The Jordanian Diabetes Crisis

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Executive Summary

A steadily rising GDP, along with relatively high spending on health care, has allowed Jordan to make a number of significant health advances in the past three decades. Increased life expectancy and immunization rates and reduced child mortality are just a few of the many basic indicators that demonstrate substantial health improvements. Jordan’s dedication to expanding healthcare access and improving quality has produced results so marked that the country has become a popular destination for medical tourism.

However, while Jordan’s rapid economic development has allowed it to significantly diminish the prevalence of diseases associated with less developed nations, chronic diseases have become an emerging health crisis. Lifestyle changes including increased caloric intake, decreased consumption of fruits and vegetables, and a decline in physical activity, have contributed to rapidly increasing rates of chronic disease, making them the leading cause of mortality in Jordan.

The government of Jordan recognizes that diabetes, in particular, has created a heavy financial and social burden and has instituted a number of efforts to combat the growing problem. The most visible of these efforts is National Center for Diabetes, Endocrinology and Genetics (NCDEG), which undertakes research, provides high-quality treatment, and conducts endocrinological training for physicians. The Jordanian response also includes the dissemination of standardized treatment brochures for doctors and patients, youth health education, physician training and certification, and some limited public awareness campaigns.

Recommendations

However, the current response is not proportional to the burgeoning problem. In order to more systematically address this issue, Jordan must take the following steps:

**Youth:**
- Evaluate existing health education programs, assess the strengths and weaknesses of each, and avoid duplication in function
- Adopt a coordinated National Health Education Program
- Implement a health curriculum into all government primary and secondary schools

**Adults and Families:**
- Promote a culture of exercise
- Develop and transform outdoor social spaces and public walkways
- Incorporate “green spaces” into future urban planning and design

**Doctors:**
- Create an abbreviated training program that would complement current certificate and degree programs offered at the NCDEG
- Provide incentives for diabetes-related doctor training
Introduction

Health Profile

Overall population health in Jordan compares favorably when evaluated against a number of universal health indicators. Average life expectancy at birth is 72 years, which is relatively high for the developing world.\(^1\) Infant mortality is 22 deaths per 1,000 live births,\(^2\) a figure that represents one of the world’s fastest declines in infant mortality rates since 1981.\(^3\) Access to and advances in health technologies are the primary drivers behind the increase in life expectancy and decrease in mortality.\(^4\) Increased living standards and better health care are the primary contributors to an annual population growth rate of approximately 2.5%,\(^5\) a high figure which has led to increased focus on family planning. Further complicating the issue of population growth, Jordan’s stability has made it a desirable destination for an estimated 500,000 Iraqi refugees who have poured in since 2003.\(^6\) The long term future of these individuals is unclear, but the immediate strain on the health sector is being felt. Additionally, as preventable diseases have been reduced and eradicated, chronic diseases, which oftentimes appear later in life, have steadily increased. Diseases such as diabetes burden Jordan’s health care system with expensive, long term treatments and carry significant social costs as well.

Health Care System

The Jordanian health care system is comprised of five sectors. These include: the Ministry of Health, which has its own hospitals and health centers; Royal Medical Services, which is primarily designed for military personnel but also used by some civilians with appropriate referrals; government university medical centers including Jordan University Hospital and King Abdullah University Hospital; various private hospitals; and clinics administered by the United Nations Relief and Works Agency.\(^7\) To coordinate health policy across sectors, the Jordanian government formed the High Health Council in 1999. The council is headed by the prime minister and includes representatives of the major providers and associations as well as experts in health and health policy. Its objective is to, “Draw the general policy of the health sector and to put forward the strategy to achieve it and to organize and develop the health sector as a whole so as to extend health services to all citizens according to the most advanced methods and scientific technology.”\(^8\)

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Expenditures

Jordanians spend $502 per capita on health care per year, or 9.8% of GDP (2004). Government spending makes up 48.4% (2004) of total health care spending. A breakdown of public health expenditures by function indicates that almost 58% is spent on curative services, 27% on preventive measures, 5% on administrative activities, 3% on training, and 7% on miscellaneous activities. The private sector finances more than half of total health care expenditures; a large and disproportionate portion of which goes to pharmaceutical spending. As of 2001, 81.5% of all pharmaceutical spending was done by the private sector, while only 18.5% from the public.

Chronic Disease

Because of recent media attention on epidemics in developing countries, there is an assumption that relatively low-income levels lead to conditions that promote communicable diseases and allow easily preventable diseases to persist. However, in Jordan, it is economic growth that has contributed to a public health crisis, but in chronic, not communicable, disease. Communicable disease rates in Jordan are low even in comparison with many developed countries. High vaccination rates have reduced and eliminated many easily preventable diseases. However, chronic disease rates have been steadily rising. As a result, the leading cause of mortality in Jordan is chronic disease.

In part, Jordan has been a victim of its own success. Increased prosperity has brought electricity, tap water, television and transportation into the home, leading to a decrease in physical activity. Mechanized agriculture has made food cheap and abundant. Diets that are oftentimes low in fruits and vegetables and high in fats and starches have exacerbated the problem. Obesity, defined as having a body mass index (BMI) over 30, has a prevalence of nearly 50%. Even improved health care has exacerbated the problem; as people live longer, the likelihood of

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9 1 Jordanian Dinar (JD) = 1.41 U.S. Dollars
18 Ibid
19 Ibid
chronic disease increases.\textsuperscript{20} For these reasons, chronic disease rates are predicted to continue on an upward trend.\textsuperscript{21}

The growth in diabetes’ rates, oftentimes thought of as a “rich country disease,” has been particularly alarming. From 2002 to 2004, the reported rate of diagnosed diabetes climbed from 6.3\% to 7.4\%.\textsuperscript{22} Current total estimates range from 16\% to 30\% depending on the age range and defined glucose levels.\textsuperscript{23} The prevalence of diabetes in Jordan constitutes not only the highest in the region, but also one of the highest in the world.\textsuperscript{24} A Finnish study estimated that Type 2 diabetes, most commonly known as adult onset, can be prevented in 58\% of cases;\textsuperscript{25} a startling statistic indicating the need for action.

