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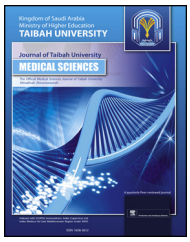

Original Article

Characteristics Associated with Knowledge about Periodic Health Examinations among Adults in Al-Jouf Region, KSA

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المخلص

أهداف البحث: يعد نقص المعرفة أحد العوائق التي تعيق استخدام الفحص الصحي الدوري. تهدف هذه الدراسة إلى استكشاف المعرفة حول الفحص الصحي الدوري بين البالغين المقيمين في منطقة الجوف بالمملكة العربية السعودية، وتحديد الخصائص المرتبطة بمثل هذه المعرفة.

طرق البحث: تم إجراء مسح مقطعي يستهدف البالغين (≤ 18 عاما) المقيمين في منطقة الجوف، المملكة العربية السعودية، لجمع المعلومات حول خصائصهم الاجتماعية والديموغرافية، واحتياجاتهم من الرعاية الصحية، والمعرفة والممارسات تجاه الفحص الصحي الدوري. تم إجراء الإحصائيات المقارنة وتحليل الانحدار الخطي متعدد المتغيرات لتحديد الخصائص المرتبطة بالمعرفة حول الفحص الصحي الدوري.

النتائج: أكمل ما مجموعه 624 مستجيبا الاستطلاع وشاركوا في هذه الدراسة. من بين المشاركين، كان متوسط درجة المعرفة بالفحص الدوري الصحي 5.26 بنطاق من 0 إلى 7. أظهر تحليل الانحدار أن درجة المعرفة بالفحص الصحي الدوري كانت أعلى بشكل ملحوظ بين الإناث، المشاركين بدرجة الكلية، وأولئك الذين عملوا في مجال الرعاية الصحية مقارنة بنظرائهم.

الاستنتاجات: أظهر هذا البحث ارتفاعا نسبيا في درجة المعرفة بالفحص الصحي الدوري بشكل عام بين البالغين الذين شملهم الاستطلاع في المملكة العربية السعودية، لكن الاختلاف في درجة المعرفة، حيث يكون الذكور، وذوي المستويات التعليمية المنخفضة وأولئك الذين لا يعملون في مجال الرعاية الصحية أقل دراية بالدوريات بشكل ملحوظ. الفحوصات الصحية من أقرانهم حتى بعد التحكم في الخصائص الأخرى التي قد تؤثر على مستويات المعرفة. قد توفر الأبحاث التي تتناول المعرفة بالمواضيع الصحية الأخرى والسلوكيات الصحية، بما في ذلك الاستفادة من الخدمات الصحية، إرشادات لأولئك الموجودين في المملكة العربية السعودية في الجهود المبذولة لتحسين المعرفة واستخدام الفحوصات الصحية الدورية بشكل عام وبين مجموعات محددة.

الكلمات المفتاحية: الفحص الصحي الدوري؛ الفحص الصحي الدوري في المملكة العربية السعودية؛ في منطقة الجوف؛ المعرفة بالفحص الصحي الدوري؛ البالغين في منطقة الجوف.

Abstract

Objectives: A lack of knowledge is one of the key barriers that hinders the use of Periodic Health Examinations (PHEs). This study aimed to investigate the knowledge of PHE among adults residing in Al-Jouf region, KSA, and determine characteristics associated with such knowledge.

Methods: A cross-sectional survey targeting adults (≥18 years) residing in Al-Jouf region, KSA, was conducted to gather information relating to their sociodemographic characteristics, needs for healthcare, and knowledge about and practices toward PHE. Comparative statistics and multivariate linear regression analysis were conducted to determine the key characteristics associated with knowledge about PHE.

Results: A total of 624 respondents completed the survey and participated in this study. Among the participants, the mean PHE knowledge score was 5.26 (SD = 0.05) with a range of 0–7. Regression analysis

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showed that the PHE knowledge score was significantly higher among females, respondents with a college degree, and those worked in the healthcare field when compared to their counterparts.

Conclusion: Analysis revealed a relatively high overall knowledge score for PHE among surveyed adults in KSA although knowledge score varied in males, those with lower educational levels and those who did not work in the healthcare field; these cohorts were significantly less knowledgeable about PHE than their peers even after controlling for other characteristics that may affect knowledge levels. Research to address knowledge of other health topics and health behaviors, including the utilization of health services, may provide guidance to those in KSA to improve the knowledge and use of PHE overall and within specific groups.

