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The Impact of Oral Health Care Education on Students in Sulaimanyah High Schools

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Abstract

Education plays a crucial role in most sectors nowadays. It is an important factor that facilitates the different aspects of human life and enhances students' attitudes toward life. Furthermore, there are other important study education parameters related to human health, which improve knowledge regarding how to ensure better health and prevent health issues. This can be attributed to the fact that remarkable motivations are intrinsically associated with many factors, even though education can be perceived as a main and necessary factor. This paper concentrates on dental and oral health education under a specific population, taking students from Sulaimaniyah high school, generally, and students from grades between seven to twelve, in particular, as a sample. Furthermore, the main aim of this paper is to identify the extent to which the students in schools have general knowledge of oral health and how they keep their mouths clean and safe. Also, it can predict how education in oral health can be an important factor in improving the quality of life and health of humans. The methodology followed by this paper is conducting surveys and distributing them among two high schools in Sulaimaniyah City. The results of this paper show that nearly half of the students did not have adequate educational information about oral health. Therefore, they need to go through a specific education curriculum designed for them by professionals in the same field and taught by schools as required curriculum.

Keywords: Education, oral health, dentistry, machine learning

1. Introduction

Schools play an important role in promoting the health and safety of young people and helping them develop healthy behaviours for a lifetime. Studies show that school health programs can positively affect educational outcomes, health risk-related behaviours, and health outcomes (Álvarez-Bueno et al., 2017; Freudenberg & Ruglis, 2007; Pulimeno, Piscitelli, Colazzo, Colao, & Miani, 2020). Likewise, programs primarily designed to improve academic performance are increasingly being recognized as necessary public health interventions (Arnaiz-Sánchez, de Haro, Alcaraz, & Mirete Ruiz, 2020; Dan J. Hatch, 2009; Hill, Nielsen, & Fox, 2013). Leading national educational organizations have recognized the close relationship between health and education and the need to promote health and well-being within the framework of education (Ohajunwa, 2022; Telfair & Shelton, 2012). The aforementioned sources motivated the researchers of this paper to start this kind of research.

The mission of the National Institutes of Health (NIH) has been defined as "the science in the pursuit of basic knowledge about the nature and behaviour of living systems and the application of that knowledge to promote health, prolong life, and reduce disease and disability (Kaplan, Spittel, & Zeno, 2014).

Early childhood education can help inculcate beliefs and behaviours that promote good health outcomes throughout a student's life. However, the likelihood that a child will be exposed to interventions specifically designed to inculcate those beliefs and behaviours depends on their social, educational, and economic circumstances (Cutler & Lleras-Muney, 2010).

Education plays a crucial role in most sectors nowadays. It is an important factor that facilitates the different aspects of human life and enhances students' attitudes toward life. Furthermore, there are other important study education parameters and studies related to human health, which improve knowledge regarding ensuring better health and preventing health issues. This can be attributed to the fact that a considerable number of impulses and motivations are intrinsically associated with many factors, even though education can be perceived as a main and necessary factor (Murray et al., 2012).

Comprehensive school health education includes curricula and instruction for students from pre-kindergarten to grade 12 and addresses a variety of topics such as the risks associated with the abuse of alcohol and other drugs, healthy eating or nutrition, mental and emotional health, personal health and wellness, physical activity, safety and injury prevention, tobacco use and violence prevention (Allison & Attisha, 2019; Ramirez et al., 2012). Formal and structured health education consists of a set of planned learning experiences that provide the opportunity to acquire the essential information and skills students need to make good health decisions. When delivered by qualified and trained teachers, health education helps students gain the knowledge, attitudes, and skills they need to make health-promoting decisions, achieve health literacy, adopt health-promoting behaviours and safeguard the health of others.

Presently, health education curricula and methods should adhere to national health education standards and include effective health education curricula characteristics. Holistic health education, based on the assessment of student's health needs and planned in collaboration with the community, ensures that health messages which are relevant to students and that meet the needs of the community are promoted (Darlington, Violon, & Jourdan, 2018;

Gase et al., 2017; Lewallen, Hunt, Potts-Datema, Zaza, & Giles, 2015). Here, we have compiled and structured our survey in this research work based on the fact that researchers, who examined such comparisons and found better-educated people had lower morbidity rates than the more common acute and chronic diseases, partially attributed this fact to the role played by an individual's education level and educational attainment in determining any type. From the purview of the job or profession that one possesses, which, in turn, is directly related to one's financial and socioeconomic status, education is perhaps the essential component of social and economic status. Furthermore, as it shapes future professional opportunities and earning potential, education also provides knowledge and life skills that allow educated people to access information and resources that promote their health in an improved and more seamless manner (Cygan, Tribbia, & Tully, 2020; Purnell et al., 2020).

