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Assessment of School Health in Saudi Arabia: The Path to Improved Future Students Health. (Implications of the Saudi School Health Program)

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Abstract

Background: The health and wellbeing of school students are of essential value to world communities. In Saudi Arabia (SA), a school health program was initiated with the strategic goal of enhancing the health of the students and the early detection of any health problems.

Aims: This study aimed to identify the most common health problems and conditions among school students in SA based on the periodic examination program for school students (PEPSS).

Method: A retrospective secondary data analysis from the Ministry of Health (MOH) was based on the program collected in 2018 across four school grades, namely, 1st primary, 4th primary, 1st intermediate, and 1st secondary grade, from 40 school complexes around SA. The collected data included variables related to sociodemographic, family history, past infectious diseases, completion of vaccinations, body mass index (BMI), visual acuity tests, dental examination, scoliosis tests, and attention deficit hyperactivity disorders (ADHD). Data were entered and analyzed using an SPSS program (version 20) where descriptive statistics were calculated, the association between an outcome and some main variables were also calculated, and a p-value of less than 0.05 was considered as significant at a confidence interval of 95%.

Results: From the overall 12,032 students, 46.6% were males, and 53.4% were females. The most common health problems reported were tooth decay (62%), low visual acuity (15.3%), overweight (9.7%), and obesity (8.8%). Although almost all students were fully immunized (99.4%), the health status was calculated as less likely lower among males than females (AOR 1.26; 95% CI: 1.17-1.37).

Conclusion: The results concluded that dental caries and visual acuity were the highest health problems among students. The widespread prevalence of dental caries indicates the need for more research to appraise the public health implications of this developing problem.

Keywords: Periodic Examination Program; School; Students; Health; Saudi Arabia

List of Abbreviations: ADHD: Attention Deficit and Hyperactivity Disorder; BMI: Body Mass Index; DTP: Diphtheria, Tetanus, Pertussis; HSA: Health School Act; SA: Saudi Arabia; MCV: Meningococcal Conjugate Vaccine; MMR: Measles, Mumps, and Rubella; MOH: Ministry of Health; MOE: Ministry of Education; OPV: Oral Polio Vaccine; PEPSS: periodic Examination Program for School Students; SA: Saudi Arabia; SPSS: Statistical Package for Social Sciences; USA: United State of America; WSCC: Whole School, Whole Community, Whole Child.

Introduction

Health of school students is essential to all communities. Students are challenged to adopt important health domains required for future.[1] Despite advances in medicine, many diseases affect youths around the globe, some are linked with an unhealthy lifestyle. [2] Several health problems that develop early in a student's life can be better prevented and treated if identified earlier, such as vision, dental pain, and mental problems, which considered as health barriers to learning, use their negative effects on the process of development, and attendance of the student.[3]

The sedentary lifestyle is constantly increasing leading to further inactivity, obesity and other comorbidities.[4, 5] Globally, the new trend in public health is prevention, rather than treatment, and the best way to accomplish this goal is to train and educate the newer generations to a healthier way of living. Overweight and obesity have been identified in many studies as the underlining cause of many health pathologies during childhood[6] and adulthood[7]. Many programs have been implemented, worldwide, to address the problem and educate the youth. [8-10] These programs are usually run by governmental agencies and aim to annually monitor specific indices of health of school age children and teens in order to design the best educational interventions for that country. These indices comprise, but are not limited to, weight monitoring, level of activity, dental hygiene, mental health and skeletomuscular problems, depending on the health issues already identified in the country.

