

Population-based health survey in Eastern region of Saudi Arabia

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مسح صحي مرتكز على السكان في المنطقة الشرقية من المملكة العربية السعودية

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الخلاصة: أجرى الباحثون مسحاً صحياً مجتمعياً لوصف الحالة الصحية الراهنة والممارسات الصحية الوقائية للمتسبين إلى الحرس الوطني ومن يعولونهم ممن يسكنون في المنطقة الشرقية من المملكة العربية السعودية. وهو مسح مستعرض أجري عام 2010 لجمع البيانات من خلال مقابلات استخدمت فيها الاستبيانات ومن خلال قياسات بدنية مباشرة. وقد شمل المسح 1339 بالغاً ممن بلغت أعمارهم 14 عاماً أو أكثر، واستكملوا استبيانات المسح (وكان العمر الوسطي 30.7 عاماً بانحراف معياري 12.7 عاماً). وتبين أن نصف أفراد العينة لديهم مشكلات زيادة الوزن والسمنة، و 50٪ زيادة أكثر من الدهون في المصل، واضطرابات نفسية. كما اكتُشِفَ ارتفاع ضغط الدم لدى 9٪ منهم والسكري لدى 9.1٪ منهم، وكان 15.8٪ منهم من المدخنين. وكان معدل استكمال التمنيع 88.9٪ والرضاعة الطبيعية من الثدي لدى الأطفال 80.2٪، ولم تستخدم 21.7٪ من النساء أي مانع حمل بالفم؛ ومع ذلك فإن 6.5٪ منهن فقط أجريتن تصوير الثدي 13.4٪ أجريتن لطاخة من عنق الرحم. وتقدم النتائج التي أظهرها هذا المسح خط الأساس الذي ينبغي لكثير من برامج وسياسات الصحة العمومية أن تنطلق منه وتقوى.

ABSTRACT A community health survey was conducted to describe the current health status and preventive health practices of National Guard military employees and their dependants residing in the Eastern region of Saudi Arabia. In a cross-sectional survey in 2010, data were collected via a questionnaire interview and direct physical measurements. A total of 1339 adults aged ≥ 14 years completed the survey [mean age 30.7 (SD 12.7) years]. About two-thirds of the sample had problems of overweight and obesity, while 50% had high serum lipids and psychiatric disorders. Hypertension and diabetes were detected in 9.0% and 9.1% of the participants respectively and 15.8% were smokers. The rates of complete immunization and breastfeeding of children were 88.9% and 80.2% respectively and 21.7% of the women had ever used oral contraceptives. However, only 6.5% of the women had ever had a mammogram and 13.4% a cervical smear. The survey results provide a baseline from which to strengthen many public health policies and programmes.

Enquête de santé en population générale dans la région est de l'Arabie saoudite

RÉSUMÉ Une enquête de santé communautaire a été menée pour évaluer l'état de santé actuel ainsi que les pratiques de santé préventive des employés militaires de la Garde nationale saoudienne et de leurs personnes à charge dans la région est de l'Arabie Saoudite. Dans une enquête transversale menée en 2010, des données ont été recueillies par questionnaire administré lors d'un entretien et par des mesures physiques directes. Près de deux tiers des personnes souffraient de surpoids et d'obésité et la moitié d'une hyperlipidémie sérique et de troubles psychiatriques. Une hypertension et un diabète ont été dépistés chez 9,0 % et 9,1 % des participants respectivement tandis que 15,8 % étaient fumeurs. Au total, 1339 adultes de 14 ans ou plus ont répondu à l'enquête (âge moyen 30,7 ans [ET 12,7]). Au total, 88,9 % des enfants avaient un statut vaccinal complet, 80,2 % avaient été allaités au sein et 21,7 % des femmes avaient déjà eu recours aux contraceptifs oraux. Toutefois, seules 6,5 % des femmes avaient déjà bénéficié d'une mammographie et 13,4 % d'un frottis du col. Les résultats de l'enquête fournissent une base de données initiales utile pour renforcer de nombreux programmes et politiques de santé publique.