Confounding matters is the presence of over 2 million Palestinian and Iraqi refugees. Several non-governmental and international organizations operating in the country have noted that both groups bring with them high prevalence rates of diabetes alongside other chronic diseases.\textsuperscript{27}

Diabetes inflicts heavy economic costs for countries with high rates of the disease.\textsuperscript{28} Late discovery also contributes to the significant burden, oftentimes requiring more expensive and involved treatments. The annual direct costs of diabetes treatment, including medication, approach JD654 million, and are matched by the indirect, mainly social, costs.\textsuperscript{30} Diabetes also inflicts psychological costs for patients. According to one study of female Palestinian refugees in Jordan:

\begin{enumerate}
\item[\textsuperscript{23}] Estimate provided by National Center for Diabetes, Endocrinology and Genetic Diseases when inclusive of impaired glucose tolerance for adults over the age of 25 in discussion with author, February 2008. Nasir and Nasir, 144.
\item[\textsuperscript{30}] \textit{Ibid.}
\end{enumerate}
(L)iving with a chronic disease and chronic refugee status under continuously deteriorating health and living conditions made the women constantly aware that they faced chronic uncertainty and unpredictability about their future. Some of the emerging themes from the data included hopelessness, inner suffering, uncertainty, and lack of control over diabetes.31

Recognizing the prominence of diabetes within Jordanian society, the government has established a national institute to address the issue. The National Center for Diabetes, Endocrinology and Genetic Diseases (NCDEGD) seeks to conduct scientific research in the field, provide education to the general public, and treat those suffering from diabetes.32 Other private sector organizations have also created centers to provide comprehensive diabetes treatment.33

Outlook

As Jordan has modernized it has continually improved its citizens’ access and quality of health care. It has been able to accomplish this in one of the world’s most volatile regions despite a rapidly growing population, the loss of its major trading partner Iraq to two gulf wars, a severe water shortage and an influx of refugees from the ongoing war in Iraq. The increasing wealth of Jordan’s largely successful modernization may be leading to more sedentary lifestyles and increased consumption of generally lower quality food. These factors are converging to exacerbate a rising prevalence of chronic diseases, specifically diabetes and heart disease, and an increasing national expenditure on health care in total dollars and as a percentage of GDP. More preventative care, better information distribution to doctors and patients, and further cost containment strategies are needed for Jordan to continue its rapid health improvement.

Analysis

Economic Factors

Economic and Demographic Shifts

The past few decades have ushered in a time of extreme economic and social change in Jordan. A 5.7% real GDP growth rate34 and a population that is moving into the cities and adapting urban lifestyles has resulted in significantly altered food consumption patterns that are contributing to its rapidly growing rates of obesity and diabetes. Quite simply, Jordanians can afford to eat a higher quantity of food and they are leading more sedentary lives. A 2004 report entitled, “Obesity and Diabetes in Jordan: Findings from the Behavioral Risk Factor Surveillance

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System” estimates that about 50% of Jordanians do not engage in any physical activity and average daily caloric consumption in Jordan has increased from 2152 calories in 1965 to over 2800 calories in 2000, even while estimates for daily energy requirements have barely risen (see Chart 2). However, while Jordan is not wanting for food in the aggregate, parts of the population “do not have an adequate food energy intake. Poor families have a higher consumption of affordable energy sources, such as cereals, which lack many essential nutrients.”

Diet

Perhaps equally problematic is that the quality of the Jordanian diet has deteriorated. The authors of the 2004 Obesity and Diabetes in Jordan report felt that, “Perhaps the most striking finding from this survey was the low intake of fruits and vegetables among participants: only about 19% of survey respondents reported having consumed three or more cups of fruits, fresh juices, or vegetables the previous day.” Only 4.2% of the average Jordanian’s dietary energy supply (DES) comes from fruits and vegetables. This is compared to 53.3% from cereals, 11.4% from sweeteners and 14% from vegetable oils (See Chart 3).

Further, these numbers represent large historical changes in the Jordanian diet. From 1964-1966 it was estimated that Jordanians consumed more than 285 KG of fruits and vegetables per person per year; by 1998 -2000 this was down to about 130 KG per person per year. Additionally, there were significant per/capita increases in the consumption of cereals, vegetable oils, and to a lesser extent, sweeteners (see Chart 4).

Price Distortions

The fact that current consumption patterns represent a departure from historical consumption demonstrates elasticity to the Jordanian diet that transcends cultural and historical dietary patterns. In other words, social, demographic, and economic influences are significantly altering the Jordanian diet, and the altered Jordanian diet is likely correlated with high and increasing levels obesity and diabetes.

One possible economic influence on the dietary change, though clearly not sufficiently explanatory, is the Jordanian policy of food subsidies, regulations, and cereal commodity aid. According to the Food and Agricultural Organization of the United Nations, “The type of fruit and vegetable consumed varies with the availability and prices. For example, tomato, potato and cucumber were the most available and consumed vegetables in 1992 and 1997.”

37 Ibid.
Further, the IMF reports that “by lowering the relative price of the subsidized foodstuffs without setting any limit on the quantity of purchases, it encouraged the substitution of those goods for other food items, thus increasing demand for the subsidized foodstuffs.” Most importantly, fruits and vegetables were not significantly subsidized relative to the cereals, fats, oils and meats. (See Chart 6) As predicted, the relative consumption of cereals increased while fruits and vegetables significantly decreased during the subsidy period of the 1990s. (See Chart 4) Of course, without a more thorough quantitative analysis the causal relationship remains tentative.

In an effort to balance the budget, Jordan’s proposed 2008 national budget has eliminated all remaining food subsidies and significantly decreased fuel subsidies. Immediately, the prices for many consumer goods will rise. For example, the price of a kilogram of potatoes is expected to rise to US $1.5 from its current price of 75 cents. Exacerbating the situation is the recent severe frost that has killed crops over 5,000 km$^2$ in the Jordan Valley. The current turbulence in the Jordanian macro economy, and the price pressures on Jordanians resulting from inflation and increased fuel costs, will continue to put strain on Jordanian daily life.

While the connections between Jordan’s price distortions, subsidies, and its growing obesity epidemic are not clear, the Jordanian diet has shown responsiveness to pricing signals; therefore, the opportunity may exist to influence the makeup of the Jordanian diet through effective economic incentives. Unfortunately, price distortions caused by food subsidies and macroeconomic fluctuations may have provided researchers a natural experiment to study the elasticity of demand for various food stuffs. To the extent that researchers could determine how high quality and low quality foods are substituted in the Jordanian diet, Jordan may be able to acquire a valuable policy tool in the obesity/diabetes epidemic going forward.

**Cultural Factors**

Even before diabetes develops into a medical condition, a myriad of behavioral and lifestyle factors are at work in the background, making Jordanians more susceptible to acquiring the disease. Jordanians do not incorporate physical exercise into their daily routine. The most recent Behavioral Risk Factors Survey, conducted by the Ministry of Health in concert with the Centers for Disease Control, showed that less than 50% of Jordanian adults engaged in some form of physical activity on a daily basis. These numbers are roughly consistent with the percent of Palestinian refugees with diabetes and/or hypertension that can be classified as having a sedentary lifestyle. Lack of physical activity is the primary conduit through with obesity arises, and being overweight or obese is a major risk factor leading to diabetes. The odds that obese Jordanians will develop diabetes are 3.27 times higher than adults who maintain a normal

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The reasons why Jordanians do not engage in physical activity are varied. Self-efficacy has also been shown to influence participation in physical activity. Jordanian women glean less satisfaction from exercise than their male counterparts, helping to explain their lower self-reported participation rates. Moreover, the costs of joining a fitness center can be upwards of JD1000 per year, making this option prohibitively expensive for most ordinary Jordanians.