Keywords: Adults in Al-Jouf Region; Knowledge; KSA; Periodic health examination; Periodic health examination in Al-Jouf Region

Introduction

The health of Saudi Arabians has improved dramatically over recent decades. As of 2020, the average life expectancy from birth was 75 years. This is an increase of 29 years from a life expectancy from birth of 46 years in 1960.[1] Despite this improvement, significant increases in the number of non-communicable diseases and cancers have also been observed. For example, the prevalence of diabetes increased from 9.7% in 1970−1979 to 34.7% in 2010−2017 among men and increased from 7% to 28.6% among women over the same period. Almost one-third of Saudi adults (27.2%) have hypertension[2] and one in four Saudi adults (24.7%) can be classified as being obese.[3] Obesity, diabetes, hypertension, hypercholesterolemia and chronic obstructive pulmonary disease are now the major contributors to the poor health status of Saudi Adults.[2]

These and other similar conditions can often be detected early in the disease course and/or prevented by monitoring health vitals such as weight and blood pressure which can be collected during periodic health examinations (PHE). In general, PHE refers to regular visits with healthcare providers for health and wellness checkups rather than visits to address specific conditions, illnesses or injuries.[4,5] These typically annual visits provide an opportunity to screen patients for potential health problems, detect conditions in the early stages when treatments are most effective, identify health-related risk factors and counsel patients to improve their health behaviors.[6,7] Despite the free-of -charge access to healthcare services in KSA, making PHEs available at no cost,[8] a very low proportion of Saudi adults complete PHEs. Results from a 2013 nationally representative sample survey found that just one-quarter of Saudi adults aged 15 years or older had ever had a PHE.[5] Saudis who were older; had more education; were married; consumed more fruits and vegetables; were diagnosed with prediabetes, diabetes, or hypercholesterolemia, and had visited a healthcare provider for an illness or injury in the past 2 years, were more likely to report that they have had a PHE.[9] More recent convenience sample surveys of Saudi adults (2015−2021) reported PHE rates that were almost double (22.0%−42.1%)[10−13] those of the overall PHE rate in the 2013 survey.

In 2016, KSA launched Vision2030, an ambitious plan to transform its economy and reform its public service infrastructure. One aim was to improve the primary healthcare system so that it could better address the increasing rates of non-communicable diseases plaguing the country. Since the launch of reform efforts, significant progress has been made to address the physical primary healthcare infrastructure (e.g., renovating clinics, automating health information systems) and improve access (e.g., increasing telehealth services and increasing working hours).[14] However, addressing non-communicable diseases rates will likely require more than just reforming the primary healthcare system and providing free access to care. Saudi adults may need a greater understanding of the benefits of PHEs and what they entail to regularly attend PHE sessions.

Research to date is mixed on the extent to which Saudi adults are knowledgeable about PHEs.[12,13,15] One study assessing the perspectives of physicians working in government-operated primary healthcare centers considered the lack of knowledge about PHEs and understanding the need for PHEs by Saudi patients as a major barrier to the wider use of PHEs. One physician who was involved in this previous study said that "patients do not have any idea of what is the benefit from [routine checkups] … They do not have [an] idea [of] what labs mean and how they help them…'".[16] In another study, Al-Etesh et al. (2020) surveyed adults residing in the Al-Jouf Region of KSA with respect to PHEs. These authors found that two-thirds (64%) of the surveyed adults reported they had never heard about PHEs. Of the one-third (36%) of surveyed adults who reported they had heard about PHEs, only 58% were correct in that PHEs entailed regular visits with healthcare providers for health and wellness checkups rather than visits to healthcare providers to address specific conditions, illnesses or injuries.[15] In contrast, Al-Kahil et al. (2020) found that more than two-thirds (69.5%) of their respondents from Riyadh in KSA correctly answered at least nine of twelve PHE knowledge questions, indicating what they defined as "know[ing] very well" about PHEs.[10] Maqbul et al. also reported a high rate of adequate knowledge of PHEs, with 76.4% of Saudi adults from the Makkah region correctly answering three of five PHE knowledge questions (although only 32.8% correctly answered four of five and only 12.9% answered five of five).[12] Significant variation in PHE knowledge among Saudi adults has been observed in males, those

with less education, those working for free businesses, those without chronic diseases, and those not having regular PHEs and having inadequate PHE knowledge. While this research to date has been important in contributing to the scant literature regarding utilization and knowledge of PHEs in KSA, specific research examining the knowledge levels of PHE has been restricted to bivariate analyses, which does not show which characteristics are independently associated with knowledge level and thus which characteristics are most appropriate to target for interventions to increase awareness and utilization of PHEs. Therefore, this study was undertaken to address this limitation. We aimed to identify factors that are independently associated with knowledge about PHEs and highlight their importance in designing future interventions to increase awareness and utilization of PHEs.

