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REVIEW

Addressing the Threat of Chronic Diseases in Oman

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PEER REVIEWED

Abstract

Introduction

The overall health status of the Omani population has evolved over the past 4 decades from one dominated by infectious disease to one in which chronic disease poses the main challenge. Along with a marked reduction in the incidence of infectious diseases, improvements in health care and socioeconomic status have resulted in sharp declines in infant and early childhood mortality and dramatic increases in life expectancy.

Methods

Focusing on the time period from 1990 through 2005, we reviewed relevant epidemiological studies and reports and examined socioeconomic indicators to assess the impact of the changing disease profile on Oman's economy and its health care infrastructure.

Results

Over the next 25 years, the elderly population of Oman will increase 6-fold, and the urbanization rate is expected to reach 86%. Currently, more than 75% of the disease burden in Oman is attributable to noncommunicable diseases, with cardiovascular disease as the leading cause of death. The distribution of chronic diseases and related risk factors among the general population is similar to that of industrialized nations: 12% of the population has diabetes, 30% is overweight, 20% is obese, 41% has high cholesterol, and 21% has the metabolic syndrome.

Conclusion

Unless reforms are introduced to the current health care system, chronic diseases will constitute a major drain on Oman's human and financial resources, threatening the advances in health and longevity achieved over the past 4 decades.

Introduction

The rising burden of noncommunicable diseases (NCDs) has been an increasing public health concern globally. In 2005, the World Health Organization (WHO) estimated that 61% of deaths (35 million) and 49% of the global burden of disease were attributable to NCDs (1). Eighty percent of such deaths occurred in low- and middle-income developing countries where health resources are limited (2). If current trends continue, by 2030 chronic diseases will account for 70% of total global deaths and 56% of the global disease burden (1).

Oman, located in the southeastern corner of the Arabian peninsula, has a land area of 309,000 square kilometers. In 1959, the country emerged from several wars between tribal factions in the interior and coastal areas (3). The last conflict, which took place in the south, ended in 1982 with the forging of a treaty between Oman and Yemen. Since then, the country has maintained internal peace and stability and peace with its neighbors. In 1970, Sultan Qaboos bin Said assumed power and set the country on the path of modernization. In less than 20 years, Oman acquired all the attributes of a modern state: running water, electricity, telephone, television, shopping malls, schools, university education, hospitals, and clinics (4).

Like many developing countries, Oman bears a high burden of NCDs. Several studies have documented the distribution of risk factors associated with NCDs in this relatively small country (5-9). We describe the rapid changes in the epidemiologic map of Oman from one dominated by first-generation diseases (i.e., infectious diseases) to the emergence of NCDs as the dominant feature of ill health. Furthermore, we elaborate on the accompanying demographic, socioeconomic, and behavioral risk factor changes that have contributed to the current epidemiologic transition.

Methods

The Directorate General of Planning of the Omani Ministry of Health routinely collects data for health planning purposes. Data on morbidity, mortality, and use of health care services are compiled from primary-, secondary-, and tertiary-care regional health institutions by a Health Information Unit, headed by a statistician, in each of Oman's 10 administrative regions. These data are fed into electronic templates and sent to the central Health Information Unit. There, information is reviewed and published as an annual health report. We reviewed these reports for the years 1990 through 2005.

In addition, the Oman Ministry of Health's Research Department designs and conducts national health surveys every 5 to 10 years to provide decision makers with community-based data on certain variables, including behavioral and biological risk factors for NCDs. We reviewed the report of the Oman National Health Survey 2000 (10), the Joint Study Report on Mortality and Health Transitions in Oman (3), several WHO consultants' reports on primary care in Oman (11,12), and the 1999 World Bank *Cost-Effectiveness Review of the Health Sector* (13). We also searched the National Library of Medicine's MEDLINE database for publications on chronic diseases pertinent to Oman.