Saudi Arabia (SA) has one of the highest obesity and overweight prevalence rates among Middle Eastern nations.[11] Tooth decay and vision problems as well are widely common among school students in SA. [12-14] The preventable nature of these illnesses makes them a prime target for intervention.[15] The collaboration in Saudi Arabia (SA) between the Ministry of Health (MOH) and the Ministry of Education (MOE) is essential in establishing effective school health programs and interventions.[16] For these reasons, the MOH in SA has established the "Periodic Examination Program of School Students (PEPSS)" designed for constant monitoring and early detection of any abnormal health conditions occurred among SA students..[16] The present program was just a pilot examination (phase one, 1,413,709 students),conducted in all four school grades in SA.[17] The findings of this study will be provide the basis for the ongoing future school-based health assessment and provide the MOH with a clear vision for any health problem among school children in the country, so any further timely interventions can be implemented. Therefore, the aim of this study was to present the findings of the student-health survey program conducted by the MOH in a cohort of schools in SA.

Methodology

Study Design and Participants

A retrospective secondary data analysis from the Ministry of Health (MOH) was based on the PMEPSS program implemented in 2018, across four school grades namely, 1stprimary, 4th primary, 1st intermediate, and 1st secondary grade of the public schools. Private schools do not report directly to the MOH, thus were not included in this pilot study. There is a total of 30,625 schools in Saudi Arabia, out of which 26,248(86%) are public and 4,377 (14%) are private.

The schools are segregated to male-only and female-only schools and are organised in 20 Educational Regions (Riyadh, Jeddah, Eastern Province, Makkah, Madinah, Al-Qassim, Aseer, Al-Bahaa, Hail, Jazan, Najran, Tabouk, Al-Jouf, Al-Qurayyat, Al-Taif, Al-Ahsa, Bisha, Hafar Al-Batin, Al-Qunfudhah, and Northern Borders) that are located within the five geographical regions (Center, North, South, East, and West). Most of SA population (83%) is urban and the most populated cities are Riyadh, Makkah, Madinah, Jeddah, Dhahran, Jubail and Yanbu.

The survey was carried out during the second semester of 2018 and included both genders and across the four school grades. For this pilot study two (2) School Units, one for each gender, per Educational Region were randomly selected, therefore 40 (20X2=40) School Units were surveyed, in total. Each School Unit contains primary, intermediate and secondary schools. The data were collected and recorded on a specialised MOH platform[16] by an external medical staff from MOH, after the student is examined by a doctor or nurse. The institution of "school nurse" is not widely implemented in SA,[18] but each school in the kingdom is affiliated to a primary healthcare centre, which is responsible for sending the medical team to examine the students.

Evaluated Parameters

All student records retrieved from the main database of the general department of the school health at the PMEPSS program of the MOH were included and analysis. Depending on the student grade, different parameters have been evaluated. Namely, the socio-demographic variables (age, gender, school grade, region), the general clinical status; the family history (past or current chronic diseases, asthma, diabetes-DM); past infectious diseases; the biometric data (height, weight, BMI); the visual acuity, and the dental evaluation by a dentist to check oral health, dental carry and application of florid have been reported for all students, regardless their grade.

The vaccination status (for the obligatory children's vaccines: OPV, MMR, Varicella, DTwP (Td), MCV4, Influenza Vaccine), the attention deficit hyperactivity disorder (ADHD), and the hearing ability were examined only in the first beginners (1st primary), where it makes sense (if there were any problem, it would have been already detected in older students). On the other hand, smoking and early signs of depression were only assessed in intermediate and secondary grades, where these issues are more likely. Scoliosis was measured in both 4th primary and intermediate grades following their physical growth, while the learning ability/disability was evaluated in 4th primary, where students more likely will manifest it.

Measures of outcomes

An overall health status of the students was the dependent outcome of this analyzed which was calculated based on the sum of the computed binary data of all included variables related to the health of the students. An assessment instrument of well-being status was earlier validated by the World Health Organization (WHO) and the cut-off set for decision on positive or negative levels was set at stronger parameters if they are more than 75th Percentile or 75% in ideal situations.[19] Therefore, the obtained scores were then categorized as adequate (=1) or not adequate (=0) according to 75th percentile as cut-off point. These health status-related variables include those related to the completion of essential vaccinations, with the categories of no compliance =0, compliance =1. In addition, the BMI, which included Saudi's gender-specific percentile charts and thus was categorized into four groups: underweight less than the 5th percentile, normal 5th percentile to less than the 85th percentile, overweight 85th to less than the 95th percentile, and obese 95th percentile or above.[20] Accordingly, scores for each BMI category were coded as zero (0) for underweight, one normal weight, two for overweight, and three for obese. Other screening tests were measured, such as the visual acuity by using Sloan/Snellen charts (normal=1, poor=0; any student scored below 6/12 was considered myopic (poor) for both eyes), dental examination (normal=1, poor=0); Adam's forward bending test to examine scoliosis among students (no=1, yes=0); and the Vanderbilt Assessment Scale to identify ADHD categorized as (normal=1, abnormal=0).[21]