Materials and Methods

Study design

This study used a cross-sectional survey design.

Instrument

A two-part survey instrument was constructed by a member of the study team (NA). The first part included six questions to capture the following socio-demographic characteristics of the respondent: age, sex, education level, location of residence and employment status. The second part included seven questions to ascertain the respondent's knowledge of PHEs (the instrument included 12 other questions related to PHEs that are not discussed herein but are presented elsewhere.[15]) The instrument was reviewed by a panel of experts in primary care and medicine to ensure the validity of its content. After modifications based on the panel's input, the instrument was determined to have a Cronbach's Alpha of 0.867, thus providing evidence of its reliability.

Sampling

The target participants for this study were adults who were 20–80 years of age and residing in Al-Jouf region, KSA. The Al-Jouf region is located on the north borders of the country, bordering Jordan.[17] Two nationally representative surveys conducted to monitor the burden of non-communicable diseases and their risk factors in the country showed that the population of Al-Jouf had the highest likelihood of daily smoking and undiagnosed hypertension when compared to other populations in the country.[18]

When the survey was initiated, there were 63 primary healthcare centers operated by the Ministry of Health[19] to serve 531,952 residents in Al-Jouf region.[20] Overall, 63.76% of Al-Jouf residents (339,181 residents) were adults aged ≥20 years.[20] Therefore, the desired minimum target number of respondents for this study was 384 to ensure a 95% confidence level and a 5% margin of error. To be eligible to complete the survey, respondents had to be current residents of the Al-Jouf Region and 20–80 years of age. Adults ≤19 years of age and those from outside of the region were excluded.

Data collection process

Members of the general public were approached by members of the study team in public locations (commercial complexes, parks and government office buildings) in five communities in the Al-Jouf Region between December 1, 2020 and January 31, 2021 and invited to participate in the study. The study team described the focus of the study, the voluntary nature of the study, explained that all responses would be kept confidential, and answered any questions potential respondents had about the study. For those interested in participating, a written informed consent process was completed before they were given the self-administered survey instrument (in their choice of Arabic or English) to complete.

Measures

The main outcome variable

The main outcome variable was '*Knowledge about Periodic Health Examination (PHE)*'. The Saudi Center for Disease Prevention and Control developed a national checklist to guide PHEs for adults aged ≥18 years, which calls for providers to measure height and weight, inquire about smoking status, and inquire about physical activity level, among other components as part of the PHE.[21] The outcome, knowledge about PHE, was measured with seven questions; three questions assessed the respondent's general knowledge about PHE, and four questions assessed the respondent's knowledge about components of PHE as outlined by the Saudi Center for Disease Prevention and Control guidelines for PHEs.[21] The general knowledge questions were: 1) "Do you have any prior information about periodic health examination for adults?"; 2) "According to your information, the periodic health examination (for adults) means a person visits primary healthcare centers and hospitals only in cases of illness or complaint?"; and 3) "According to your information, the periodic health examination (for adults) means regularly seeking periodic health examination at specific and regular times while he/she is healthy (not complaining of any illness)?". The four PHE component questions were: 1) "The measurement of weight and height is one of the components of the periodic health examination?"; 2) "When you visit a primary care provider, asking about your smoking status is one of the components of periodic health examination?"; 3) "When you visit a primary care provider, asking about your daily physical activity is one of the components of periodic health examination?"; and 4) "When you visit a primary care provider, asking about fastening seat belt is one of the components of periodic health examination?"

Responses to each of the seven questions were dichotomized (coded 1 for the correct answer and coded 0 for the

wrong answer). Of the seven questions, the correct answer to the second general knowledge question and the fourth PHE component question was 'no'. The correct answer for all other questions was 'yes'. The responses to all seven PHE knowledge questions were totaled to create a summary knowledge score with a possible range from 0 to 7.