Although the accuracy of the health information data gathered by the Directorate General of Planning in the Omani Ministry of Health has not been formally assessed, health information officers from various WHO member states in the Eastern Mediterranean Region (EMR) have visited Oman several times to learn from its health information systems. In addition, the International Agency for Research on Cancer, a specialized WHO agency, has examined Oman's cancer registry data and has considered it sufficiently reliable to be included in its publication, *Cancer Incidence in Five Continents* (http://www.iacr.com.fr/statist.htm). Oman is 1 of only 2 countries among the 22 EMR member states whose cancer data were included.

Results

Demographic and economic profile

The total population of Oman is estimated to be 2.5 million, of which 1.8 million are Omani citizens. Nearly 54% of Omanis are younger than 20 years, and only 3.5% are older than 60 years. Life expectancy increased by 25 years in a period of 35 years, from 49.3 years in 1970 to 74.3 years in 2005. The current annual population growth rate is 2.2%. By 2030, the total population will double (14). Approximately 70% of the increase will occur in the group aged 15 to 64 years. Over the same period, the number of Omanis aged 65 and older will increase 6-fold. Urbanization has risen from 11% in 1970 to 79% in 2005 and is projected to reach 86% by 2030 (15). A rapidly growing number of Omanis are leaving arable land and labor-intensive jobs and moving to the capital city of Muscat to work in less strenuous office-based or industrial jobs. These changing trends in urbanization (i.e., the number of people living in urban areas) and employment lead inevitably to lifestyle changes that expose the population to increased biological and behavioral risk factors.

Partially as the result of an intense birth control campaign begun in the 1990s, the total birth rate among women aged 15 to 45 years declined by almost 50% in 10 years, from 6.0 per woman in 1995 to 3.1 per woman in 2005. The World Bank classifies Oman as an upper-middle–income developing country, and WHO stratifies it as a country with low child and adult mortality rates. The discovery of oil in Oman in 1964 and its commercial exploitation in 1967 has led to a steady increase in per capita income from U.S. $410 in 1970 to more than U.S. $12,000 in 2005.

Control of communicable diseases

Successful interventions have prevented or controlled communicable diseases in Oman, among them, the implementation of WHO's Expanded Programme

on Immunization (EPI), improvements in living conditions and basic sanitation, and provision of free health care services to all citizens. Immunization coverage has been maintained at nearly universal levels (greater than 95%) for all vaccine-preventable diseases within the EPI, and polio and diphtheria have not been reported in the country since 1990. These interventions have contributed to the rapid decline in mortality rates among infants (from 118/1000 live births in 1970 to 10.3/1000 live births in 2005) and children under age 5 years (181/1000 in 1970 to 11.0/1000 in 2005) (Figure 1) (16).

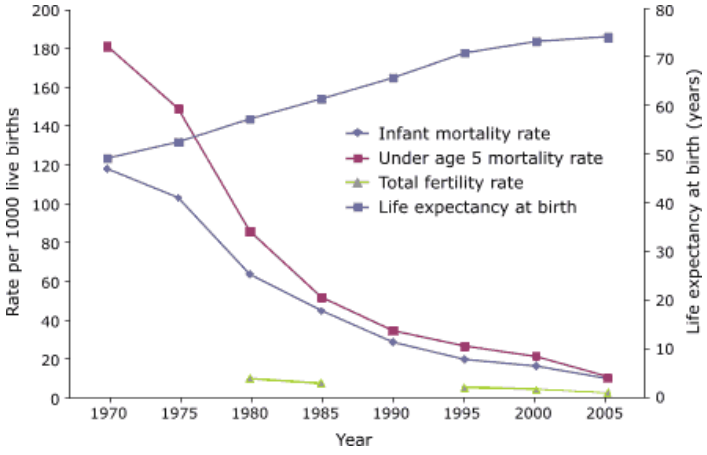

Figure 1. Trends in mortality among infants and children under age 5 years, life expectancy at birth, and total fertility rates, Oman 1970–2005 (16). Fertility data for the years 1970–1980 and 1985–1995 are not available.