Family involvement with schools is a shared responsibility of both school staff and families. School staff must be committed to making families feel welcome and engaging families in a variety of meaningful ways. On the other hand, families should be dedicated to providing practical support to facilitate their children's learning and development (Purwanti & Hatmanto, 2019; Vamos, Okan, Sentell, & Rootman, 2020). To contribute to family involvement, families and school staff must collaborate to support and improve learning, development, and student health. This relationship between school staff and families intersects and promotes student health and learning in multiple settings at home, school, out-of-school programs, and in the community. Family involvement must be ongoing throughout a child's life with consistent and stable commitment as children mature into adulthood (Bröder et al., 2018; Drossman et al., 2021).

1.1 Previous Studies

An investigation in a developed country like the United States of America was performed on this field of the relationship between education and dental and medical health care, and this research was examined by the Dental Education Committee of Dental Medicine School shared with the Student Affairs Office at Harvard in Boston state of USA, investigated that, there was a critical engagement between the process of school education learning and student's knowledge on oral health and dental care (Park, Donoff, & Saldana, 2017). It was mentioned that the students were critically taught, learned, and introduced to the inter-professional education program course on oral health in the final stage of high school or at their early university stage. (Bröder et al., 2018; Nakre & Harikiran, 2013) It was noted this medical background of educational experience indicated an adequate quality of assistance to supply the tools in two directions. On the one hand, giving students general knowledge helps them increase awareness and understanding of mouth health and available medical care. On the other hand, it brought future health care to medical professionals, such as dentists, who serve oral health and offer better dental care that meets the needs of the patient population than providing additional dental care to the general public overall (Bröder et al., 2018; Guven, 2017; Hendrickson & Cohen, 2001; Park et al., 2017). In these former works we mentioned above, we found that each group of researchers was used to apply their methods to assess the education level and awareness of the students on oral health care, for instance, The Harvard School of Dental Medicine (HSDM) suggested a central oral health program in its curriculum to take effect measure between related subjects: oral health and education, to conduct this, HSDM introduced to the students' number of courses entitled basic idea between oral health and

education, problem-based learning tutorial case, potential findings, issues, and treatments, pre-course survey, aspects of oral health and dental treatment. After completing these courses, students were asked to complete a questionnaire. Then an assessment of the effectiveness of education on oral health was measured, indicating that education had a crucial role in oral health and dental care knowledge progression (Bröder et al., 2018).

Besides this, it is of interest to see other previous studies, for this purpose, an article is introduced reporting that nearly around 75% of the children at school suffer from unhealthy conditions of the mouth and lack of dental care. (Movaseghi Ardekani, Ghaderi, Kaveh, Nazari, & Khoramaki, 2022) This again exemplifies supporting that oral education lesson plays a constructive role in the life of adolescent students at schools which causes an increase in understanding, knowledge, and information on dental care, in addition, it is vital to begin with healthy habits in the early ages. This article also showed that students with high literacy on oral health generate fewer dental problems. Referring to the methodology of this previous study that was done five years ago, Ardekani carried out his work in 2017, theory-based educational intervention assumption was undertaken, randomized controlled trial was applied, this was done to look into education effect relating to medical oral education literacy behaviours on high school students, two questionnaires were employed depending on PMT (Proxy Means Testing) constructs. The first survey form was given to the attendance to be filled to determine information on demography, knowledge, and awareness of students forward dental health care. However, the second questionnaire form was applied to measure student literacy on oral health. The participants were asked to complete the questionnaires before and after a training course.

Then collected data were processed, and this estimated students' knowledge rate of dental care (Guven, 2017).

1.2 Aim of This Study

The main intention of this paper is to find out whether adolescent students have at any time received adequate education knowledge throughout the year of study in school curriculum programs with proficient content of learning to keep their mouths and teeth healthy. Also, find out how family education support and student self-pre-knowledge education can increase the significant impact on oral health care.

2. Methodology

A survey technique comprising five questions, which were related to the main study outcomes, was used in this paper. This questionnaire form was designed for class level tenth, aged 16 years old, chosen among the age range from 13 to 18 years old, as our sample data in our study. A population of 100 individuals and two high school students from both genders (51 males and 43 females, 5 left blank and one missed) were taken. They individually completed the form face to face under the agreement and supervision of the school manager. Thus, students answered all the survey questions, and the school's manager collected all answers to keep the process transparent and remove any bias during data collection.