Independent variables

Socio-demographic characteristics included age (≥40 years old = 1 and 20–39 years old = 0), sex (female = 1 and male = 0), and level of education (college degree = 1 and less than college degree = 0), employment status (employed = 1 and unemployed = 0), healthcare worker (yes = 1 and no = 0), and area of residence (Skaka city = 2, governorates: Tabarjal, Dumat Al-Jandal and Al-Qurayyat = 1, and Swayer center = 0). The variable, area of residence, was categorized and coded based on the classification of Emirates of Al-Jouf Province that belongs to Ministry of Interior.[17]

Health status was measured by the presence of certain chronic conditions (diabetes, hypertension or high blood cholesterol); responses to the chronic disease questions were dichotomized as 1 for 'yes, have at least one of these chronic conditions' and '0 for no, do not have any of these chronic conditions'.

Statistical analysis

Summary statistics (e.g., frequency distribution and percentages) were employed to characterize the respondents in this study and describe their responses to the survey questions. Comparisons were performed using t-tests and analysis of variance (ANOVA) between respondent groups based on the outcome of interest (knowledge about PHE), socio-demographic characteristics and health status. Multivariate linear regression analysis was conducted to examine the association between socio-demographic characteristics and health status and knowledge about PHE among the study sample.

Results

A total of 624 respondents completed the study. Table 1 shows the sociodemographic characteristics of the study sample. More than half (56.6%) of the respondents were 20–39 years of age, and two-thirds (66.7%) were male. Three-quarters of the respondents had a college degree (78.4%) and were currently employed (73.4%). Less than one in five worked in the healthcare field (15.9%). The area of residence for respondents, with half from the governorates (51.8%), 42.5% from Skaka city and 5.6% from Swayer center. The mean PHE knowledge score was 5.26 (SD = 0.05), with a range of 1–7.

Table 2 shows the results of the t-tests and ANOVA. There were significant differences in mean PHE knowledge scores based on levels of education and working in the healthcare field. Specifically, the PHE knowledge score among respondents with a college degree was significantly higher than among those with less than a college degree ($p < 0.001$). The PHE knowledge score among respondents who worked in the healthcare field was significantly higher than those who did not work in the healthcare field ($p < 0.001$). The differences in PHE knowledge score based on the other characteristics or health status were not statistically significant.

Table 1: Characteristics of the survey respondents.

Variables	N	%
Age Group		
20–39 years	353	56.6
≥40 years	271	43.4
Sex		
Female	208	33.3
Male	416	66.7
Level of Education		
Less than College Degree	135	21.6
College Degree	489	78.4
Employment Status		
Unemployed	166	26.6
Employed	458	73.4
Healthcare Worker		
No	525	84.1
Yes	99	15.9
Area of Residence		
Swayer Center	35	5.6
Governorates	323	51.8
Skaka City	266	42.6
Has a chronic condition[a]	127	20.4
Outcome	**Mean**	**SD**
Knowledge about Periodic Health Examination	5.26	0.05

N = Number; SD = Standard Deviation.
[a] Have at least one of the following chronic conditions: diabetes, hypertension or high blood cholesterol.

Table 3 shows the results of the multivariate linear regression analysis and the goodness of fit of the model (R^2). Analysis indicated that sex, level of education and working in the healthcare field were significantly associated with PHE knowledge scores. Specifically, on average and when holding all other characteristics constant, the PHE knowledge score for females was significantly higher by 0.26 points when compared to males ($p = 0.034$). Respondents with a college degree had a PHE knowledge score that was significantly higher by 0.54 points than those without a college degree ($p < 0.001$). Respondents who worked in the healthcare field had a PHE knowledge score that was significantly higher by 0.66 points when compared to those who did not work in that field ($p < 0.001$).

Multicollinearity among the independent variables was assessed by generating the variance inflation factor (VIF). All VIF values were smaller than 10 (the highest value was 5.12), thus indicating the absence of a perfect linear relationship between the variables in the multivariate linear regression model.[22] See Table 3 for more details.

Discussion

Results of the fully adjusted analysis indicated that females, those with a college degree and those who worked in

Table 2: Comparison of knowledge about periodic health examination by respondent characteristics.