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Introduction

According to the World Health Organization (WHO), health is defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity and should enable people to lead socially and economically productive lives [1]. Globally, policy-makers, provincial health departments, researchers and health professionals are all agreed that a comprehensive source of accurate health measures is essential to assist them in addressing the health needs of their nation. Classic examples of comprehensive health surveys are the Demographic and Health Surveys conducted in many countries worldwide [2] and the Canadian Health Measures Survey [3].

Previous national health surveys in Saudi Arabia have not covered a complete range of nutrition, physical activity habits, family medical history, current and past medical conditions, health-related risk factors and topics related to women's and children's health [4–6]. The National Guard Health Affairs (NGHA) provides modern medical care for military employees and their dependants and is active in promoting disease prevention and the adoption of healthy lifestyles [7]. Based on the regional need and the mission of NGHA, a community health survey was conducted to describe the current health of the inhabitants of National Guard housing. We believed our sample to be equivalent to a national representative sample, as National Guards are recruited from all regions of Saudi Arabia. No population-based study has been done in this particular group, and there is a gap in our knowledge regarding the prevalence of major health problems and the preventive health practices of this population. The general aim of the study was to obtain accurate and up-to-date information on the health status and preventive health practices of National Guard housing inhabitants

that would act as baseline community health data for regional planning. The specific objectives were to evaluate the extent of health problems associated with major health concerns (such as diabetes, obesity, hypertension, cardiovascular disease) and to assess health lifestyles and practices and participation in prevention and screening.

Methods

Study design and setting

The National Guard Health Measures Survey 2010 (NGHMS-2010) was a cross-sectional study using household interviews and direct physical measurements. A survey of the selected households was conducted from May to October 2010 at 2 National Guard housing complexes in the Eastern region of Saudi Arabia, one in Al-Hasa and other in Dammam. All adults, aged 14+ years, living in National Guard housing were included in the survey. Children aged < 14 years and adult visitors were excluded.

Sample

The study population was the National Guard military employees and their eligible dependants residing in National Guard housing in Al-Hasa and Dammam. The National Guard housing was the primary sampling frame and formed the starting point for the sampling procedure. They are subdivided into 9 administrative districts and samples were selected from each district. Based on the probability proportional to size, a fixed number of households were selected from the household list in each of the selected districts, and all household members in the eligible age group in the selected household were selected for the survey.

A household (individual sharing a cooking area) was used as the sampling unit. There were a total of 3756 households (2506 in Al-Hasa and 1250 in Dammam). Our calculations resulted

in a sample size of 349 households, for a type 1 error rate of 0.05, 5% margin of error. Assuming a non-response rate of 20%, the final sample size was 419 households (280 in Al-Hasa, and 139 in Dammam).

Data collection

The NGHMS-2010 was carried out at the primary health centres (PHC) in Al-Hasa and Dammam. Sampled households were notified by phone and the interviewers contacted the head of the family to create a list of household members and then select a respondent. Once a respondent from each household was selected and agreed to participate, an appointment was made at the PHC. Data collection was performed in 2 stages: a health questionnaire administered by trained interviewers and direct physical measurements and collection of blood samples.

The pre-coded questionnaire, based on the Health Measures Survey, is a reliable and validated tool [3]. It was translated into Arabic and was pre-tested and validated in the current context in a pilot study. The questionnaire has 15 modules covering topics such as nutrition, physical activity habits, family medical history, current and past medical conditions, health-related risk factors and topics related to women's and children's health. The interviews took about 60 minutes on average to administer.

