases through evidence-based public health: implementing the NCD 2020 action plan. Global health promotion, 1757975914567513.

[15]. Mogli, G. (2009). Medical Records Role in Healthcare Delivery in 21st Century. Acta Informatica Medica, 17(4), 209-212.

[16]. World Health Organisation (2006). Country cooperation strategy for WHO and Saudi Arabia 2006-2011. Cairo (Egypt): WHO Regional Office for the Eastern Mediterranean. Retrieved May 30, 2015, from http://www.who.int/countryfocus/cooperation_strategy/ccs_sau_en.pdf.

[17]. Albejaidi, F. M. (2010). Healthcare system in Saudi Arabia: An analysis of structure, total quality management and future challenges. Journal of Alternative Perspectives in the Social Sciences, 2(2), 794-818.

[18]. Altuwaijri, M. M. (2008). Electronic-health in Saudi Arabia. Just around the corner? Saudi medical journal, 29(2), 171-178.

[19]. Memish, Z., Jaber, S., Mokdad, A., Almazroa, M., Murray, C., & Al Rabeeah, A. (2014). Burden of Disease, Injuries, and Risk Factors in the Kingdom of Saudi Arabia, 1990-2010. Preventing Chronic Disease, 11, Preventing Chronic Disease, 2014 Oct, Vol.11.

[20]. Hanan, A.-A., & Roland, M. (2005). Quality of primary health care in Saudi Arabia: a comprehensive review. International Journal for Quality in Health Care, 17(4), 331-346.

[21]. Sebai, Z. A., Milaat, W. A., & Al-Zulaibani, A. A. (2001). Health care services in Saudi Arabia: past, present and future. Journal of family & community medicine, 8(3), 19.

[22]. Robinson M. Does decentralization improve equity and efficiency in public service delivery provision? IDS bulletin. 2007 Jan 1;38(1):7-17.

[23]. Samb, B., Desai, N., Nishtar, S., Mendis, S., Bekedam, H., Wright, A., Patel, K. (2010). Prevention and management of chronic disease: a litmus test for health-systems strengthening in low-income and middle-income countries. The Lancet, 376(9754), 1785-1797.

[24]. Al-Rubeaan, K., El-Asrar, A., Ahmed, M., Youssef, A. M., Subhani, S. N., Ahmad, N. A., Al-Ghamdi, A. (2014). Diabetic retinopathy and its risk factors in a society with a type 2 diabetes epidemic: a Saudi National Diabetes Registry-based study. Actaophthalmologica. 2015 Mar;93(2):e140-7. Doi: 10.1111/aos.12532. Epub 2014 Oct 1.

[25]. Jannadi, B., Alshammari, H., Khan, A., & Hussain, R. (2008). Current structure and future challenges for the healthcare system in Saudi Arabia. Asia Pacific Journal of Health Management, (1), 43-50.

[26]. Telmesani, A., Zaini, R., & Ghazi, H. (2011). Medical education in Saudi Arabia: a review of recent developments and future challenges. Eastern Mediterranean Health Journal, 17 (8) 703-7.

[27]. Al-Homayan, A. M., Shamsudin, F. M., Subramaniam, C., & Islam, R. (2013). Analysis of health care system-resources and nursing sector in Saudi Arabia. Advances in Environmental Biology, 7(9), 2584-2592.

[28]. Almutairi, A., & McCarthy, A. L. (2012). A multicultural nursing workforce and cultural perspectives in Saudi Arabia: An overview. TheHealth, 3(3), 71-74.

[29]. Aljumah, A. A., Ahamad, M. G., & Siddiqui, M. K. (2011). Predictive Analysis on Hypertension Treatment Using Data Mining Approach in Saudi Arabia. Intelligent Information Management, vol. 3, no. 6.

[30]. Issa, A.N., Al-Ammar and S. Mostaft (2009).Health care and Pharmaceutical Industries in Saudi Arabia-Member Briefing. American Health Lawyers Association. Retrieved May 5, 2015, from http://www.kslaw.com/Library/publication/11-09%20AHLA%20Issa,%20Al-Ammar,%20Mostafa.pdf.

[31]. Benamer, H. T., & Bakoush, O. (2009). Arab nations lagging behind other Middle Eastern countries in biomedical research: a comparative study. BMC Medical research methodology, 9(1), 26.

[32]. Sait, K. H., Anfinan, N. M., Eldeek, B., Al-Ahmadi, J., Al-Attas, M., Sait, H. K., El-Sayed, M. E. (2014). Perception of patients with cancer towards support management services and use of complementary alternative medicine-a single institution hospital-based study in Saudi Arabia. Asian Pac J Cancer Prev, 15, 2547-2554.

[33]. Alnaif, M. S., & Alghanim, S. A. (2009). Patients'knowledge and Attitudes towards Health Education: Implications for Primary Health Care Services in Saudi Arabia. Journal of family & community medicine, 16(1), 27.

[34]. Balbus, J. M., Barouki, R., Birnbaum, L. S., Etzel, R. A., Gluckman, P. D., Grandjean, P., Hoffman, K. (2013). Early-life prevention of non-communicable diseases. Lancet, 381(9860).

[35]. Ravichandran, K., Mohamed, G., & Al-Hamdan, N. A. (2010). Public knowledge on cancer and its determinants among Saudis in the Riyadh Region of Saudi Arabia. Asian Pac J Cancer Prev, 11(5), 1175-1180.
[36]. World Health Organisation (2009). 2008-2013 Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases. WHO Press, Geneva. Retrieved May 28, 2015 from http://www.who.int/nmh/publications/ncd_action_plan_en.pdf.
[37]. Al-Mohrej, O. A., AlTraif, S. I., Tamim, H. M., & Fakhoury, H. (2014). Will any future increase in cigarette price reduce smoking in Saudi Arabia? Annals of thoracic medicine, 9(3), 154.
[38]. Bassiony, M. M. (2009). Smoking in Saudi Arabia. Saudi medical journal, 30(7), 876-881.
[39]. Beaglehole, R., Bonita, R., Horton, R., Adams, C., Alleyne, G., Asaria, P., Casswell, S. (2011). Priority actions for the non-communicable disease crisis. The Lancet, 377(9775), 1438-1447.
[40]. Al-Haqwi, A. I., Tamim, H., & Asery, A. (2010). Knowledge, attitude and practice of tobacco smoking by medical students in Riyadh, Saudi Arabia. Annals of thoracic medicine, 5(3), 145.

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