Statistical Analysis

The original data were registered in an Excel sheet, coded, cleaned, and any incomplete or missed variables were marked accordingly, then imported into the Statistical Package for Social Sciences (SPSS) version 20 (IBM, NY) and used for data analysis. Descriptive statistics (i.e., frequencies and percentages, as appropriate) were calculated, Pearson's chi-square test was used for categorical variables, and a p-value of less than 0.05 was considered as significant at a confidence interval of 95%. Those variables with 4 categories, for example the BMI, were converted into a binary format: normal and abnormal (underweight, overweight, and obese) groups to be easily included in the overall assumption of the health status of the students. An adjusted odds ratio was calculated through a backward multivariate logistic regression model and was fitted to see whether the overall health status is correlated with the three factors of gender, school grade, and region.

Scientific and Ethics approval

An approval was received from the Institutional Research Board at King Abdullah International Medical Center (SP19/105/R). Additional permission was received from the MOH in Saudi Arabia to use the data in this study. No student identification or information was provided; thus, no consent form was required.

Results

Characteristics		No.	%
Gender	Male	5,605	46.6
	Female	6,427	53.4
School Grades	1st primary	2,583	21.5
	4th primary	2,448	20.3
	1st Intermediate	3,445	28.6
	1st secondary	3,556	29.6
Region	Taif	969	8.1
	Jeddah	930	7.7
	Al-Madinah	899	7.5
	Eastern Province	842	7.0
	Tabuk	844	7.0
	Riyadh	824	6.8
	Jazan	737	6.1
	Northern Borders	664	5.5
	Najran	661	5.5
	Asir	644	5.4
	Al-Hasa	563	4.7
	Makkah	550	4.6
	Hafr Al-Batin	523	4.3
	Al-Qurayyat	442	3.7
	Al-Jouf	435	3.6
	Al-Qassim	386	3.2
	Bisha	348	2.9
	Al-Qunfudhah	301	2.5
	Al-Baha	272	2.3
	Hail	198	1.6

Table 1: Descriptive Statistics of the Study Sample

A total of 12,032 students were included in this study, 5,605 (46.6%) males, and 6,427 (53.4%) were females. The distribution into the different school grades: first primary (21.5%), fourth primary (20.3%), first intermediate (28.6%), and first secondary grade (29.6%) is shown in Table 1.

Table 2 shows the level of vaccination coverage among school students with an overall 99.4% being vaccinated, and only 0.6% of them having an incomplete vaccination record.

Vaccination	Vaccination status	No.	%
Overall vaccination	Yes	11,959	99.4
	No	73	0.6
Varicella	Yes	12,032	100.0
	No	0	0.0
MMR	Yes	12,032	100.0
	No	0	0.0
DTP	Yes	12,032	100.0
	No	0	0.0
OPV	Yes	11,842	98.4
	No	190	1.6
MCV4	Yes	1,0151	84.4
	No	1,881	15.6
Flu vaccine	Yes	5095	42.3
	No	6,937	57.7

Table 2: Vaccination Coverage among School Students

The association of BMI with general characteristics (grade, gender, and region) is illustrated in Table 3. The majority had a normal BMI (51.7%), followed by those who were underweight (29.8%); the rest were described as either overweight or obese (9.7% and 8.8%, respectively). A statistically significant difference ($P< 0.001$) was found in the rate of the distribution of BMI between males and females, with males tending to be more obese than females (58.1% versus 41.9%) but with slight difference in regard to overweight (50.1% versus 49.9%). Cross tabulation also showed significant differences in the BMI between the different grades. First-primary students scored more as underweight (28.3%), first-grade intermediate students scored more toward overweight and obesity (41.7% and 29.3%, respectively), while the first-secondary grade trended toward normal BMI (31.8%). Overweight was more common among those from western region (46%), while underweight was higher among eastern region students (34.0%), in comparison to other regions in SA ($P <0.001$).