Data were collected about exercise (exercise undertaken for fitness, recreation or sport in the 30 days prior to interview); hygiene practices (regularly washing hands before eating within the last 30 days); serious injuries (suffered injury which caused loss of at least 1 full day of usual activities such as school, sports or a job or required treatment by a doctor or nurse within the last 30 days); and psychiatric problems (self-reported presence of a range of depressive symptoms and emotional distress using the Centre for Epidemiologic Studies Depression scale [8]). Married women answered questions about

prevention and screening practices: immunization (complete immunization of their children with 6 vaccines BCG, polio, diphtheria, tetanus, pertussis and measles); breastfeeding (breastfed their children for at least 6 months); screening (ever had a mammogram or cervical smear, self-reported and validated from medical records); and contraceptive use (ever used oral contraceptive pills).

A clinical examination was performed, and blood pressure, weight and height were measured by the nurses. Weight was measured using domestic scales with indoor clothing without shoes on to the nearest 0.1 kg. Height measurement was carried out to the nearest mm by using a measuring tape. Trained technicians collected a 20 mL of fasting blood (12-hour fasting) into 2 tubes of 10 mL each. The laboratory data collected included fasting plasma glucose (FPG), fasting lipids and glycosylated haemoglobin (HbA1c) levels (on diabetic patients only).

Quality control measures

Quality control measures were built into the survey design to ensure accuracy, completeness and comparability of information across the facilities. These included development of a training manual of standardized procedures; training of coordinators and interviewers in clinical measurement and questionnaire completion to provide consistency of techniques; and scheduled replication of measurements by survey supervisors. The field supervisor supervised the interviewers in 10% of all the patient interviews. For every 50th person visiting the clinic, all clinical measurements were repeated blindly by another interviewer, and 2 blood samples were submitted to the laboratory without identifiable linkage to check the quality of laboratory procedures.

Definitions

Diabetes was determined based on levels proposed by the American Diabetic Association (ADA) and adopted by the WHO as follows: normal blood

glucose (FPG < 6.1 mmol/L), impaired fasting glucose (FPG 6.1–6.9 mmol/L) and diabetes mellitus (FPG \geq 7.0 mmol/L or random plasma glucose \geq 11.1 mmol/L) [9]. Blood pressure was measured with a mercury sphygmomanometer according to the standardized protocol recommended by the American Heart Association [10]. Hypertension was defined as a systolic blood pressure \geq 140 mmHg or greater or a diastolic blood pressure \geq 90 mmHg (based on the mean of the 2 readings) or current therapy with anti-hypertensive medication. Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in metres. According to the National Institutes of Health guidelines [11], weight status was classified into following BMI categories: underweight (\leq 18.5 kg/m²), normal weight (18.5–24.9 kg/m²), overweight (25–29.9 kg/m²), obesity (\geq 30 kg/m²) and gross obesity (\geq 40 kg/m²). Hyperlipidaemia was defined as serum cholesterol > 5.2 mmol, or low-density lipoprotein cholesterol > 3.4 mmol, or serum triglycerides > 1.7 mmol. People were grouped into 3 exercise levels period: high (1+ hours of vigorous exercise during the last 1 week), moderate (< 1 hour of vigorous exercise) and low/sedentary (no exercise or little exercise in the 30 days prior to interview).

Ethical issues

The study proposal was approved by the institutional review board. All information provided by the interviewers was strictly confidential. All records were securely stored and locked to restrict access only to study staff. A prospective participant in the survey was informed about the proposed survey before any consent to participate was considered valid. Participation on the study was voluntary; respondents could decline any test or withdraw at any time.

Data analysis

The data were entered into a personal computer and SPSS, version 16.0, was

used for data analysis. Descriptive statistics was used to summarize the data and to describe the prevalence of common problems in the study group.

The significance of relationship of the items related to lifestyle and prevention practices, health problems and prevention and screening practices with sex, age, education level, mothers' working status and family size was assessed using the chi-squared test. For this purpose age was categorized as < 35 or \geq 35 years, education level as high or low, mothers' working status as working or housewife and family size as 4, 4–7 and > 7 members.

Results

Of the total of 2054 individuals residing in a sample of 419 houses, 1869 (91.0%) were located. Of these, a total of 1339 (71.6%) adults completed the survey. Their mean age was 30.7 (SD 12.7) years.