A macro level explanation rests in the extreme degree of urbanization that has occurred over the last few decades. At present, over 80% of Jordanians live in urban areas, initiating a natural decrease in daily physical activity due to occupational shifts away from labor-intensive agriculture. Urban areas in Jordan are not generally conducive to physical activity for two reasons. First, traffic conditions make the city unsafe for pedestrians. A lack of pedestrian safe spaces within and around city roads contributes to the fact that 43% of traffic casualties are pedestrians. The development of a public transportation system further mitigates the need for natural physical activity. Secondly, the rapid development of Amman has not emphasized the provision of any prominent parks or public recreational areas. The lack of such spaces could signal the government’s level of commitment to the health of residents. Due to the conspicuous absence of formal public recreational spaces, the next best option for residents of Amman is to utilize the sidewalks adjacent to major roadways, which poses significant danger related to the previous point.

A more biological explanation for the high incidence of obesity, and subsequently of diabetes, in Jordan lies in the starvation, or thrifty, gene. Posited in 1962, the theory states “for thousands of years populations who relied on farming, hunting and fishing for food…experienced alternating periods of feast and famine…to adapt to these extreme changes in caloric needs, these people developed a thrifty gene that allowed them to store fat during times of plenty so that they would not starve during times of famine.” Scientists have used decades-long studies on the Pima Indians in the Southwest United States to connect the starvation gene with the high rates of obesity and diabetes observed in native populations. Once an asset to populations that maintained a traditional way of life, the gene has now become a liability with changes in work type and constant availability of food. Jordanian medical professionals note that the historical presence of nomadic Bedouins in Jordan puts the population at relatively higher risk, as very few still maintain the traditional Bedouin lifestyle.

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47 Dr. Sana Naffa, World Health Organization, Personal Interview. 27 February 2008.
51 Ibid.
52 Dr. Kamel Ajlouni, President, National Center for Diabetes, Endocrinology and Genetic Diseases, Personal Interview, 25 February 2008.
Perhaps the most important cultural factor fueling the diabetes crisis is the absence of a preventative health care culture. Health care professionals report that it is not typical for Jordanians to seek out medical care before symptoms emerge, which helps to explain why almost one-third of diabetics are unaware that they suffer from the disease.\(^{53}\) The lack of demand for preventative care is possibly explained by financial considerations. Just visiting a private facility can cost upwards of JD\(^5\)10,\(^{54}\) where the average Jordanian earns about JD\(^4\)450 a month.\(^{55}\) Therefore, the costs of preventative check-ups are very high, even for the region. Those who utilize MOH facilities may do so at a highly subsidized rate; however considerations over the relative quality of care provided at public medical centers influence decision-making. A national healthcare utilization survey found that in over one-third of cases, a person with a medical need chose not to use their MOH insurance because of the quality of care they anticipated receiving, a percentage significantly higher than for any other insurance type.\(^{56}\)

The cost of diabetes treatment is also prohibitive. The lowest-paid Jordanian government employee would need to work five days to afford a basic monthly diabetes care package.\(^{57}\) In addition, indirect costs may exceed out-of-pocket payments due to the preservation of strong familial ties. Entire families may be uprooted for indeterminate amounts of time if and when treatment is sought. Such cost constraints may reinforce a culture of denial amongst Jordanian men and women when it comes to disease, although women are more likely to admit they have a chronic disease than men.\(^{58}\) Given the development and progression of the disease, addressing the impediments to early detection is paramount.

Structural Factors

Structural issues within the health care system can also inform why diabetes has become a pressing concern for Jordan. Human resource deficiencies could be thought to impair the ability of health care professionals to properly diagnose and treat diabetes. Jordan has experienced a high level of so-called “brain drain” within the health care sector. Doctors are emigrating to both developed countries (United States, Canada, Europe) as well as the Gulf States (Saudi Arabia, United Arab Emirates, Kuwait, Qatar, Bahrain and Oman) where they command a higher wage for their services. This has not necessarily meant a shortage of doctors, as there are 23.6 physicians per 10,000 Jordanians,\(^{59}\) which is high for the region and comparable to that of the United States.\(^{60}\) Rather, health professionals with lesser credentials are filling the void that is left when the most qualified doctors choose to work abroad. Additionally, fewer young people are entering the medical profession,\(^{61}\) which will likely pose even greater challenges in the future.

\(^{53}\) Ibid.

\(^{54}\) Dr. Sana Naffa, World Health Organization, Personal Interview, 27 February 2008.


\(^{57}\) Dr. Kamel Ajlouni, President, National Center for Diabetes, Endocrinology and Genetic Diseases, Personal Interview, 25 February 2008.

\(^{58}\) Ibid.


\(^{61}\) Dr. Sana Naffa, World Health Organization, Personal Interview, 27 February 2008.
Historically, there has been a lack of coordination across the health care system that has led to organizational inefficiencies. At the administrative level, there is presently no national system for accessing medical records, so RMS doctors that receive referrals from MOH, for instance, have no sense of patient history or previous treatments administered. This becomes important in the context of diabetes because often patients possess risk factors or display symptoms of “pre-diabetes” that can be damaging to one’s health and are frequently recorded in their medical file. Also, there is currently no national plan for training specialists in diabetes and other endocrine diseases. The NCDEGD, located in Amman, is the only national level facility that offers specialized medical education in this area. Doctors from all sectors are sent to the NCDEGD, but a disproportionate number come from the providers and areas in the country that can afford to do so. As such, inequity has arisen in doctor quality in rural vs. urban areas and in private vs. public medical facilities, which directly impacts patients. Along a similar vein, each health service provider manages its own health promotion initiative, as one does not exist nationally. Weak intra- and inter-sectoral coordination fails to take advantage of economies of scale or best practices. The High Health Council is meant to address exactly these types of cross-sectoral issue, but has so far struggled to design or implement any strategies or policies.

Finally, the priorities of the health policymaking establishment are focused on health concerns that are deemed more pressing, limiting the amount of time and resources that are spent on diabetes. The government has taken painstaking efforts to address the issue of rapid population growth in Jordan and has had great, although it still remains at an unsustainable level. Further, domestic financing considerations weight heavily in the determination of policy priorities. Jordan does not possess the resources to adequately fund all its desired health programs so it must rely on donor support to fill some of the gaps. The United States, through its international development arm, USAID, has supported programs in Jordan that focus primarily on family planning, reproductive health, maternal and child health services, as well as institutional health reforms. Only recently has USAID begun to address behavior change related to healthy lifestyles and chronic diseases, and only in a limited capacity. UNRWA has experienced similar funding challenges, as it must rely on international donors to fund its operations. As a result, UNRWA health centers must utilize an “at-risk” approach to screening for chronic disease as opposed to the preferred “community” approach. Only patients over the age of 40 are screened for chronic diseases, along with those aged 22-40 who demonstrate risk factors. These institutional restrictions have meant that diabetes has not received a level of attention commensurate with its significance.