Within 11 years (1995–2005), the number of malaria cases in Oman dropped from more than 32,000 to 544. All of the 544 cases were classified as imported cases, mostly from East Africa and the Indian subcontinent. A significant but slower decline has occurred in the total number of cases of pulmonary tuberculosis, from 258 cases in 1985 to 131 cases in 2005 (16).

Rising tide of noncommunicable diseases

In 2002, NCDs in Oman accounted for more than 75% of hospital deaths and a similar percentage of disability-adjusted life years (DALYs) lost (1). In 2005, 40% of inpatient and 55% of outpatient morbidity was attributed to chronic diseases, compared with 36% and 43% in 1995, an increase of 11% and 28%, respectively (16). In 2002, cardiovascular disease (CVD) ranked first among the leading causes of death (Figure 2) and third among causes of lost DALYs (Figure 3). The prevalence of hypertension (blood pressure ≥140/90 mm Hg) among both sexes aged 20 years or older has risen from 27% in 1995 to 32% in 2000 (6,10).

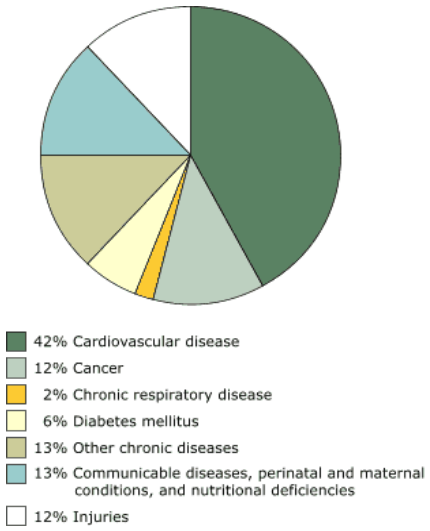

Figure 2. Estimated deaths attributable to diseases and injuries, all ages, Oman, 2002 (17).

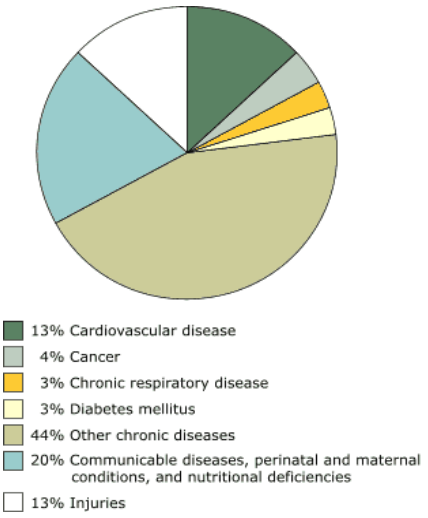

Figure 3. Estimated disability-adjusted life years lost attributable to diseases and injuries, all ages, Oman, 2002 (17).

According to the National Health Survey of 2000 (18), the prevalence of diabetes mellitus in Oman rose from 8.3% in 1991 to 11.6% in 2000 among adults aged 20 years or older. The survey, which employed identical methodology and diagnostic criteria for both years (19), showed 7.1% of men and 5.1% of women had impaired fasting glucose. Only one-third of people with diabetes knew that they had the condition (18). WHO estimates a 190% increase in the number of people living with diabetes in Oman over the next 20 years, from 75,000 in 2000 to 217,000 in 2025 (20). Omanis also have high rates of diabetes-related complications. More than 14% of people with diabetes in Oman were found to have diabetic retinopathy compared with 11.6% of Saudis and 6.7% of Indians (21). Twenty-seven percent of Omanis with type 2 diabetes had microalbuminuria (22). More than 50% of amputations in Oman are attributed to diabetes mellitus (16).