Variables	Categories	Underweight N: 3,590 (29.8%)	Normal N: 6,219 (51.7%)	Overweight N: 1,163 (9.7%)	Obese N: 1,057 (8.8%)	P value
		No. (%)	**No. (%)**	**No. (%)**	**No. (%)**	
Gender	Male	1,613 (44.9)	2,793 (44.9)	583 (50.1)	614(58.1)	< 0.001
	Female	1,977 (55.1)	3,426 (55.1)	580 (49.9)	443 (41.9)	
School Grades	1st primary	1,015 (28.3)	1,232 (19.8)	127 (10.9)	208 (19.7)	
	4th primary	670 (18.7)	1,332 (21.4)	188 (16.2)	257 (24.3)	< 0.001
	1st Intermediate	970 (27.0)	1,679 (27.0)	485 (41.7)	310 (29.3)	
	1st secondary	935 (26.0)	1,976 (31.8)	363 (31.2)	282 (26.7)	
Region	Center	310 (8.6)	560 (9.0)	169 (14.5)	170 (16.1)	
	West	1,010 (28.1)	1,897 (30.5)	535 (46.0)	205 (19.4)	
	East	460 (12.8)	925 (14.9)	252 (21.7)	291 (27.5)	< 0.001
	North	588 (16.4)	1,787 (28.7)	83 (7.1)	125 (11.8)	
	South	1,222 (34.0)	1,050 (16.9)	124 (10.7)	266 (25.2)	

Table 3: Association between BMI and Gender, School Grades and Region

Table 4 shows that the overall computed health status of the students was 72.9% of an adequate health status, which was calculated from the sum of computed binary data, of all health variables. Twelve thousand eighteen students tested negatively for ADHD (99.9%), and only 6,219 (51.7%) had a high BMI. A strong significant association was found between most of the health variables and gender.

Variables	Categories	Total No. (%)	Male No. (%)	Female No. (%)	P-Value
Overall health status	**adequate**	8769 (72.9)	4183 (74.6)	4586 (71.4)	<.0001
	Inadequate	1422 (25.4)	1841 (28.6)	3263 (27.1)	
Vaccination	**adequate**	11959 (99.4)	5557 (99.1)	6402 (99.6)	0.001
	Inadequate	48 (0.9)	25 (0.4)	73 (0.6)	
Body Mass Index	**adequate**	6219 (51.7)	2793 (49.8)	3426 (53.3)	<.0001
	Inadequate	2812 (50.2)	3001 (46.7)	5813 (48.3)	
ADHD	**adequate**	12018 (99.9)	5602 (99.9)	6416 (99.8)	0.059
	Inadequate	3 (0.1)	11 (0.2)	14 (0.1)	
Front/Side Scoliosis	**adequate**	12009 (99.8)	5598 (99.9)	6411 (99.8)	0.120
	Inadequate	7 (0.1)	16 (0.2)	23 (0.2)	
Low Visual Acuity	**adequate**	10188 (84.7)	4914 (87.7)	5274 (82.1)	<.0001
	Inadequate	691 (12.3)	1153 (17.9)	1844 (15.3)	
Dental Caries	**adequate**	7561 (62.8)	3842 (68.5)	3719 (57.9)	<.0001
	Inadequate	3842 (68.5)	3719 (57.9)	7561 (62.8)	