Demographic data

Regarding participants' profile, just over 50% of participants were in the age group 14–34 years, while < 2% were aged 55+ years. Males comprised 57.4% of the studied group. Almost three-quarters of the sample had a low or medium level of education, and the most common family size was 4–7 members (Table 1).

Lifestyle and preventive measures practices

A great majority of the participants (93.1%) expressed satisfaction with their health. Physical exercise, hand washing, daily bathing and daily tooth brushing were practised by a majority of the sample. However, 15.8% of the sample reported that they were smokers (Table 2).

The rate of health satisfaction was significantly higher among males and those aged < 35 years ($P < 0.002$ and < 0.001 respectively). Similarly practising physical exercise was reported by

Table 1 Demographic profile of participants in the National Guard Health Measures Survey 2010 in Eastern region of Saudi Arabia (n = 1339)

Variable	No.	%
Age (years)		
14–24	498	37.2
25–34	253	18.9
35–44	399	29.8
45–54	166	12.4
55+	23	1.7
Sex		
Male	769	57.4
Female	570	42.6
Education level		
Low (grade 1–6)	596	44.5
Medium (grade 7–9)	431	32.2
High (grade ≥ 10)	312	23.3
Family size		
< 4	142	13.4
4–7	666	63.0
> 7	250	23.6

significantly more males, those aged < 35 years ($P < 0.001$, and < 0.001 respectively) and with family size < 7 ($P < 0.02$). The practice of daily bathing and daily tooth brushing did not show significant variation across the variables. The practice of hand washing was reported by significantly more males, those aged ≥ 35 years and those with higher education level ($P < 0.007$, < 0.001 and < 0.02 respectively). On the other hand, smoking was reported by significantly more males, those aged ≥ 35 years and those with family size ≥ 7 members ($P < 0.001$, < 0.01 and < 0.04 respectively).

Health problems

Around two-thirds of the sample had problems of overweight and obesity, while 50% had high serum lipids and psychiatric problems. Hypertension and diabetes were present in just under 10% of the sample in both cases; and a few individuals (6.0%) had suffered a serious accident (Table 3).

We found that 31% of participants had 1 or more of the major risk factors for cardiovascular disease (high

blood cholesterol, diabetes, high blood pressure and smoking), while 10% of participants had 2 major risk factors.

Overweight or obesity was significantly more common among males ($P < 0.02$), raised serum lipids among males and participants aged ≥ 35 years ($P < 0.001$ and < 0.001 respectively) and diabetes mellitus among males, those aged ≥ 35 years and those with family size ≥ 7 members ($P < 0.001$, < 0.001 and < 0.03 respectively). The rate of hypertension was also significantly higher among subjects aged ≥ 35 years ($P < 0.001$). Serious accidents were suffered by significantly more males ($P < 0.009$). In contrast, psychiatric problems were present in significantly more females, those aged < 35 years, and those with family size of ≥ 7 members ($P < 0.001$, < 0.01 , and < 0.02 respectively).

Prevention and screening practices

Married women answered questions about prevention and screening practices. High rates of complete immunization of their children and breastfeeding their children for at least 6

months (88.9% and 80.2% respectively) were found, while 21.7% of women had ever used oral contraceptives and very few had ever had a mammogram or cervical smear (Table 4).

Adequate childhood immunization and breastfeeding practices was found among significantly more women aged < 35 years ($P < 0.001$ and < 0.01 respectively). A cervical smear had been obtained by significantly more women aged ≥ 35 years ($P < 0.005$). However, having ever had a mammogram or ever used oral contraceptive pills did not show a significant variation with woman's age, education level, mothers' working status or family size.

Discussion

The findings of the NGHMS-2010 have described the prevalence of health problems and use of preventative health practices among the studied group of National Guard military employees and their dependants. It provides an excellent base from which to strengthen many public health policies and programmes. These results help in the identification and selection of priority health issues at a regional level. Based on these very important issues, relevant health indicators can be selected and monitored.