All survey questions were oriented to either 'Yes' or 'No' answers, except for the following question: What number of times do you wash your mouth in a day? The explanation for this question had an integer data type and ranged from 0 to 3 times per day. The remaining questions posed queries regarding the extent to

which students in schools know about oral health as technology, family information and schools, and other sources and knowledge. The total number of data observations was found to be 206.

After data were collected, they were loaded into the machine learning and classification models, and the two models will use **Logistic Regression** and **Decision Tree Classification**. The reason behind the classification model is that these models find whether a student is healthy or not by using binary classification – 0 and 1. Both methods are used to analyse data, which work on predicting the outcome respectively. The reason is that the process is applied mainly for data classification in the form of binary classification.

The two most commonly used models, Decision Tree and Logistic Regression were also used to facilitate improved performance and choose the highest accuracy results.

During the process, the dataset is before going into the specified models, and to get high accuracy results, the content feature data convert into numbers rather than 0 and 1 only. This is accomplished using the label encoding technique, which prevents the data from being plotted and arranged in the wrong methodologies and methods.

In addition, cross validations and metric methods are used to check the results of availing high accuracy of prediction. In addition, to make the checking results more efficient and see the number of correct and false predictions and precisions, the confusion matrix has been used. Figure 1 shows the different stages and processes of the working model.

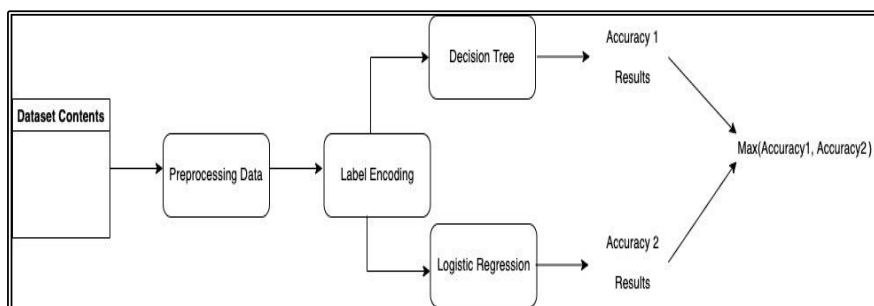


Figure 1: Model structure.

3. Results and Discussions

Regarding our investigation, at the beginning of this part of the research result explanation, it was noticed that the number of both genders who received the questionnaire form was 53 males and 47 females out of 100 individuals. Still, after the process completion, we determined that the total number of students who responded, meaning that they filled out the form, was only 94 individuals, and the rate was 54.3%. The female rate was 45.7%, as shown in Table 1 and Figure 2. In addition, 5 individuals out of 100 chosen samples were not responded at all, which was 5%, and 1% of the total samples were missed.

Table 1. Information on survey participation rates.

Gender	Number of Students	Responded	Left Blank	Missed
Female	47	43	3	1
Male	53	51	2	0
Total counted	100	94	5	1

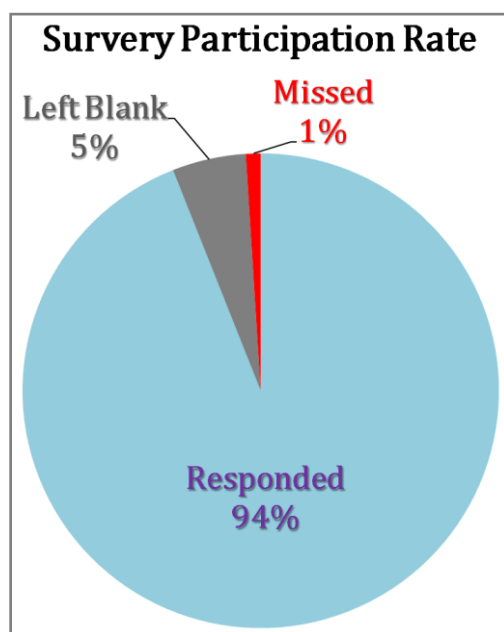


Figure 2: The pie chart of total student participation for both genders.

In addition, this work demonstrates that most male student responses exhibited a lack of oral health knowledge, nearly 53%. In contrast, only 40% of female students chose to be inadequate cognition to the oral health education care. It is of great interest that the overall percentage of family support rate was approximately (91%). This could be appreciated to a great extent and very worthy, but such kind of encouragement would be non-professionally supportive of raising their students' background knowledge in education related to oral health and dental care. We noticed that there was no specific yearly consistent lesson in the student's school curriculum program that taught them education impact on oral health and dental care subjects. A summary of the results is placed in Table 2.