Variables	N (%)	Knowledge about Periodic Health Examination			
		Mean	SD	*t*-value	*p*-value
Age Group					
20–39 years	353 (56.6)	5.23	1.38	−0.632	0.527
≥40 years	271 (43.4)	5.30	1.29		
Sex					
Female	208 (33.3)	5.39	1.30	−1.817	0.069
Male	416 (66.7)	5.19	1.36		
Level of Education					
Less than college degree	135 (21.6)	4.79	1.40	−4.607	<0.001[a]
College degree	489 (78.4)	5.38	1.30		
Employment Status					
Unemployed	166 (26.6)	5.16	1.37	−1.050	0.294
Employed	458 (73.4)	5.29	1.33		
Healthcare Worker					
No	525 (84.1)	5.15	1.35	−4.441	<0.001[a]
Yes	99 (15.9)	5.80	1.16		
Area of Residence		**Mean**	**SD**	***F*-value**	***p*-value**
Swayer Center	35 (5.6)	5.26	1.15	0.36	0.696
Governorates	323 (51.8)	5.21	1.39		
Skaka City	266 (42.6)	5.31	1.31		
Has a chronic condition[b]					
No	497 (79.6)	5.26	1.33	0.190	0.849
Yes	127 (20.4)	5.24	1.38		

Note: Comparison made using t test except for area of residence for which ANOVA was used.
N = Number; SD = Standard Deviation.
[a] $p < 0.05$, the significant level.
[b] Has at least one of the following chronic conditions: diabetes, hypertension or high blood cholesterol.

Table 3: The multivariate (adjusted) linear regression analysis of individual factors predicting periodic health examination knowledge score.

Variables	Coefficient (β)	*SE*	*t*-value	*p*-value	VIF
Intercept	4.43	0.265	16.73	<0.001	0
Age Group					
20–39 years	Ref				
≥40 years	0.23	0.118	1.95	0.051	1.27
Sex					
Male	Ref				
Female	0.26	0.124	2.12	0.034[a]	1.27
Level of Education					
Less than a college degree	Ref				
College degree	0.54	0.130	4.14	<0.001[a]	1.05
Employment Status					
Unemployed	Ref				
Employed	0.04	0.142	0.30	0.762	1.44
Healthcare Worker					
No	Ref				
Yes	0.66	0.150	4.36	<0.001[a]	1.11
Area of Residence					
Swayer Center	Ref				
Governorates	0.04	0.236	0.19	0.851	5.12
Skaka City	0.151	0.238	0.63	0.526	5.10
Has a chronic condition[b]					
No	Ref				
Yes	−0.003	0.136	−0.02	0.981	1.10
Goodness of Fit	**R-Square** = 0.072, **Adj R-Square** = 0.059				

SE= Standard Error; VIF = Variance of Inflation; Ref = Reference Group.
[a] $p < 0.05$, the significant level.
[b] Has at least one of the following chronic conditions: diabetes, hypertension or high blood cholesterol.

the healthcare field had statistically significantly higher levels of knowledge of PHEs than males, those without a college degree, and those who did not work in the healthcare field, respectively, after accounting for other characteristics (e.g., age, employment status, chronic disease status) that may affect the level of PHE knowledge. These results are similar to previous research that found that males and those with lower education levels had lower levels of PHE knowledge.[12,15] There appears to be no other research that has shown variation in PHE knowledge by employment in the healthcare field when compared to not being employed in the healthcare field in KSA; however, it is not surprising that those employed in the healthcare field would have high levels of knowledge regarding the appropriate utilization of healthcare services.

Although multiple national interventions may need to be implemented to increase overall PHE knowledge rates and subsequently the national PHE rate in KSA, there is potential to increase these rates among males, those without college degrees, and those who do not work in the healthcare field by targeting these populations with tailored interventions to increase their knowledge of and understanding of the value of PHEs. Existing research on tailored interventions to increase the utilization of certain healthcare services, especially preventive screenings, may provide guidance on interventions which may be useful to consider in KSA.

A randomized controlled trial conducted in the UK showed that sending letters with scheduled PHE appointments were more effective in patients actually having PHEs than sending open invitation letters encouraging patients to make their own appointments for a PHEs.[23] Although the culture and the healthcare delivery system in the UK and KSA are different, it is likely that the response of Saudi patients to clinical communications would be similar to that of UK patients. Indeed, other studies have shown that patient groups from both countries have been responsive to SMS reminders about upcoming health appointments. However, open PHE invitation letters have not been evaluated in KSA. Therefore, it is recommended that the Ministry of Health initially pilot test this strategy in two primary healthcare centers, with one center being randomized to patients being sent scheduled appointment letters and the other center randomized to patients receiving open invitation letters. Both letters could contain the same information regarding the value of PHEs and what they entail. Although these letters may go to all clinic patients rather than specific patient groups (e.g., those with lower education levels, those who work outside the healthcare system), the letters could be written in a way to address the potential needs of these specific groups (e.g., written at a lower literacy level, written without medical or healthcare jargon, and written with extra detail about accessing the clinic) which could have a differential effect on increasing knowledge of and use of PHEs among those with lower knowledge levels (i.e., those with lower education levels).