Table 4: The Adequacy of Different Health conditions

Fourteen students were diagnosed with ADHD (0.1%), and 23 (0.2%) with front/side scoliosis. However, 1,844 (15.3%) of the total students were reported with low visual acuity, and 7,561 (62.8%) with tooth decay. A chi-square test was performed to test the association between the positive diagnoses of a health problem with participant characteristics. For example, strong significant association was found between ADHD and grade, where almost all were from 1st-primary grade (92.9%, $P < 0.001$). Front or side scoliosis were associated with 4th-primary grade (100.0%) and were mostly from the northern region (52.2%), with a P value <0.001 in both diagnoses. Females (62.5%), in 1st- secondary grade (36.7%), and from western region (33.7%) were reported to have higher percentages of low visual acuity ($P < 0.001$, for each variable). The prevalence of dental caries was higher among males (50.8%) and 1st-secondary grade (29.1%), there was almost an equal prevalence among students from western and southern regions (26.7% and 26.5%, respectively); however, all the variables showed a statically significant difference (P <0.001).

Variables	Categories	ADHD N: 14 (0.1%)	Front/Side Scoliosis N: 23 (0.2%)	Low Visual Acuity N: 1,844 (15.3%)	Dental Caries N: 7,561 (62.8%)
		No. (%)	No. (%)	No. (%)	No. (%)
Gender	Male	3 (21.4)	7 (30.4)	691 (37.5)	3,842 (50.8)**
	Female	11 (78.6)	16 (69.6)	1,153 (62.5)**	3,719 (49.2)
School grades	1st primary	13 (92.9)**	0 (0.0)	293 (15.9)	1,552 (20.5)
	4th primary	1 (7.1)	23 (100.0)**	325 (17.6)	1,686 (22.3)
	1st Intermediate	0 (0.0)	0 (0.0)	549 (29.8)	2,126 (28.1)
	1st secondary	0 (0.0)	0 (0.0)	677 (36.7)**	2,197 (29.1)**
Region	Centre	1 (7.1)	6 (26.1)	192 (10.4)	841 (11.1)
	West	4 (28.6)	12 (52.2)**	622 (33.7)**	2,016 (26.7)**
	East	2 (14.3)	0 (0.0)	318 (17.2)	1,029 (13.6)
	North	7 (50.0)	5 (21.7)	285 (15.5)	1,675 (22.2)
	South	0 (0.0)	0 (0.0)	427 (23.2)	2,000 (26.5)

All the**= P value < 0.001

Table 5: Association between positive diagnosis of ADHD, Scoliosis, and Visual Acuity with participant's characteristics

Table 6 illustrates that female gender was approximately 16% more likely to be prone to health problems than males (AOR: 1.163, 95% CI: 1.071- 1.263, P: <0.000). On the other hand, students of first-primary, first-intermediate, and first-secondary grade were more likely to be at risk of inadequate health status compared to fourth-primary grade (AOR: 1.443, 95% CI: 1.268-1.643, P: <0.000; AOR: 1.582, 95% CI: 1.402-1.786, P: <0.000; AOR: 1.317, 95% CI: 1.165-1.489, P: <0.000). The distribution throughout different regions of the country, showed that western region was more likely to be at risk of inadequate health status than those from other regions (AOR: 1.433, 95% CI: 1.281 -1.602, P: <0.000), as seen in Table 6.

Variables	Categories	Univariate			Multivariate		
		OR	95% CI	P value	AOR	95% CI	P value
Gender	Male	†	-	-	†	-	-
	Female	1.163	1.071 -1.263	<0.000	1.163	1.071- 1.263	<0.000
School Grades	4th primary	†	-	-	†	-	-
	1st primary	1.443	1.268-1.643	<0.000	1.443	1.268-1.643	<0.000
	1st Intermediate	1.582	1.402-1.786	<0.000	1.582	1.402-1.786	<0.000
	1st secondary	1.317	1.165-1.489	<0.000	1.317	1.165-1.489	<0.000
Region	Center	1.054	0.901- 1.233	0.509	1.054	0.901- 1.233	0.509
	West	1.433	1.281- 1.602	<0.000	1.433	1.281 -1.602	<0.000
	East	1.098	0.960- 1.255	0.172	1.098	0.960- 1.255	0.172
	North	0.770	0.677 - 0.877	<0.000	0.770	0.677- 0.877	<0.000
	South	†	-	-	†	-	-