Policy discontinuity also plagues Jordan due to the frequent turnover of Health Ministers. Each new Minister is able to articulate their goals in support of the King’s vision, but this does not ensure that any two subsequent Ministers hold the same policy agenda. Again, the organizational structure of the High Health Council is ideally suited to overcome this instability because the

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62 Ibid.
64 The “Better Health Habits for Healthier Future” campaign began in just five schools and has since expanded to an additional 50. Students are provided with information pertaining to five key themes: personal hygiene, physical fitness, nutrition, anti-tobacco life and family planning. United States Agency of International Development/Jordan, “Features: In Focus,” http://jordan.usaid.gov/features Disp.cfm?id=134&type=success (Accessed 12 March 2008).
Secretary-General serves a relatively longer term, but whether the High Health Council will make significant progress at policy integration is uncertain.

**International Donor Programs and Partnerships**

According to experts from USAID/Jordan, obesity affects one-third of the Jordanian population. While significant USAID funding is geared toward child and maternal healthcare, attention has also been given to promoting healthy lifestyles. Although it is sensible to allocate funding toward intervention and curative care, there is an ever-increasing push to distribute resources toward prevention.

Jordan has committed to building a society in which “children are nurtured in a safe environment that enables them to be physically healthy, mentally alert, emotionally secure, socially competent and able to learn.”

Under the vision and leadership of King Abdullah and Queen Rania, the Hashemite Kingdom of Jordan with ministries and several public and private sector partners are developing a “long-term national health strategy with priorities shifted toward greater attention to family health and preventive health behaviors.” Since 2004, the Jordan Health Communication Partnership (JHCP), a USAID funded project led by Johns Hopkins University, has been using the Behavior Change Communication tool to motivate and create positive behavior change. Under the slogan “Our Health, Our Responsibility,” health promoting messages are being disseminated throughout Jordan, equipping citizens with the information necessary to make healthy decisions for their futures. Additionally, within the education sector, *Passport to My Future*, a program considered a successful example of a non-conventional approach to spreading all campaign messages in one attractive entertaining yet educating package, has been implemented in 55 ‘Health Competent Schools’ throughout Jordan.

In an effort to promote “better health habits for a healthier future,” USAID in partnership with the Ministry of Education, instituted the above referenced 55 schools as ‘Health Competent Schools’. The initiative focuses on five key themes including: personal hygiene, physical fitness, nutrition, anti-tobacco life and family planning. Essentially, several of these topic areas aim at preventing chronic diseases, including diabetes. While curriculum changes have been implemented for grades 11 and 12, there is an underlying assumption that students at this age will naturally educate those younger than them as well as take the messages they learn in their lessons back to the communities in which they live. USAID believes that “these additions and changes not only educate the students, but also train them to become ‘agents of change’ in their schools, homes and communities through empowering them with the knowledge, skills and resources to spread the knowledge beyond our arms reach.”

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68 Ibid.
70 Ibid.
Similarly, the WHO believes that “an effective school health program is one of the cost-effective investments a nation can make to improve both health and education.”\textsuperscript{71} In an initiative to raise health standards in schools, since September 2007, 28 schools have been designated as ‘health promoting schools’. The purpose of the proposal is to “work to raise students’ awareness of health issues with the objective of improving the health conditions of students and the community.”\textsuperscript{72} Under a cooperation agreement between the Ministry of Health and the WHO, during 2008 the number of health-promoting schools is expected to reach 100 across the Kingdom. Currently, there are five criteria which must be met in order to qualify as a health-promoting school. They are as follows:

- Fosters health and learning with all the measures at its disposal.
- Engages health and education officials, teachers, teachers’ unions, students, parents, health providers and community leaders in efforts to make the school a healthy place.
- Strives to provide a healthy environment, school health education, and school health services along with school/community projects and outreach, health promotion programs for staff, nutrition and food safety programs, opportunities for physical education and recreation, and programs for counseling, social support and mental health promotion.
- Implements policies and practices that respect an individual’s well-being and dignity, provide multiple opportunities for success, and acknowledge good efforts and intentions as well as personal achievements.
- Strives to improve the health of school personnel, families and community members as well as pupils; and works with community leaders to help them understand how the community contributes to, or undermines, health and education.\textsuperscript{73}

Recently, The Royal Health Awareness Society (RHAS), a NGO established in 2005 under the leadership of Queen Rania, signed a Memorandum of Understanding with the WHO on March 10, 2008.\textsuperscript{74} The goal of The RHAS is “to promote a healthy Jordanian society by initiating and supporting preventive health initiatives that focus on behavior change.”\textsuperscript{75} The vision of RHAS is in line with the mandate of WHO to improve the lives of people in Jordan. Both WHO and RHAS believe that this can be achieved by developing effective collaborative programs to increase positive health behaviors. One of RHAS’s seven main projects includes a healthy schools project. The WHO’s role is to provide technical assistance and confirm scientific content of health messages.

\textsuperscript{72} Ibid.
\textsuperscript{73} Ibid.
\textsuperscript{75} Ibid.
This one-year MoU agreement “targets RHAS’s National Health Campaign which aims at spreading and raising awareness on various health related issues that are of priority and relevance for the population – wide scale.”\textsuperscript{76} The campaign will be pursued through placing health messages containing facts and figures in local media vehicles in a comic fashion with the aim of modifying people’s behaviors as they acquire a better understanding of various health indicators.

**Policy Options**

**Promoting Healthy Lifestyles among Jordan’s Children and Youth**

Jordan’s jewel is its human capital. Given the lack of natural resources combined with the influx of refugees affecting every sector of Jordan’s infrastructure, the government is wise to invest in its people. In order to facilitate economic and social development, however, it is imperative that Jordanians remain healthy and strong. Ensuring that the children and youth are healthy today will secure a strong workforce for tomorrow. Moreover, preventative measures directed at youth will be significantly less expensive than curative measures taken after the onset of diabetes. Finally, patterns set early in life are more likely to become permanent patterns of behavior than those established in adulthood.\textsuperscript{77} Given that children and youth are among the most vulnerable populations in society, it is vital to protect and educate them at a young age so that the economic returns are greater.

**Requiring Annual Physicals**

**Description:** In order to catch the onset and curtail the increase of obesity, which is proven to be correlated with chronic diseases including hypertension, cancer and diabetes, we propose requiring annual physicals for children at all government schools. Ideally, this would take place at the start of the school year, but national and international health days could determine the timing of annual physicals.