Another approach to increasing PHE knowledge rates may be through public awareness campaigns. Indeed, other researchers studying PHE in KSA have generated evidence that such campaigns may be effective. Al-Etesh et al. found among surveyed adults in the Al-Jouf Region of KSA that their most common source of information about PHEs was social media platforms (e.g., twitter and Facebook).[15] Moreover, respondents to the survey in Riyadh, KSA, by Al-Kahil et al. considered both social media and traditional mass media (e.g., television and radio) to be effective methods for spreading awareness of PHEs in the community. In support of these findings, a systematic review of studies reported that small scale media campaigns were effective in increasing cancer screening, particularly cervical cancer screening, in Asia. However, the authors reported insufficient research related to mass media campaigns to report conclusions regarding its effectiveness.[24] Community health education awareness campaigns have been disseminated and evaluated in KSA. In one example, researchers assessed the effect of a city-wide epilepsy awareness campaign in Riyadh and found that it significantly increased knowledge relating to epilepsy.[25] To address misinformation regarding COVID-19, the Saudi Arabian Ministry of Health developed and disseminated *via* social media platforms, a series of informational videos regarding the virus and mitigation strategies (e.g., washing hands and following curfews). The value of these videos was then assessed through online surveys. Half of survey respondents reporting watching the videos, and among these, 69.5% of respondents reported positive changes in COVID-19-related beliefs and practices.[26]

Another strategy for targeting specific groups is the use of community health workers; individuals trained in the health topic who are typically members of the group they are targeting and are embedded within the community rather than within healthcare facilities. Community health workers have been employed successfully worldwide to share health information to facilitate health behavior change, including uptake of healthcare services.[27–29] National public awareness campaigns have the potential to increase health-related knowledge, but deploying trained community health workers provides an opportunity to share information one-on-one and answer specific questions about PHEs and help Saudi citizens navigate the healthcare system to actually receive PHEs that are not likely possible with broad public awareness campaigns. An intervention to increase knowledge of prostate cancer and increase screening rates in a US community utilized barbers as community health workers. Barbers received training to deliver an educational intervention on prostate cancer and screening to their male clients in their barbershops. The barbers reported the intervention was easy to implement, helpful to address prostate cancer and did not interfere with their business.[30] An educational intervention specific to PHEs could be developed to train barbers in KSA and pilot tested among a small group of barbershops to assess the feasibility and effectiveness of such an intervention.

Worksite wellness programs have been successfully employed to improve health behaviors, health measures, health expenditures and employment related measures, such as absenteeism.[31] Worksite wellness programs aimed at increasing knowledge and the use of PHEs could target workers not employed in the healthcare field. A recent pilot study evaluated the use of text messaging and computer prompts to change physical behavior among male office

workers in KSA. Analysis showed that this intervention was effective in significantly reducing sedentary behavior by 46 min per day among intervention group participants compared to control group participants.[32] A similar intervention could be developed and tested for non-healthcare field workers in KSA to educate them about PHEs and encourage and remind them to schedule their PHEs each year.

Limitations

This study has several limitations that should be taken into account when considering the results. First, this study utilized a convenience sample of respondents. The lack of a random sample means that the results cannot be generalized to the full population of KSA but rather represents results specific to the survey respondents. Nevertheless, the lack of information on this topic provides merit to these findings. Second, this survey relied on the self-reporting of the use and knowledge of PHEs. Self-reporting can result in courtesy bias, where respondents answer what they think the survey takers expect.[33] While this may have affected the use of PHE responses in the survey (not reported in this paper), it is not likely that courtesy bias affected responses to the knowledge questions.

Conclusions

This research identified a relatively high overall PHE knowledge score among surveyed adults in KSA but variation in the knowledge score; males, those with lower educational levels and those who do not work in the healthcare field were significantly less knowledgeable about PHEs than their peers even after controlling for other characteristics that may affect knowledge levels. Research to address knowledge of other health topics and health behaviors, including the utilization of health services, may provide guidance to those in KSA in efforts to improve knowledge of and use of PHEs overall and among specific groups.

Source of funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest

The authors have no conflict of interest to declare.

Ethical approval

The ethical approval was obtained from the Research Ethics Committee at Qurayyat Health Affairs, Ministry of Health (Approval number: H-13-S-017; date: 24/11/2020). Furthermore, the survey questionnaire was administered to participants after explaining the study purpose and the voluntary nature of the study and obtaining their informed consents.