Lifestyle and preventive measures practices

Physical activity can reduce the likelihood of a person developing heart disease, high blood pressure, osteoporosis and possibly diabetes [12]. It can also have a positive effect on a person's overall wellbeing, mental health and self-image. Physical inactivity is an established risk factor for cardiovascular disease, cancer and diabetes. A literature review in 2004 concluded that the prevalence of physical inactivity among Saudi children, adolescents and adults was high [13]. A recent study in Taif, Saudi Arabia found that 54% of the

Table 2 Participants' self-reported lifestyle and preventive health measures

Variable	Total		Satisfied with health		Practising physical exercise		Daily bath		Daily tooth brushing		Hand washing		Smoking	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Age (years)														
14-24	498	99.0	493	99.0	353	70.9	307	61.6	276	55.4	484	97.2	34	6.8
25-34	253	96.8	245	96.8	187	73.9	155	61.3	141	55.7	243	96.0	37	14.6
35-44	399	87.2	348	87.2	235	58.9	265	66.4	235	58.9	342	85.7	83	20.8
45-54	166	85.5	142	85.5	89	53.6	108	65.1	102	61.4	136	81.9	36	21.7
55+	23	78.3	18	78.3	7	30.4	12	52.2	15	65.2	18	78.2	3	13.0
<i>P</i> -value	0.001		0.001		0.001		0.28		0.53		0.001		0.01	
Sex														
Male	769	96.9	745	96.9	577	75.0	480	62.4	435	56.6	730	95.0	181	23.5
Female	570	88.0	502	88.0	296	51.9	367	64.3	324	56.8	493	86.5	12	2.1
<i>P</i> -value	0.002		0.002		0.001		0.66		0.91		0.007		0.001	
Education level														
Low (grade 1-6)	596	96.5	575	96.5	392	65.8	370	62.1	344	57.7	533	89.4	86	14.4
Medium (grade 7-9)	431	92.3	398	92.3	280	64.9	281	65.2	251	58.2	382	88.6	55	12.8
High (grade ≥10)	312	86.2	269	86.2	201	64.4	196	62.8	174	55.8	307	98.4	52	16.7
<i>P</i> -value	0.79		0.79		0.88		0.82		0.87		0.02		0.66	
Family size														
< 4	142	87.3	124	87.3	117	82.4	91	64.1	94	66.1	126	88.7	21	14.8
4-7	666	96.0	640	96.0	470	70.6	426	64.0	431	64.7	597	89.6	91	13.7
> 7	250	88.4	221	88.4	101	40.4	157	62.8	168	67.2	222	88.8	54	21.3
<i>P</i> -value	0.73		0.73		0.001		0.88		0.66		0.87		0.04	
Total	1339	93.1	1339	93.1	931	65.2	888	63.3	888	63.3	1339	91.3	158	15.8

Chi-squared tests.