Data from the National Cancer Registry show approximately 900 new cases of cancer reported annually in Oman. Malignant neoplasms are the

second leading cause of death and the third cause of lost DALYs in Oman. The annual age-adjusted incidence of cancer ranges from 70 to 110 per 100,000 population. Non-Hodgkin's lymphoma, leukemia, and gastric cancer are the most common cancers among men, and breast cancer and leukemia are the most common among women. Unlike the United States and other parts of the world, lung cancer is only the fourth most common malignancy among men, likely because smoking was not introduced widely in Oman until after 1970.

High burden of risk factors

Although pockets of malnutrition still exist (2.2% of children under age 5 years have protein-energy malnutrition), 30% of Omani adults are overweight (body mass index [BMI] 25.0 to 29.9 kg/m^2) and 20% of adults are obese (BMI $\geq$ 30.0 kg/m^2) (23). The rate of private car ownership is as high as 69% among Omanis (24). Data on food imports (Table) indicate an increasing trend of per capita consumption of refined sugar, dried and evaporated whole milk, chicken, cheese, and chocolate products over the past decade, while fruit consumption has increased only slightly (25).

The prevalence of high cholesterol (total serum cholesterol >5.2 mmol/L) was 41% in 2000 (10). Another survey of adults in the city of Nizwa in 2001 showed that more than 35% of those surveyed had high total cholesterol, 25% had high triglyceride levels, and 77% had abnormal high-density lipoprotein (8). The same survey indicated that 21% of adults had metabolic syndrome as defined by the National Institutes of Health Adult Treatment Panel III (26). Similar rates of metabolic syndrome have been reported among the U.S. adult population (27). More than 28% of adults in Nizwa reported no physical exercise during working hours, and 60% did not engage in any leisure time physical activity (28).

Data on tobacco use show a 25% increase in per capita imports from 1993 to 2003 (Table) (25). Currently, more than 13% of Omani adults are smokers, 13.4% of men and 0.5% of women. In the Oman component of the Global Youth Tobacco Survey (GYTS 2003), 27% of boys and 9% of girls aged 13 to 15 years were current users of some form of tobacco (29). Waterpipe smoking is gaining popularity among youth, with 15% of boys and 3% of girls reporting this form of smoking in 2003 (30). Curbing tobacco use has been an important area of work for the Oman Ministry of Health, and Oman is party to the WHO Framework Convention on Tobacco Control.

To combat the surge of behavioral risk factors, a community-based demonstration project aimed at reducing NCDs and their associated risk factors was established in the city of Nizwa in 2001, and a similar project is currently underway in the eastern city of Sur. The WHO Healthy Cities Program (31) has been under way in the eastern region of Kalhat for more than 10 years.

Within the Oman Ministry of Health there is a directorate for control of noncommunicable diseases and another for community-based initiatives, both of which address common chronic conditions such as diabetes. These agencies ensure availability of Arabic-speaking diabetes specialists in every region of Oman. Small diabetes clinics, run by family physicians on specific days of the week, have been established in most primary health care (PHC) centers. Management guidelines to treat diabetes and hypertension have been developed and are updated regularly.

Discussion

The health care system of Oman faces formidable challenges in its efforts to prevent chronic diseases from eroding the achievements of the past 4 decades. First, increases in the population will lead to an estimated 210% increase in the demand for health care by 2025, and treatment of CVD alone will account for 21% of total health care expenditures (32). Furthermore, the Omani health system currently suffers from overuse of health services, both by patients, with 5.6 visits per person per year, and by physicians, with 70% of tests requested being unnecessary (33). Second, patients' expectations for quality of care and better health outcomes are increasing; continuing with the current modest standards of clinical care may erode the public's confidence in the national health system. Third, the current rate of increase in the cost of health care is a cause of great concern for sustainability of health care services, especially given the rapid rate at which costs are increasing. Although Oman's per capita expenditure on health (U.S. $220) is lower than that of neighboring Arab Gulf states (U.S. $665 in United Arab Emirates and U.S. $539 in Bahrain) (34), health care expenditures increased by 64% from 1995 to 2005. Clearly, improving care for chronic diseases would put incrementally increased financial demands on an already resource-constrained health

care system. Fourth, there is a great need to shift health care services from acute and episodic treatment to treatment that meets the ongoing needs of people with chronic conditions, with greater focus on health promotion and chronic disease prevention.