†= Reference; OR= Odds ratio, AOR= Adjusted odds ratio

Table 6: Predictors of overall low health status among School Students Using Univariate and Multivariate Analysis

Students who were found with some health issues, during this survey, were referenced either to the corresponding primary health care center, for simple cases, or to a specialist if a more serious case was detected. The scope of this article does not allow us to elaborate more on the follow-up of students, as it aims to only report the screenshot findings and further investigation is needed to fully address the follow-up issues.

Discussion

This is a nationwide pilot study conducted in SA, which comprehensively addressed student health to include multiple health topics. The studied variables were compared with previous studies conducted in SA and at other countries. For example, components of the BMI, such as obesity (8.8%), among both genders in this study were almost consistent with findings conducted among primary-aged Saudi students at the national level in the past years (9.3%); however, this was not true for overweight, which showed marked differences (9.7% vs. 23.1%, respectively) between both studies.[20] Likewise, overweight in our study was almost similar to findings in a study conducted in both Majmaah and Tabuk city in Saudi Arabia (9.7% vs. 10.1% and 7.3%, respectively) among primary-aged students.[22, 23] In the other side, underweight, as another BMI parameter, was double (29.8%) than what has been reported by AlBuhairan *et al* (15.2%) in their study at the national level.[24] The strong significant association of BMI categorizations with gender and region was almost similar to other studies, suggesting that male gender was associated with obesity in the central region, while overweight was associated with females in the northern region of the country.[25] A recent systematic review, comparing the adolescent physical activity in SA and other countries revealed that SA females engaged less in physical activity, maybe because of limited opportunities, given the limited availability of sport facilities, a reason mostly given by the participants. [26] In another most focused study in SA schoolgirls (10-15 years old) the employment status of the parents and the family monthly income were significant factors that influenced physical activity in females, with those unemployed and less wealthy being more active. This can be explained because of the use of school buses or other private transportation methods that are common, especially for females, to upper class incomes. Nevertheless, the physical activity of Saudi females is lower than the corresponding girls in Spain or Italy but higher than girls in China. [27]

The range of dental caries prevalence in this study was 60.1% in primary students to 68.9% among secondary students, with a general average of 62.8%. Several studies conducted in the country by Riyadh, Jeddah, Dammam and Qassim have shown variations in the prevalence of dental caries among school students ranging from 69.0% to 83.0%, which is higher than what has been observed in this study.[12, 14, 28, 29] This high prevalence should be a source of attention to the public health planners toward improving the health of children. In Germany, at the age of 12, 66.8% had not yet experienced potentially caries-related treatments[30] emphasizing the need for a serious plan to focus on the multifactorial nature of dental caries and the factors associated with it.[31] Among the interventions required is the inclusion of oral health in school programs, which has shown positive results in many countries in the world by raising oral health awareness.[32–34]

Attention was paid to visual inspection in schools for the early detection of eye problems. Many students were found to suffer from eye problems as well, due to different causes, but this aspect was not deeply studied in this project. Low visual acuity was associated with being female, being a first-secondary grade student, and residing in the western region ($P<0.001$). A previous study from Riyadh, reported similar findings related to low vision acuity among secondary students,[13] which was also consistent with findings from China.[35] Remarkably, age was established as a determining factor for the occurrence of low vision acuity, and this acuity could also be highly increased as it is associated with the tremendous use of mobile applications among the current generation. Recently, many studies have reported that the increased use of digital devices by adolescents brings a new challenge of digital eye-strain at an early age.[36]

This study showed that scoliosis prevalence was low (0.2%) all cases were located among the fourth- primary grade students, with the majority being females, which is similar to the findings from a previous study conducted in south-western SA.[37] Likewise, our findings were consistent with a study conducted among Norwegian children, despite the differences in socio-cultural factors, with a prevalence of 0.55%.[38] However, a large variation was found in the reported prevalence of scoliosis from one country to another; perhaps the methods used were not similar in their accuracy, since forward bend test used to screen scoliosis, the level and quality of training on this screening may vary from region to another, depending on the potential and resources of each region which lead to miss some cases due to lack of trained staff. [39] The goal of screening is to detect those who will be at risk for developing scoliosis in school-age, with a deeper insight into scoliosis etiology.