Table 3 Participants' measured health status

Variable	Total No.	Overweight or obese No.	Overweight or obese %	High serum lipids No.	High serum lipids %	Diabetes mellitus No.	Diabetes mellitus %	Hypertension No.	Hypertension %	Psychiatric problems No.	Psychiatric problems %	Serious accident No.	Serious accident %
Age (years)													
14-24	498	200	40.1	90	18.1	5	1.0	2	0.4	206	41.3	35	7.0
25-34	253	198	78.3	131	51.8	15	6.0	6	2.3	122	48.2	5	2.0
35-44	399	302	75.7	322	80.7	54	13.5	55	14.0	195	48.9	21	5.2
45-54	166	133	80.1	130	78.3	40	24.1	41	24.7	84	50.6	18	10.8
55+	23	14	60.9	18	78.2	8	34.7	16	70.0	9	39.1	1	4.3
<i>P</i> -value		0.001		0.001		0.001		0.001		0.01		0.001	
Sex													
Male	769	522	67.9	209	27.2	83	11.0	73	9.4	312	40.6	61	7.9
Female	570	325	57.1	101	17.7	30	5.2	47	8.2	311	54.6	19	3.3
<i>P</i> -value		0.02		0.001		0.001		0.82		0.001		0.01	
Education level													
Low (grade 1-6)	596	336	59.5	128	21.4	54	9.0	61	10.2	242	40.6	38	6.3
Medium (grade 7-9)	431	240	55.7	102	23.6	37	8.6	39	9.0	220	51.0	24	5.5
High (grade ≥ 10)	312	171	54.8	80	25.7	22	7.0	20	6.4	161	51.6	18	5.8
<i>P</i> -value		0.54		0.82		0.78		0.46		0.88		0.78	
Family size													
< 4	142	100	70.5	35	24.7	18	12.7	16	11.3	51	36.0	10	7.0
4-7	666	424	63.7	170	25.5	52	7.8	56	8.4	280	42.0	39	5.9
> 7	250	175	70.0	64	25.6	27	10.8	24	9.6	142	56.8	14	5.6
<i>P</i> -value		0.56		0.91		0.44		0.55		0.02		0.44	
Total	1339	847	63.2	691	51.6	122	9.1	120	9.0	616	46.0	80	6.0

Chi-squared tests.

Table 4 Married female participants' self-reported health practices

Variable	Total		Completed children's immunization		Breastfed children for 6 months		Ever had mammogram		Ever had cervical smear		Ever used oral contraceptives	
	No.		No.	%	No.	%	No.	%	No.	%	No.	%
Age (years)												
14-24	78		73	93.6	68	87.2	6	7.7	3	3.9	14	18.0
25-34	125		119	95.2	107	85.6	8	6.4	8	6.4	24	19.2
35-44	152		118	77.7	104	68.5	8	5.3	24	15.8	32	21.0
45-54	41		27	65.8	24	58.5	2	4.9	12	29.3	10	24.3
55+	11		7	63.6	7	63.6	1	9.0	5	45.4	3	27.3
<i>P</i> -value			0.001		0.01		0.64		0.01		0.72	
Education												
Low (grade 1-6)	103		88	85.4	78	75.8	5	4.9	12	11.7	17	16.5
Medium (grade 7-9)	182		166	91.2	152	83.5	12	6.5	25	13.7	42	23.0
High (grade ≥ 10)	102		90	88.2	80	78.4	8	7.8	15	14.7	25	24.5
<i>P</i> -value			0.74		0.12		0.74		0.88		0.48	
Work status												
Employed	53		45	85.0	43	81.1	4	7.5	9	17.0	14	26.4
Not working	334		299	89.0	267	80.0	21	6.3	43	13.0	70	21.0
<i>P</i> -value			0.84		0.91		0.77		0.07		0.08	
Family size												
< 4	42		36	85.7	34	81.0	3	7.1	5	12.0	8	19.0
4-7	246		222	90.2	197	80.0	16	6.5	31	12.6	52	21.1
> 7	101		86	85.1	79	78.0	6	6.0	16	16.0	24	23.8
<i>P</i> -value			0.88		0.94		0.82		0.22		0.32	
Total	387		344	88.9	310	80.2	25	6.5	52	13.4	84	21.7

Chi-squared tests.

participants were physically active, of whom 27.7% were practising vigorous physical activity and 72.3% moderate physical activity [14]. Another study, from Riyadh, found that 53.5% of the participants were totally physically inactive, 27.5% were irregularly active and only 19.0% of the entire sample was active on a regular basis [15]. The self-reported prevalence of practising physical exercise was 65.2% in our study. We hypothesize that the younger age of our study population is the reason for the higher rate of physical activity.

Health problems

Excess body weight has been linked to several health risks and diseases. The link between overweight and the risk of heart disease (complicated by high

blood pressure, high blood lipids and diabetes) is especially important considering that heart disease is the most common cause of death in Saudi Arabia [16]. The literature showed a prevalence of overweight and obesity in Saudi Arabia of 36.9% and 35.6% respectively [17].