Table 2: Results summarization of students' knowledge related to oral health.

<i>(1) Family knowledge and role in oral health education</i>		
Gender	Family factor rate	
Male	92.2%	
Female	90.7%	
<i>(2) Student's self-general knowledge rate on oral health care</i>		
Gender	Rate of having knowledge	Does not have any pre-knowledge
Male	47.1%	52.8%
Female	60.5%	39.5%
<i>(3) Answers from both genders: Existence of any school program lessons on oral health</i>		
Gender	Exist	Not Exist
Male	0%	100%
Female	0%	100%

In this study, we processed the data by applying two mathematical equations (Logistic Regression and Decision tree)

models. The obtained results from both equations utilized in this paper showed the high accuracy of the resulting model after testing the model in different steps. The Logistic Regression result is 92 per cent, whereas the Decision Tree result is 99 per cent. The difference in the percentages can be attributed to the fact that the Decision Tree model goes much more into the depth of the data classification and further split, thereby always providing high accuracy. This indicates that using data pre-processing for cleaning and predicting the data is relevant in both Logistic Regression and Decision tree equations.

In addition, the results that were mathematically calculated from both algorithms equations, which are logistic regression and decision, show that a healthy mouth and teeth are related to two main observations to a greater extent, namely the number of times per day the students washed their mouths and students' general knowledge about oral health and how to keep their teeth healthy. The remaining inputs, namely using technology for acquiring available health information and family information and advice, also influence the results, especially in terms of increasing the accuracy of the inputs.

However, no model can provide perfect accuracy results yet. This, in turn, means that the model and algorithm techniques work more in data analysis and summarize the data to provide the output. Therefore, by using this process, models work on preventing wrong accuracy and precision results. This can be done using the confusion matrix table chart, which comprises four main parts: True Positive, False Positive, True Negative, and False Negative. Figure 3 shows a few wrong predictions, such as being 0s, but predicted 1s is only two while predicting 1s but being 0s is only 3.

In addition, data separation was based on providing a percentage of the original data to the test data, that is the amount of data given to the model to test the performance of the model.

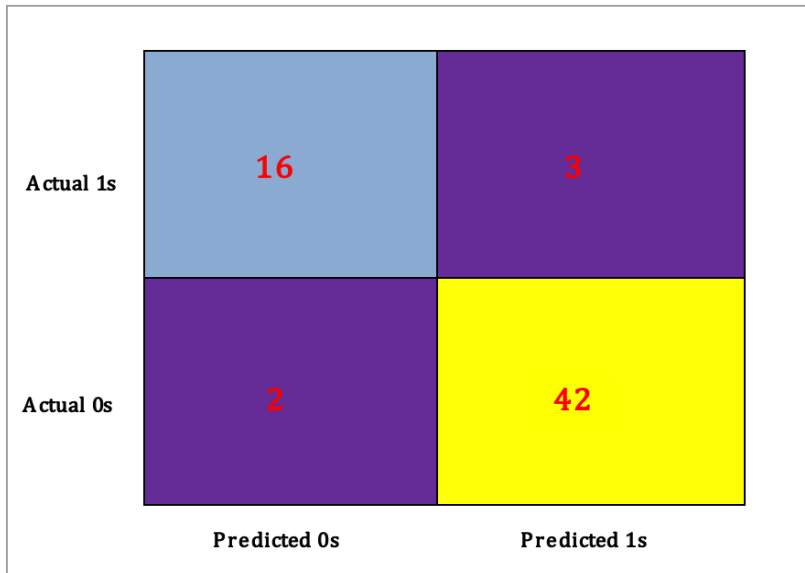


Figure 3: Accuracy results of the model prediction.

4. Conclusion

This paper has shown that about one-half of the total high school students chosen responded to a personal lack of education relating to oral health information. In contrast, our constructive outcome is that almost the majority of all families supported their adolescent students excellently to be aware of dental care matters. This family effort is commendable and highly appreciated, but unfortunately, it is less academic and insufficient to systematically

contribute knowledge to the students. Therefore, we suggest that the educational sectors edit an annual plan to consistently provide additional academic courses in high school programs to teach and educate students about oral health and dental care topics. This, in turn, will enable students to considerably provide cascade information about their oral health and protect the oral health of their family members and their society.