Authors contributions

AA & HF contributed to the study conceptualization, data cleaning and analysis, results interpretation, and manuscript preparation. NA led the design of the study, the development and validation of the questionnaire, data collection, and communications with participants. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

References

1. Life Expectancy at Birth Chart, 1960-2022. Saudi Arabia Profile. https://data.worldbank.org/country/saudi-arabia?view=chart [Accessed 6 August 2022].
2. Herzallah HK, Antonisamy BR, Shafee MH, Al-Otaibi ST. Temporal trends in the incidence and demographics of cancers, communicable diseases, and non-communicable diseases in Saudi Arabia over the last decade. **Saudi Med J 2019 Mar**; 40(3): 277.
3. Althumiri NA, Basyouni MH, AlMousa N, AlJuwaysim MF, Almubark RA, BinDhim NF, et al. Obesity in Saudi Arabia in 2020: prevalence, distribution, and its current association with various health conditions. In: **Healthcare**, Vol. 9, No. 3. MDPI; 2021 Mar 11. p. 311.
4. Centers for Disease Control and Prevention (CDC). *Behavioral risk factor surveillance system survey questionnaire*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2021.
5. *Saudi health interview survey results*; 2013. https://www.healthdata.org/sites/default/files/files/Projects/KSA/Saudi-Health-Interview-Survey-Results.pdf. [Accessed 6 September 2022].
6. Ponka D. The periodic health examination in adults. **CMAJ (Can Med Assoc J) 2014**; 186(16): 1245. https://doi.org/10.1503/cmaj.141125.
7. Liss DT, Uchida T, Wilkes CL, Radakrishnan A, Linder JA. General health checks in adult primary care: a review. **JAMA 2021**; 325(22): 2294–2306. https://doi.org/10.1001/jama.2021.6524.
8. Almalki M, Fitzgerald G, Clark M. Health care system in Saudi Arabia: an overview. **East Mediterr Health J 2011 Oct**; 17(10): 784–793. https://doi.org/10.26719/2011.17.10.784. PMID: 22256414.
9. El Bcheraoui C, Tuffaha M, Daoud F, AlMazroa MA, Al Saeedi M, Memish ZA, et al. Low uptake of periodic health examinations in the Kingdom of Saudi Arabia, 2013. **J Family Med Prim Care 2015**; 4(3): 342–346. https://doi.org/10.4103/2249-4863.161313.
10. Al-Kahil AB, Khawaja Ram Kadri AY, Abbarh SM, Alakhras JT, Jaganathan PP. Knowledge and practices towards routine medical checkup among middle-aged and elderly people of Riyadh. **J Patient Exp 2020**; 7(6): 1310–1315.
11. Albaloushi N, Alomair S, Ali S. Attitude towards performance of medical checkups: a survey from eastern province of Saudi Arabia. **Int J Eng Res Appl 2015**; 2: 57–59.
12. Maqbul MS, Bajubair AM, Althakafi AM, Alnaggar ARA, Aljumaydi AA, Alsadi AN, et al. A Saudi national population-based study awareness and practice of periodic medical check-up. **Asian J Pharm 2021**; 15(3): 379.
13. Maqbul MS, Alghamdi RD, Bakhsh LW, Almashjari NA, Alanazi SH, Bahsjwan AA, et al. A cross section survey assessment study on the knowledge and practice of periodic medical checkup among the Saudi population. **J New Dev Chem 2021**; 3(3): 40–49.