Likewise, there was an association between ADHD and grades; almost all the positive cases were among first-primary students, which was similar to the findings of a study conducted in western SA.[21]

The vaccination program in SA is one of the best protection programs in the region, and the rate of vaccination coverage in this study was very high (99.4%), which was close to what other study reported (98%) in SA.[17]

The overall score-based level of around 72.9% was calculated in this study as students' health which was not the optimum health status for Saudi students. The composite score provided an indicator of the level of health care status, which focused mainly on health-related screened variables. Different methods could be used in different contexts to build an acceptable tool for conceptualizing health-related measures. For example, in the United State of America (USA), a Healthy Schools Act (HSA) was developed and approved, along with its components, to work in promoting school health throughout the country with the specific requirement of responding to the growing concerns of childhood obesity epidemic.[40]

The authors in this study measured the overall health status of school students by computing the sum of the binary scores for each category and subcategorizing the health status as either adequate or inadequate (75th percentile as the cut-off point). On reviewing the different literatures, no consensus was found in determining the level of health among school students with big variations in indicated variables and categories. Therefore, this method used in our study to indicate the optimum health among school students was perhaps not optimal to find the general health status, however, it can initiate a debate for examining and implementing a similar model. Some of these models could also include other components that may be applicable for assessing the status of school health programs according to each context. The overall computed health status of the students was 72.9% of an adequate health

status. Based on this outcome parameter, three variables were used to test the association between the overall health status, gender, grade, and region. The findings illustrated that being a female, residing in the western region, or being enrolled in any grade except the fourth- primary grade makes one more prone to health problems than the remaining variables, with strong statistically significant differences (P<0.001). It was clearly seen that most health problems were from the southern region, however, no clear explanation could be given yet.

In general, there is currently strong evidence of the existence of health conditions (i.e., a health barrier to learning) such as vision problems, dental pain, and mental problems that if unmanaged, can interfere with the ability to learn.[3] However, other health conditions like learning difficulties, hearing loss, and behavioral problems are not yet included in the school health program of the MOH. Although, the optimistic upcoming plan of this sector is to improve the contents of school health programs throughout the country, which will be part of the integrative health care program aiming to empower the new Saudi generation based on the country's vision 2030.[41]

Limitations

The determination of cause and effect were not the purpose of such secondary data-based studies as this study. In considering some incomplete data or purposefully not included data such as learning capabilities, disabilities, smoking survey, family history and depression, should be taken in consideration in future studies and school-children assessment to provide better understanding of the health status under examination of school-based students. Inter-observer bias was possible when conducting some physical examinations such as measuring the visual acuity, scoliosis, and ADHD tests, as well as the measure of the weight and height to calculate the BMI.

However, the sample size in this study was large enough to represent the wide variety of students in the country. The authors suggest that the data collected regularly from different areas of SA can be of use for a future longitudinal study with a good description of the risk factors reported throughout the period.

Conclusions

The results concluded that dental caries, followed by underweight, then visual acuity were the highest health problems among school students. However, the prevalence of ADHD and scoliosis was very low. The widespread prevalence of dental caries indicates the need for more research to appraise the public health implications of this developing problem. It is advisable to provide an integrative preventive health education program. A periodic examination with continuous clinical and laboratory tests would increase the diagnosis and early detection.

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Declarations

Authors' contributions

The idea of the project and writing for the project was done by NAL, as part of her master's graduation project; the data analysis and reviewing the entire project was done by AB, the main advisor.

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