**Advantages:** Currently, the situation among Jordanians consists of going to a clinic or hospital only when a condition is very serious. By the time one suspects he or she may have diabetes, the condition has likely progressed to Type II diabetes. Empowering Jordan’s population to be proactive about their healthcare and increasing country wide buy-in into a system of preventative behavior rather than a curative mentality will reap benefits for Jordan at large. Requiring annual physicals at schools would not only benefit children and families, but it would promote a culture of making doctors visits and getting check-ups regardless of one’s health condition. Additionally, it would encourage a system of record keeping. In 2004 UNICEF helped promote the first National School Health Day.\textsuperscript{78} If this event continues to occur annually, the concept of

\textsuperscript{76} Ibid.


an annual physical could be tied to it. Moreover, since all children below the age of 15 qualify for free healthcare services, the economic burden on families is limited. 79

**Disadvantages:** Providing the manpower to perform annual physicals either at the beginning of a school year or on a national or international health day is challenging. Compacted schedules in which doctors try to perform physicals on large numbers of students would reduce the quality of service. Given the enrollment size of most government schools, doctors may not have enough time or support staff to get through an entire school. What then would the policy be for students who do not undergo a physical during school hours on a given annual physicals day? Moreover, while the government provides free healthcare for children <15, other sectors in society have to absorb this cost in some way.

*Standardizing and Expanding Health Education in Government Schools*

**Description:** While the WHO and USAID to a certain extent work together under the leadership of the MOH school health program, it appears that the existing health education curriculum lacks central coordination and standardization, perhaps because of the number of funding/implementing agencies. From our interview with a representative from the WHO, it was indicated that the WHO supports the MOH in selecting schools and implementing health programs while USAID provides funding for training. 80 We propose that the government and aid agencies commission a study to evaluate the effectiveness, efficiency, and impact health education programs are having on students and communities. Furthermore, upon completion of a review, we recommend that all government schools in Jordan adopt a standardized health curriculum, integrating health components into primary and secondary schools. Currently, there is a plan to expand the program(s) to include all secondary schools within the next five years. 81 Given the time it will take to conduct a thorough study of the program(s) however, we recommend that the GOJ extend the timeline beyond five years to allow for this review.

**Advantages:** The development of adequate school health programs which promote healthy lifestyles contributes to the generation of a healthy school environment and engrains the idea of self-care as a habit in the lives of young learners. Moreover, empowering school children with essential health messages can be used as a tool for children to become community educators who can contribute to a decrease in traditionally harmful practices such as overeating and inactivity. Improving school health is an indirect way to improve community health and school children are oftentimes the most effective media to assist in the spread of health messages.

Physical education and recreation advocated by the programs benefits young people at different levels. At the personal level it can increase self confidence and participation, enhance interpersonal skills, overall health, growth and development. At the institutional level, it builds leadership and can help bridge the intergenerational gap. And at the community level, it can help create healthy and safe environments through social connectedness, community ownership and sustainability.

79 Dr. Kamel Ajlouni, President, National Center for Diabetes, Endocrinology and Genetic Diseases, Personal Interview, 25 February 2008, and Ministry of Health Representatives, Doctors, and Administrators from Al-Bashir Hospital, Personal Interview, 28 February 2008.

80 Dr. Sana Naffa, World Health Organization, Personal e-mail correspondence, 30 March 2008.

Disadvantages: A constraint to standardizing health education is that school health is a subject which requires close collaboration between several sectors, particularly the health and education sectors. Not only do involved sectors have to agree to contribute to the design of a useful and effective curriculum, but a plan of action to review and update materials must also be a major component. Possessing the necessary resources to properly evaluate and test the effectiveness of government school health programs and curriculum is a cost consideration that cannot be ignored.

Moreover, a multi-sector approach to health education requires time, coordination, and the sharing of resources. It also necessitates including a health component in teacher training and investing more into the training of nurses who might then be assigned to government schools to teach health education classes and provide on-site services. This burden is compounded by the shortage of nurses in the Kingdom.

Another constraint is the regional difference across Jordan in which a standardized health education program might not work. The population in Irbid, the Jordan Valley and Amman might vary drastically according to diet, socio-economic status and actual school attendance rates. Additionally, when determining a standardized health education plan, both refugee populations of Palestinians and Iraqis must also be considered. A thorough review should address these concerns as well.

Promoting Healthy Lifestyles Among Communities and Families

Introduction to Public Recreational Spaces

Description: Current efforts for a more pedestrian-friendly Amman suffer from an ad hoc approach. In discussing efforts to promote healthy lifestyles, Ministry of Health officials cited the expansion of current pedestrian zones, including the planned opening of a walking street. Although commendable for being a highly visible promotion of physical activity, the small scope limits the ability of such projects to effect lifestyle change, particularly if a taxi is required to access such areas. Amman, in particular, features relatively limited pockets of open space, which are generally utilized for either tourist or retail purposes. Furthermore, these public areas do not appear to benefit from a pragmatic approach to pedestrian planning. Traversing between high foot traffic areas is frequently unsafe or simply impossible.

Another impediment to encouraging active lifestyle changes is a lack of urban recreational space, such as parks and athletic fields. Green areas in Amman are concentrated in tourist spaces, away from major residential areas. Many of the non-tourist areas observed were not developed for family usage; they were either lots left delinquent or in the planning stages for future commercial purposes. Our proposal is, therefore, to develop a more connected network of walkways and open public facilities in urban Jordan.

Advantages: Despite these significant costs, the long term benefits of public recreational space development makes such projects worth examining. With preventable diseases like diabetes

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82 Ministry of Health Representatives, Doctors, and Administrators from Al-Bashir Hospital, Personal Interview, 28 February 2008.
costing Jordan an estimated JD1.308 billion in direct and indirect costs, the public health benefits, though difficult to quantify, would be significant.

In addition to health benefits, public recreational spaces have aesthetic appeal, and, specifically for Amman, would add tourism value. In some guidebooks, Amman is considered a jumping off point as opposed to a destination in its own right. To be more tourist friendly, Amman would need to address the difficulty, particularly for non Arabic speakers, of negotiating areas that, although close in proximity, are not directly accessible by foot. Additionally, open space does not necessarily mean lost revenue; a recreation industry and associated businesses would fill a niche, which has been identified, but as of yet unfulfilled. Of no less significance are the financial gains made by reducing gas consumption and traffic. Although not an exhaustive analysis of primary and secondary benefits, e.g. pollution reduction, this list provides strong justification for examining the lack of public activity areas and seeking creative solutions to provide for a growing health need.

Disadvantages: Valuable city space constitutes the primary cost of walkways and recreational areas. This is particularly problematic for pedestrian works projects because of the extremely dense downtown and the large overlap between residential and commercial areas. Additionally, walkways do not generate easily measurable income and the current “cab culture” makes such projects seem of dubious necessity. Furthermore, recreational areas seem extravagant for a country attempting to accommodate a growing population and a current refugee crisis. Factor in the costs of renovating and maintaining such areas and it becomes clear why such projects have, as of yet, not gained traction.