14. Al Khashan H, Abogazalah F, Alomary S, Nahhas M, Alwadey A, Al-Khudhair B, et al. Primary health care reform in Saudi Arabia: progress, challenges and prospects. **East Mediterr Health J 2021**; 27(10): 1016–1026. https://doi.org/10.26719/emhj.21.042. PMID: 34766328.
15. Al-Etesh NS, Adelosoye AA, Alruwaili MG. Adult periodic health examination: knowledge and practice in the community of Al-Jouf Region–KSA. **Multi-know Elect Comp J Educ Sci. 2020**; 39: 1–27.
16. Alzahrani AM, Quronfulah BS, Felix HC, Khogeer AA. Barriers to routine checkups use among Saudis from the perspective of primary care providers. **Saudi Med J 2022**; 43(6): 618–625.
17. Ministry of Interior. Emirate of Al-Jouf Province: Al-Jouf Province. Emirate Of Al-Jowf Province (moi.gov.sa) [Accessed 6 September 2022].
18. Alqunaibet A, Herbst CH, El-Saharty S, Algwizani A, editors. *Noncommunicable diseases in Saudi Arabia: toward effective interventions for prevention*. World Bank Publications; 2021 Dec 6.
19. Ministry of Health. Statistical Yearbook: Statistical yearbook chapter I health indicators. Statistical Yearbook - Statistical Yearbook (moh.gov.sa) [Accessed 6 September 2022].
20. General Authority for Statistics. Population in Al-Jouf region by gender, age group, and nationality (Saudi/Non-Saudi). Population in Al-Jouf region by gender, age group, and nationality (Saudi/Non-Saudi) | General Authority for Statistics (stats.gov.sa) [Accessed 6 September 2022].
21. Saudi Center for Disease Prevention and Control (Weqaya). *National guideline for periodic health examination*; 2019. Periodic Health Examination.pdf, cchi.gov.sa. [Accessed 12 July 2022].
22. Schreiber-Gregory DN, Jackson HM. *Multicollinearity: what is it, why should we care, and how can it be controlled*; 2017. In: *https://support.sas.com/resources/papers/proceedings17/1404-2017.pdf. [Accessed 12 July 2022].*
23. Boulware LE, Barnes GJ, Wilson RF, Phillips K, Maynor K, Hwang C, et al. Value of the periodic health evaluation. **Evid Rep Technol Assess 2006 Apr 1**; (136): 1–34.
24. Schliemann D, Su TT, Paramasivam D, Treanor C, Dahlui M, Loh SY, et al. Effectiveness of mass and small media campaigns to improve cancer awareness and screening rates in Asia: a systematic review. **J Glob Oncol 2019 May**; 5: 1–20.
25. Alaqeel A, Kamalmaz H, Abou Al-Shaar H, AlZahrani I, Alaqeel A, Aljetaily S, et al. Evaluating the initial impact of the Riyadh epilepsy awareness campaign. **Epilepsy Behav 2015 Nov 1**; 52: 251–255.
26. Alotiby A. The impact of media on public health awareness concerning the use of natural remedies against the COVID-19 outbreak in Saudi Arabia. **Int J Gen Med 2021**; 14: 3145.
27. World Health Organization (WHO). *What do we know about community health workers? A systematic review of existing reviews*. Geneva: World Health Organization; 2020 (Human Resources for Health Observer Series No. 19). Licence: CC BYNC-SA 3.0 IGO, https://creativecommons.org/licenses/by-nc-sa/3.0/igo. [Accessed 28 June 2022].
28. Felix HC, Mays GP, Stewart MK, Cottoms N, Olson M. Medicaid savings resulted when community health workers matched those with needs to home and community care. **Health Aff 2011 Jul 1**; 30(7): 1366–1374.
29. Felix HC, Ali M, Bird TM, Cottoms N, Stewart MK. Are community health workers more effective in identifying persons in need of home and community-based long-term services than standard-passive approaches. **Home Health Care Serv Q 2019 Jul 3**; 38(3): 194–208. https://doi.org/10.1080/01621424.2019.1604461.
30. Luque JS, Rivers BM, Kambon M, Brookins R, Green BL, Meade CD. Barbers against prostate cancer: a feasibility study for training barbers to deliver prostate cancer education in an urban African American community. **J Cancer Educ 2010 Mar**; 25(1): 96–100. https://doi.org/10.1007/s13187-009-0021-1. PMID: 20146044; PMCID: PMC2862382.
31. Osilla KC, Van Busum K, Schnyer C, Larkin JW, Eibner C, Mattke S. Systematic review of the impact of worksite wellness programs. **Am J Manag Care 2012 Feb 1**; 18(2): e68–e81. PMID: 22435887.
32. Quronfulah BSA. *Development and implementation of a health promotion intervention to reduce sedentary behaviour among male office workers in Saudi Arabia: the SLIM (Sit Less, Impress and Motivate) STUDY*. Dissertation. Queensland University of Technology; 2019., https://eprints.qut.edu.au/134422/1/Baraa%20Sami%20A_Quronfulah_Thesis.pdf. [Accessed 12 July 2022].
33. Hameed W, Ishaque M, Gul X, Siddiqui JU, Hussain S, Hussain W, et al. Does courtesy bias affect how clients report on objective and subjective measures of family planning service quality? A comparison between facility- and home-based interviews. **Open Access J Contracept 2017 May 3**; 9: 33–43. https://doi.org/10.2147/OAJC.S153443. PMID: 29760573; PMCID: PMC5937485.

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