Despite the fact that preventive health care services were emphasized in every 5-year plan of the Oman Ministry of Health, until recently health care policy makers have focused on meeting public demand for health facilities and services by providing curative clinical services to the newly developing regions of Oman. One positive aspect of this has been the availability of secondary-care services in all regions of Oman. Another has been the rapid expansion of the PHC centers network throughout the country. However, the current primary care system is still geared more to combating infectious diseases, providing immunizations, and providing prenatal care rather than to meeting needs arising from the growing burden of NCDs. Most primary care physicians and nurses are not educated beyond their basic training to deal with common complex diseases like diabetes, hypertension, asthma, and psychiatric conditions. Drugs necessary to treat common conditions such as hyperlipidemia (statins), hypertension (angiotensin-converting enzyme inhibitors), depression, and other common chronic conditions are dispensed not in primary care facilities where most people access health care, but mostly in secondary and tertiary care facilities. Antiobesity and tobacco-cessation medications have yet to be added to the national formulary and can be obtained only through private-sector pharmacies at appreciably higher costs.

Two of the major risk factors propelling the current epidemic of NCDs, namely tobacco and obesity, can be curbed through implementation of appropriate strategies, such as the WHO Global Strategy on Diet, Physical Activity, and Health (35). Furthermore, the call by Strong et al (2), to set a target to reduce deaths from chronic diseases by an annual rate of 2% deserves due consideration and integration into Oman's national health goals.

Decision makers and health planners need to have greater political commitment to the provision of services for people with chronic diseases. Commitment is most likely to be forthcoming if more evidence is produced nationally demonstrating the increasing burden of NCDs. Greater commitment to providing chronic disease services will result from national research and from continuous dialogue between advocates of chronic disease control and policy makers. Greater emphasis on health promotion will enable people, both the chronically ill and the healthy, to increase control over their health and to improve it.

Finally, various departments of the government make polices and decisions that inevitably have an impact on major risk factors and, ultimately, on the health of the nation. However, collaboration and joint planning among government sections are still rudimentary and need to be strengthened through development of a national planning framework under the leadership of the Ministry of National Economy. Preventive health programs would have better outcomes if public polices on taxation, trade, food, urban planning, and the like are evidence-based and set with due consideration of public health.

Oman faces an epidemic of chronic NCDs. Oman's rapid socioeconomic development coupled with demographic trends over the past 37 years reflects positively on Oman's health indicators, most notably on the increase in life expectancy at birth. However, such achievements may be overshadowed by the dramatic rise of chronic diseases, including cardiovascular disease, diabetes and other obesity-associated syndromes, chronic renal failure, and cancer, which are costly to treat. If the achievements in the health of the nation accomplished over the past 4 decades are to continue, there must be concerted efforts and coordinated policies on the part of government with greater emphasis on proven, cost-effective primary prevention services that focus on lifestyle and behavior change.

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Tables

Table. Estimated Changes in Per Capita Imports of Selected Food Products and Cigarettes, Oman, 1993 and 2003[a]

Commodity	1993 (Metric Tons)	2003 (Metric Tons)	% Change
Chicken	17.2	27.4	+59%
Dry whole cow milk	5.2	18.1	+248%
Wheat	77.6	82.7	+7%
Oranges	16.9	17.1	+1%
Whole milk (evaporated)	6.8	10.9	+60%
Sugar (refined)	16.7	24.8	+49%
Palm oil	11.7	10.7	−9%
Sheep milk cheese	2.1	3.4	+62%
Chocolate products	2.0	2.5	+25%
Cigarettes	5.9	7.4	+25%

[a] Data are from the United Nations (25).