Introduction to Public Health Campaign

Description: A number of studies have identified a lack of public health awareness as a major contributor to the high social costs of diabetes in Jordan. Jordanians exhibit both willful and innocent ignorance, compounding the public health crisis. Willful ignorance exists throughout the developing and developed world; in general, campaigns aimed towards those in denial of their own symptoms have lower rates of return. Therefore, an effective campaign should seek to reach those who lack the knowledge to identify the onset of diabetes. In general, these individuals are more difficult to find and disseminate information to and, once found, more difficult to offer assistance to because of greater limitations in finance and mobility. However, the greatest potential for social change lies in targeting lower education individuals; comparisons across educational levels showed strong correlation between years of school and diabetes, with

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85 Ibid.
87 Dr. Shadi Azar, Clinical Lecturer at the University of Michigan and previously House Physician Radiologist at King Hussein Cancer Center in Amman, January 2008.
prevalence rates of illiterate individuals about double those with some primary education and nearly quadruple those with some secondary education.\textsuperscript{88}

Public awareness campaigns, particularly print and television based, oftentimes suffer from a lack of measurable results and, for any level of comprehensiveness, high costs. Furthermore, the benefits in Jordan now have lower marginal returns. The information consuming public already exhibits a relatively high level of diabetes awareness.\textsuperscript{89} Therefore, in order to reach at risk groups, an effective campaign must target those that fall outside of mainstream media and address concerns, such as access and cost, which are keeping them from going to the doctor.

Our proposal is, therefore, for a sustainable, community centered initiative to encourage a broader range of public participation. This program would provide basic testing services, such as blood pressure and body mass index, either free of charge or for a nominal fee. Either through a tracking mechanism or basic staggered approach, such as allowing one visit per birthday month per year, the program would offer Jordanians the financially assisted right to testing on an annual basis. The goal would be to promote taking responsibility for one’s health and to provide information on assessing one’s health indicators. Additionally, to increase the effectiveness of the initiative, some type of follow up mechanism would also need to be set up, such as a transport program.

This model would be loosely based on a recent Ministry of Health initiative that provided free diabetes testing for a one-week period in Amman. The Ministry concluded that the program was highly successful, indicating that despite low fees for basic treatments, cost still plays a prohibitive role. However, there were no immediate plans to continue the program or for additional measures to ensure follow up for those who either were diagnosed or deemed to be at risk.\textsuperscript{90} Therefore, for a program to truly yield results, it would need some degree of long term financial commitment as well as a more systematic approach to disease prevention, diagnoses and treatment.

Additionally, although financial limitations may prohibit decentralizing more expensive diabetes treatments, a successful campaign must attempt to provide a means for testing in rural areas. Eighty six percent of Jordanians are within a thirty minute drive of a Ministry of Health polyclinic.\textsuperscript{91} However, this excludes a large segment of a people who are more likely to be at-risk. Therefore, where polyclinics are unavailable, a suitable alternative should be sought out, such as a small testing station in a pharmacy. These stations would also provide booklets on disease, many of which already exist in Jordan, and act as referring agencies for those that meet certain risk criteria.


\textsuperscript{89} Kamel Ajlouni, National Center for Diabetes, Endocrinology and Genetic Diseases, Personal Interview, 25 February 2008.

\textsuperscript{90} Ministry of Health Representatives, Doctors, and Administrators from Al-Bashir Hospital, Personal Interview, 28 February 2008.

Advantages: Many of the common diabetes treatments are either government subsidized or completely covered for Jordanian citizens. This program would attempt to reach those that are more likely to delay care and, therefore, require more expensive treatments. Hemoadialysis, a commonly required treatment for advanced cases of diabetes, is costing the Jordanian government $29.7 million annually, which is approximately $17,300 per individual. In the most serious and expensive cases, diabetes complications can require a kidney transplant or cardiovascular surgery. When other expenses, including human costs and lost finances, are accounted for, preventing or even reducing the harm of any given case of diabetes is clearly lucrative. Therefore, the tipping of the balance sheet will depend on the program’s ability to access and influence targeted populations. An initial examination, by using a pilot run for example, would be a valuable way to determine the possible impact. If the Ministry of Health initiative can be used as a guide, there is the potential for long terms benefits of such a program.

Disadvantages: The cost of maintaining the program would depend on the frequency of the free testing and the extent to which any given test were subsidized. However, the initial costs would likely be high because of the need to set up testing stations outside of Ministry of Health polyclinics. Additionally, tracking and encouraging individuals to follow up could prove to be an expensive and labor intensive endeavor. Patients’ time and transport should also be considered. Although costs would level off as the as the program benefited from the learning curve, a constant level funding would be needed.

Outreach to Doctors and the Medical Community

Doctors are the primary and often only resource for medical information available to most Jordanians. Moreover, for those who have already acquired the disease, doctors are the only source of treatment. Although Jordan has achieved improvements in its medical system in recent years, several barriers inhibit Jordan’s progress in the area of diabetes.

Electronic Medical Records System

Description: The system of medical records-sharing in Jordan is often complicated, both across sectors and across clinics. Individuals with referrals arrive for appointments with a referral form but do not provide any other formal medical records. Given the fragmentation of the Jordanian health care system and frequent referrals across systems, the lack of medical records presents frequent problems. Doctors are not provided with their patients' medical history, forcing them either to make diagnoses with incomplete information or to spend large amounts of time discussing medical history with each patient. Given that the symptoms of diabetes evolve over time and are measured by medical personnel in distinct sectors, the lack of communication between sectors and clinics inhibits diagnosis and treatment of diabetes.

The creation of an electronic medical information system would centralize the storage of all medical information in a single database accessible to all medical service providers. A database would be created in the next two years and clinics would be given ten years to convert all of their medical records into the electronic system.

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Advantages: The creation of an electronic medical records system would facilitate information-sharing across doctors, clinics, and medical system. Doctors would be able to access a patient's entire medical history, charting changes over time and making note of any conditions that might complicate treatment. Doctors could therefore spend more time with patients discussing their current symptoms or concerns and less time reviewing the patients' medical history, ultimately improving the quality of care delivered to patients. The extra work generated in the short term during the conversion process would also provide additional middle-income jobs. The experience of Istishari Hospital, the first paperless hospital in Jordan, demonstrates that a transition to an electronic medical records system is feasible.93

Disadvantages: Although such a system would improve care, it is accompanied with several drawbacks. First, an electronic system would require investment in a technological infrastructure, including an adequate number of computers, scanners, and printers for each facility. Moreover, it requires that staff be trained to use the program effectively. Despite Jordan's high literacy rate, it has not yet achieved the level of information technology familiarity that would enable its workforce to easily transition to an electronic system with minimal training. Second, medical centers would likely need to create new positions to facilitate the conversion to an electronic system and to enter medical data of current patients. Well-funded medical sectors, such as the private sector and, to a lesser extent, the military and university sectors, may be able to fund new positions. However, Ministry of Health and UNRWA centers, which process the largest number of patients and consequently will have a larger number of medical records to process, also face the most severe funding shortages. It is uncertain how the Ministry of Health and UNRWA, which operate with tighter budgets, would cope with such a policy transition. Finally, the more accessible patient information, the more careful medical centers must be to create adequate safeguards to protect patient privacy.