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الخلاصة:

التعليم يشغل دورًا حاسمًا في معظم القطاعات في الوقت الحاضر. فهو عامل مهم يسهل جوانب الحياة الإنسانية المختلفة ويعزز اتجاهات الطلاب نحو الحياة. علاوة على ذلك، هناك معايير تعليمية مهمة أخرى تتعلق بصحة الإنسان، والتي تعمل على تحسين المعرفة فيما يتعلق بكيفية ضمان صحة أفضل ومنع المشكلات الصحية. ويمكن أن يعزى ذلك إلى حقيقة أن الدوافع الرائعة ترتبط ارتباطًا جوهريًا بالعديد من العوامل، مع ذلك، يمكن اعتبار التعليم عاملاً رئيسيًا وضروريًا. تركز هذا البحث على التنقيف في مجال صحة الأسنان والفم ضمن مجموعة سكانية محددة، باخذ طلاب مدرسة السليمانية الثانوية بشكل عام والطلاب من الصفوف ما بين السابع إلى الثاني عشر بشكل خاص كعينة. علاوة على ذلك، فإن الهدف الرئيسي من هذا البحث هو تحديد مدى امتلاك الطلاب في المدارس للمعرفة العامة بصحة الفم وكيفية الحفاظ على أفواههم نظيفة وآمنة. كما يمكن التنبؤ بكيفية أن يكون التعليم في مجال صحة الفم عاملاً مهماً في تحسين نوعية حياة وصحة البشر. المنهجية المتبعة في هذه العمل هي إجراء المسوحات وتوزيعها على مدرستين ثانويتين في مدينة السليمانية. تظهر النتائج أن ما يقارب من نصف الطلاب ليس لديهم معلومات تعليمية كافية حول صحة الفم. ولذلك، فإنهم بحاجة إلى الخضوع لمنهج تعليمي محدد مصمم لهم من قبل محترفين في نفس المجال ويتم تدريسه من قبل المدارس حسب المناهج المطلوبة.

پوختە:

لەم سەردەمەدا پەرودە لە زۆربەى كەرتەكاندا رۆلێكى چارەنووسساز دەگێژێت. ھۆكارێكى گرنگە كە لایەنە جۆراوجۆرەكانى ژيانى مەرف ئاسان دەكات و تێرپوانى خوێندكار بەرامبەر بە ژيان بەرز دەكاتەو. جگە لەوێش پەرودەكانى ترى پەرودەى گرنگ ھەن كە پەرودەى پەندىيان بە تەندروستى مەرفەو ھەيە، كە زانىارى سەبارەت بە چۆنىەتى دەستەبەركردنى تەندروستى باشتەر و خۆپاراستن لە كێشە تەندروستىيەكان باشتەر دەكەن. ئەمەش دەتوانرێت بگەڕێتەو ھەو ئەوێ كە پالەنرە گەرەكان لە بنەردا پەرودەى پەندىيان بە چەندى ھۆكارەو، لەگەڵ ئەوێشدا دەتوانرێت پەرودە بە ھۆكارێكى سەرەكى و پێويست ھەژمار بكرێت. ئەم تۆيژنەو ھەيە تیشكى خستە سەر پەرودە لە بوارى تەندروستى ددان و دەم و ددان لەناو گروپێكى دانىشتوانى ديارىكراودا، قوتابىيانى قوتابخانەى ناوەندى سلیمانى بە گشتى و قوتابىيانى پۆلى ھەوت تا دوانزە بەتایبەتى ھەك نمونە وەرگىرا. جگە لەوێش ئامانجى سەرەكى ئەم تۆيژنەو ھەيە ديارىكردنى ئاستى خوێندكاران لە قوتابخانەكاندا زانىارى گشتىيان ھەيە لەسەر تەندروستى دەم و ددان و چۆنىەتى پاك و خاوينى و سەلامەتى دەمیان. ھەرودە دەتوانرێت پێشبینى بكرێت كە چۆن پەرودەى تەندروستى دەم و ددان ھۆكارێكى گرنگ دەبێت بۆ باشتركردنى كوالىتى ژيان و تەندروستى مەرفەكان. ئەو مەتودۆلۆجىيەى لەم كارەدا بەكارھاتوو ھەيە برىتيەى لە ئەنجامدانى راپرسى و دابەشكردنى بەسەر دوو قوتابخانەى ناوەندى لە شارى سلیمانى. ئەنجامەكان دەريدەخەن كە نزىكەى نىو ھەيە خوێندكاران زانىارى پەرودەى تەواويان نىيە سەبارەت بە تەندروستى دەم و ددان. بۆيە پێويستە خوێندكارەكان بۆيان دىزاینكرى پەرودەى پەرودەى تەندروستى دەم و ددان لەلایەن كەسانى پەرودەى ھەمان بوارەو، و بكرىت بە بەشەوانە و بچەسپىنرێت لە مەنھەجى خوێندنى قوتابخانەكاندا.