The overall prevalence of diabetes mellitus in Saudi Arabia is 23.7% [18]. However, the prevalence of diabetes in our study was 9.1%, and we believe that the younger age of our study population is the reason for this lower rate.

There is a consensus that high blood cholesterol is a major risk factor for heart disease and that lowering blood cholesterol levels in individuals with elevated blood cholesterol reduces the risk of a heart attack. It is desirable to have low

total blood cholesterol, triglycerides and low-density lipoprotein (LDL) cholesterol levels, and high values for high-density lipoprotein (HDL) cholesterol. A recent study revealed that in Saudi Arabia, the prevalence of high cholesterol was 54.0%, while the prevalence of high triglycerides was 40.3% [19].

High blood pressure is a known risk factor for cardiovascular disease and kidney failure. Detection and control of high blood pressure have important implications for reducing the cardiovascular disease risk within the population and preventing kidney failure. It is therefore recommended that all people over the age of 25 years have their blood pressure checked as part of any routine health examination and that the patient be informed of their blood pressure

readings. The prevalence of hypertension in Saudi Arabia has been reported to be 26.1% [20]. However, the prevalence of hypertension in our study was only 9.1% and, again, the younger age of our population is the most likely reason for this low rate.

Prevention and screening practices

In Saudi Arabia, cervical cancer occurs in 4.1/100 000 female population. It accounts for 7% of all newly diagnosed cancers in females and is the 8th leading cause of cancer death in Saudi females [21]. We found that only 13.4% of female patients had ever undergone a cervical smear. This is similar to the rate of 16.8% found in the literature for Saudi Arabia [22].

In Saudi Arabia, breast cancer is the most common cancer, ranked first among females and accounting for 20.6% of all newly diagnosed female cancers [21]. It is the single leading cause of cancer death for women 20–59 years of age and thus poses a major public health concern. A recent publication estimated that the future burden of breast cancer in Saudi Arabia is expected to increase by approximately 350% by 2025 [23]. Mammogram screening is used to detect breast cancer early, thus improving the chances of successful treatment. We found that only 6.5% of our female participants had ever undergone mammography. The low utilization of mammography screening in Saudi Arabia has been mainly attributed to lack of education, low awareness among females and the lack of standard national screening programmes [24].

Our data revealed a prevalence of oral contraceptive use of 21.7%. There is other

evidence that a majority of Saudi women are using contraception methods but without medical advice; a recent study showed that 36.6% of Saudi females were using oral contraception pills [25].

A recent study of 5339 children in Saudi Arabia found that 4889 received breast milk at birth, indicating a prevalence of initiation of breastfeeding of 91.6% [26]. Our study showed that about 80% of the women breastfed their babies for at least 6 months.

A survey of national immunization coverage in Saudi Arabia in 1991 revealed that the national coverage of correct immunization with 6 vaccines (according to World Health Organization standards) was 85%, with 14% partially immunized and 1% unimmunized [27]. Our study found that 88.9% of the participants had performed complete immunization for their children.

Survey implications

The NGHMS-2010 has provided a clear picture of the measured health indicators and identified areas where considerable individual and collective effort is needed. We had a relatively young population with a mean age of 30.7 (SD 12.7) years. Despite that, too many participants smoked, were overweight, were inactive and had high levels of risk factors for chronic diseases such as cardiovascular disease, cancer, diabetes mellitus and chronic lung disease. In fact, 31% of the participants had 1 or more of the major risk factors for heart disease. We found the rates of participation were low in prevention programmes such as cervical cancer and breast cancer screening, and we suggest that measures must be taken to enhance

these practices. Another concern is the percentage of participants, particularly young women, who were exhibiting symptoms of psychiatric illnesses.

Future directions

This survey provided a wealth of data that should be viewed as the beginning of a future research and planning agenda. A concerted effort is needed to improve the health status and practices of National Guard families. A future challenge is the integration of existing sources of information for the purpose of planning and developing effective policies, programmes and supportive environments to improve the health status of all National Guard employees and their families.

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