Continuing Education for Doctors

Description: Despite the overall strength of the Jordanian medical system, health policy experts consistently indicate that some doctors lack appropriate training regarding the diagnosis and treatment of diabetes. Moreover, they also often lack the resources necessary to pursue additional training. The major training center for doctors hoping to learn about diabetes is the National Center for Diabetes, Endocrinology and Genetic Diseases in Amman, requiring doctors to relocate to Amman for the duration of their studies. This lack of information results in doctors not correctly diagnosing or treating diabetes and not communicating accurate information to patients.

Consequently, we propose the creation of a multi-faceted program of continuing education for doctors in Jordan. The National Center for Diabetes, Endocrinology and Genetic Diseases should be at the center of training efforts. It boasts excellent facilities and staff, hosting the best-qualified doctors in the field. Its training system has extra capacity and could be expanded to accommodate additional demand.

A continuing education program for doctors should first consist of subsidies for continuing education administered by the High Health Council. Continuing education will include workshops of several days which address diabetes prevention and treatment. Subsidies should be primarily targeted towards doctors working in the Ministry of Health and the UNRWA, with some subsidies remaining for doctors from other sectors. Additionally, subsidies should be distributed on a geographical basis, attempting to reach at least one doctor in as many health care centers as possible. Second, the National Center for Diabetes, Endocrinology and Genetic Diseases should establish satellite training centers in major population centers such as Aqaba and Irbid. Finally, the National Center of Diabetes should create a regular newsletter providing information to doctors across the country.

Advantages: Continuing education programs provide opportunities for doctors to become better informed about diabetes. They are then equipped with the appropriate information needed to speak about diabetes with patients when patients are at-risk for developing the disease and to prescribe appropriate treatment to diabetics to prevent the onset of complications. Targeting subsidies to Ministry of Health and UNRWA doctors would procure several benefits. First, it would provide an incentive for doctors to remain in Ministry of Health and UNRWA clinics. The likelihood of doctors leaving after receiving training is small because a single workshop will not significantly alter the value of a doctor in the market. Moreover, subsidies directed at the Ministry of Health and UNRWA doctors would help to elevate the quality of care delivered at Ministry of Health clinics. Finally, educating Ministry of Health and UNRWA doctors improves care for the greatest number of people as each Ministry of Health and UNRWA doctors carry a higher patient-lode than doctors in other sectors. Distributing subsidies on a geographical basis would enable a larger number of clinics to have access to training. If one doctor from each of 100 clinics received training, those 100 doctors could return to their home clinics and share the information they received with their colleagues. Strategically granting subsidies with the intent of widely distributing the geographical location of recipients would therefore produce a large multiplier effect, maximizing the educational impact of each JD.

Disadvantages: Despite these advantages, subsidized training would cost a significant amount of money. The cost of tuition, lodging, food, and other travel expenses for any significant number of doctors would be noteworthy. Second, there is a risk that additional training might fuel brain drain of doctors, especially from the Ministry of Health and UNRWA sectors. Finally, increases in the number of doctors receiving training at the NCDEGD may place additional stress on the Center, reducing the quality of training delivered.

The establishment of training centers in other population centers would also serve the goal of expanding the scope of training to more remote areas of the country. It would minimize the cost of providing continuing education to doctors because it would minimize the travel time and lodging expenses for trainees. It would also increase the visibility of diabetes treatment and training in parts of the country outside of Amman. However, building new training centers will incur a significant cost that will continue to increase in the next few years as the influx of Iraqi refugees drives up the cost of real estate and construction.

Finally, distribution of information by the NCDEGD would be a low-cost mechanism for information distribution. Information could be distributed to all doctors and clinics, enabling
each recipient to develop his/her/its own library of information for future reference. Literature distribution has its own set of drawbacks, though. There is no mechanism to ensure that doctors read or learn the information provided, and no opportunity for doctors to interact and ask questions of teachers.

**Recommendations**

After conducting the preceding analyses and accounting for both the nature of the diabetes crisis and the structure of the Jordanian health care system, we propose the following recommendations. We preference recommendations that will address many of the underlying causes of diabetes, and that will ensure that those already living with diabetes receive the best treatment possible. Further, given that increasing diabetes prevalence rates affect a wide cross-section of Jordanian society, we advise a three-pronged approach, focusing on youth, adults and families, and doctors, to encourage the largest possible impact.

*Youth*

Instilling the values and benefits of a healthy lifestyle at a young age increases the probability that behavioral change will be maintained throughout a person’s life. The historical absence of a national health education component in the curriculum may help explain why the majority of Jordanian adults do not engage in any form of physical activity. More recent small-scale attempts by the government to introduce health and healthy lifestyle information into secondary education have produced a complex and seemingly disoriented system due to the number of contributors, implementers, and donors.

Operating multiple health education pilot programs introduces inefficiency, and possible inequity, into the education system. In the interest of ultimately adopting a national health education program, it would be prudent to request an independent program evaluation on all healthy lifestyles curricula. Such research would provide insight into relative effectiveness, costs, benefits, and long-run viability prior to scaling up a program nationally.

The government of Jordan, and specifically the Ministry of Education, should use the information gleaned from the program evaluation to develop a mandatory health and healthy lifestyles curriculum to be implemented uniformly in all primary and secondary government schools. Information on and practical application of healthy lifestyles should be incorporated into the curriculum beginning at the primary school level in order to promote behavioral change at the earliest possible age. More detailed and advanced topics, such as chronic disease, smoking, and reproductive health, could be progressively added in at the secondary school level to address maturity and knowledge comprehension concerns. To maximize effectiveness, the health curriculum component should be a conspicuous and consistent part of every schoolchild’s education.

Although introduction of annual physicals might create habits of regular doctor’s visits, similar emphasis on health-consciousness can be generated through health education programs. Moreover, health education programs have a greater multiplicative potential—students will likely discuss their coursework with their family members. Regular class meetings entail more
regular discussions of this type as opposed to a single physical. Finally, institution of health education programs creates a framework for dealing with future health issues as the country faces new issues.

Adults and Families

One of the most important issues to address in the fight to reduce diabetes prevalence rates is the sedentary lifestyle pursued by the majority of Jordanians. The link between inactivity, obesity, and diabetes has been made explicit through a number of medical studies. It is therefore necessary for the government of Jordan to do more to promote healthy lifestyles, particularly in urban centers, through the creation of an accessible network of public recreational spaces.

One reason to believe that public recreational spaces would be an effective tool in combating diabetes risk factors is that their development would take the primary onus off the individual, which is often times a main impediment to behavioral change. Whereas media campaigns do not generally provide Jordanians with any opportunities for changing their lifestyle, accessible public spaces, if developed properly, could be naturally incorporated into people’s daily lives, eliminating the need to join expensive health clubs. Pedestrian safety could also be addressed by prohibiting access to such spaces by vehicles, as is currently planned in one particular instance in Amman.

Another benefit of available public spaces that would likely increase the program’s effectiveness is the social nature of Jordanians; much of life in Jordan is already conducted outdoors. Groups of people frequently congregate in the streets of urban areas to socialize, network, and carry out business transactions. It is quite plausible then, that given an area to safely engage in physical activity, Jordanians would capitalize on the opportunity. For women who seek camaraderie as a precondition for exercise, large public spaces would allow for groups of people to simultaneously reap the benefits of physical activity. Recreational spaces would take the form of both expanded pedestrian-friendly commercial areas and so-called “green spaces” (e.g. parks). In central Amman itself, historical city planning may limit the areas that could be renovated to produce green spaces, but future development plans in suburban Amman and other urban areas around the country should incorporate parks into city design.

The advantages accrued from the creation of public recreational spaces have much more wide-reaching effects than public awareness campaigns. Despite the frequency with which public awareness campaigns are conducted, there is limited evidence that they have had their intended effects in Jordan. Instead, creating public recreational spaces in carefully-planned locations can change behavior in ways favorable to reducing diabetes without requiring much incentive on the part of residents.

Doctor Training

As a doctor is often the first and only point of contact a Jordanian has regarding his/her physical health, it is vital that physicians across the country’s health sectors be uniformly trained in order to ensure equitable service delivery. Further, outfitting doctors with a proper knowledge base
regarding diabetes should help reduce the number of undiagnosed cases as well as improve overall disease maintenance.

Establishing a national diabetes-training program for doctors, overseen by the High Health Council and run out of the NCDEGD, will allow for an ever-expanding cohort of medical professionals to provide more comprehensive diabetes care. The training program would be a complement to the certificate and degree programs already available at the NCDEGD, and would cover an abbreviated amount of information so as to minimize the direct and indirect costs that doctors from outside the Amman area absorb.

It is recommended that the High Health Council determine the number and geographic distribution of doctors that be encouraged to undergo the training before acting as educators, themselves, to their colleagues in their home institutions. Such a determination should take into account the size of the population served and the number of other doctors that would benefit from a colleague receiving additional education. Up-to-date informational materials could also be sent to doctors at their home institutions after they complete training as a matter of continuing education.

A system should be developed whereby the costs of financing the training programs are spread across administrative levels. Hospitals and clinics in each of the sectors could sponsor one or more of their physicians to receive the training, and the government could provide subsidies to individuals in sectors that cannot afford to send doctors. International agencies and individual donor countries may also be a resource for potential funding. Doctor training may serve to promote and reinforce healthy lifestyles, as physicians would encourage behavioral changes before the onset of diabetes. Ultimately, providing targeted, uniform training is a cost-effective way to improve and equalize the level of diabetes care, and ideally, reduce the prevalence of diabetes in Jordan.

Creation of an electronic medical records system would facilitate information-sharing across doctors and sectors, but has limited implications for diabetes. Moreover, building satellite offices for the National Center for Diabetes, Endocrinology and Genetic Diseases would be cost-prohibitive and not essential to information-dissemination given the small size of the country. A carefully-designed incentive program for doctor training is more cost-effective than the other recommendations provided.

**Conclusion**

Diabetes has become a major public health issue in Jordan, incurring substantial costs for government budgets and Jordanian citizens. Although the diabetes crisis in Jordan has complicated causes, significant in-roads can be made via carefully-designed programs. A three-pronged approach including health education programs, public recreational spaces, and subsidy programs for doctor training will curtail the diabetes crisis while producing positive benefits in other areas of Jordanian society.
Appendix

CHART 1

Source: U.S. Census Bureau, International Data Base.

CHART 2

<table>
<thead>
<tr>
<th>Year</th>
<th>1965</th>
<th>2000</th>
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</thead>
<tbody>
<tr>
<td>Total population (thousands)</td>
<td>1962</td>
<td>6669</td>
</tr>
<tr>
<td>Percentage urban (%)</td>
<td>46.3</td>
<td>74.2</td>
</tr>
<tr>
<td>Per capita energy requirements (kcal/day)$^a$</td>
<td>2069</td>
<td>2085</td>
</tr>
<tr>
<td>Per capita DES (kcal/day)$^b$</td>
<td>2152</td>
<td>2824</td>
</tr>
</tbody>
</table>

$^a$ Source: James and Schofield, 1990.

CHART 5

![Chart 5: Share of protein, fat and carbohydrate in Dietary Energy Supply Trends from 1996-2000](chart)

Source: FAOSTAT

CHART 6

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Wheat</td>
<td>-42.4</td>
<td>-34.7</td>
<td>-38.8</td>
<td>-43.3</td>
<td>-39.5</td>
<td>-33.7</td>
<td>-49.1</td>
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<tr>
<td>Barley</td>
<td>-9.4</td>
<td>-7.0</td>
<td>-8.3</td>
<td>-9.0</td>
<td>-3.3</td>
<td>-1.8</td>
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<tr>
<td>Rice</td>
<td>-8.3</td>
<td>-5.2</td>
<td>-5.3</td>
<td>-6.7</td>
<td>-4.8</td>
<td>-7.1</td>
<td>-10.0</td>
</tr>
<tr>
<td>Sugar</td>
<td>-10.6</td>
<td>-2.4</td>
<td>1.8</td>
<td>2.7</td>
<td>-0.5</td>
<td>-4.1</td>
<td>-8.9</td>
</tr>
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<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
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<td>Other</td>
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<td>...</td>
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<td>...</td>
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<tr>
<td>Cash Payments</td>
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<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
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<td>Surplus (+) or</td>
<td>-83.5</td>
<td>-61.2</td>
<td>-57.4</td>
<td>-53.6</td>
<td>-43.1</td>
<td>-63.8</td>
<td>-101.8</td>
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<td>subsidy (-)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total food</td>
<td>3.1</td>
<td>2.1</td>
<td>1.6</td>
<td>1.4</td>
<td>1.0</td>
<td>1.4</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Sources: Ministry of Supply, and Ministry of Finance and Customs.

1/ Negative sign indicates subsidy.
CHART 7

Irrigated Area, 2004-2006 (000 Donums)

Year
2006
2005
2004

Area (000 Donums)