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## Indices of attitude towards smoking in school children in risk groups

### Abstract

*The objective of this research is based on the case study of a group of school children who are at risk of consumption due to smoking and the attitudes shown before and after a pre-experiment, through weighted indices for their evaluation. Different methods and instruments were applied at the empirical level, such as document analysis, observation, and analysis of the products of the activity, descriptive statistics and Chernoff's faces, as a statistical tool to process in a human face scheme the changes in the schoolchildren at risk. The analysis and discussion of the results in the initial and final stage was expressed through the control and evaluation of the variables in the quantitative and qualitative order with the purpose of guaranteeing the validity of the results on the risks of smoking.*

*Keywords:* schoolchildren, risks, smoking, index, attitude

### Introduction

Six million people die every year on the planet from non-communicable diseases such as smoking. Based on the elements discussed in the international health assemblies, strategies are designed to improve lifestyles, prevent preventable diseases and rehabilitate people, provided that the conditions are right.

The World Health Organization (WHO: 2010), defines smoking as a disease -chronic, no communicable and addictive addiction, and also the consumption of tobacco in developing

countries is a public health problem whose initiation usually occurs in adolescence, a situation that culminates in the fact that in adulthood more than half of its components have a smoking habit.

Actions to be taken to prevent smoking should involve teachers, parents, social organizations, teachers professional health care, and even students of medical science. In the action of the latter, extension activities play a starring role. (Llopiz: 2018)

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For these reasons it is necessary to act from a transformative vision from education which ensures better control, mitigation and solution to this problem, which allows the formation of a healthy personality, efficient and responsible, but this requires the implementation of measurable actions to assess the changes produced from educational actions and interventions that can be measured by science for the tangible achievement of its transformation.

The eminently social nature of education and its relationship with the cultural preparation of people, and the necessary consideration of the environment in the professional preparation of teachers to provide quality education, makes it necessary to work in this direction with a view to solving specific problems linked to social practice (Llopiz: 2019)

Index numbers are the basic instrument for synthesizing economic statistics so that the formulas used can express and describe, for example, the economic growth of a country, the mortality of populations, the inflation rate of an economy, in order to make international comparisons and can also be used to carry out studies of communicable and non-communicable diseases such as smoking, mortality and prevention.

Hence the importance of knowing the formulas that are used, and that countries and international organizations promote common practices that harmonize and standardize measurements. (Dorin: Perrotti and Goldszier, 2018).

Conceptually, an index number is defined as a statistical measure that makes it possible to study fluctuations or variations of one or more magnitudes in relation to time or space. The most common indexes are those that make comparisons over time, so some specialists consider them to be time series. (Crespo, 2005)

An Index number is a statistical measure that allows us to study the changes that occur in a simple or complex magnitude with respect to time or space (de la Fuente, 2018), the main interest of the weighted Indexes is the fact of being able to highlight or attenuate the influence of the different quantities according to some external criterion. (UAM, 2017).

Although the indices were created to explain economic phenomena and those of the so-called exact and natural sciences, at present in the social sciences or in others related to these, the indices are proliferating; to cite only a few, there is the Pearl index to measure the effectiveness of contraceptive methods in clinical studies with incidence in a social problem of great importance at present, but there are others such as the human development index (HDI) developed by the United Nations Development Programme in which it takes into consideration life expectancy

at birth, levels of education, among others; but there are also indices of global peace, sustainable development, poverty, literacy, gender parity, perception of corruption, longevity, standard of living, life satisfaction, quality of life. (UNDP, 2017; Hassanet al, 2019).

Among the latter, smoking and its effects are studied and analyzed within these human development indices, which are comprehensive, systemic, multifactorial and proactive in nature and must be based on a triad that takes into account the strengthening of self-esteem, adequate information and life skills.

The HDI emphasizes that people and their capacities are the most important criteria for evaluating the development of a country, and not only economic growth (UNDP, 2017).

Indices have been proposed to determine the quality of the use of computer resources in the classroom and the Index of the Integral Level of Quality of Learning (INICA) (Crespo, 2005).

Index numbers in practice provide information on different aspects of a population's achievements and, more importantly, there is no need to choose between them. Rather, they complement each other (UNDP, 2010, Alkire and Santos, 2014). Quoted by Burgos Dávila, Sebastián; Cando Ortega, Fernando (2016)

In this "systemic process of data collection" and in obtaining valid and reliable information for each one of the variables "used to make value judgments about the state of educational quality", the indices play an important role; thus, we speak of attendance, class quality, illiteracy, etc... (Crespo, 2002)

As tools to evaluate the weighting of these indexes, the Chernoff Faces statistical tool is used in the research, which allows processing variables or dimensions from the developed influences into a human face scheme.

Depending on the values that the variables take, the expression of the specific semblant will be. Due to its unique characteristics, it is considered by some researchers as a last exploratory in the technique of multivariate statistics. It has been proven that this technique is capable of revealing hidden patterns and showing interrelations between variables that have not been revealed by other multivariate techniques. (Statistical, aid, 2006) Therefore, the objective of the present research is expressed in analyzing the attitudes obtained by a group of school children in groups at risk of smoking through a case study, which allows changes to be measured by means of weighted indices for evaluation.

## Materials and Methods

Tobacco should be approached in this way. Although its harmful consequences for health are known, it seems impossible to put an end to it,

since numerous variables are interrelated that place us before a problem that is certainly complex. But there is no doubt that we are faced with an issue that must be present in the educational field. (Morón, 2001; SAFDARI, et al, 2013).

In order to plan the experimental intervention, an analysis of the population used in an initial pilot project with 56 schoolchildren was carried out, and a group of fourth graders was selected on the basis of the declared needs.

The evaluation of the initial state of the schoolchildren in groups at risk of smoking, based on their knowledge and the development of their attitudes towards smoking, allowed, from the initial diagnosis, a quantitative evaluation of the indicators of the development of anti-tobacco education achieved by the schoolchildren.

The evaluation of the behavior of the application of the methods and instruments used for the initial diagnosis of school children in groups at risk of smoking was aimed at: the application of knowledge in pedagogical practice and the behaviors they assume in the face of different manifestations in the school and in the place where they live.

The dimension is revealed: the attitude assumed by the subject regarding the risks of smoking.

Indicator 1: Experiences of schoolchildren in relation to the risks of smoking.

Indicator 2: Interest shown by schoolchildren in learning about smoking and its risks.

Indicator 3: Verbal and extra verbal rejection of smoking

The research considered for the measurement of these indicators through the expressions of the faces of Chernoff and his protocol of analysis, where it is expressed in a symbolic way to point out the student with the capital letter A, # and the number in question as a school sample, as codified by this statistical application.

The study and analysis of faces is done through the width of the face, the level of the ears, the average height of the face, the eccentricity of the average and lower height of the face, as well as the length of the nose.

These elements were measurable in order to verify and evaluate the attitudes assumed by the students about knowledge, risk, experiences and imitation of smoking.

In addition, the low, medium and high levels allowed for the measurement of the changes

produced before and after the application of the activities in the psycho-pedagogical order with the students.

For the integrative evaluation of the indicators, it was determined that the low level includes two low indicators, the medium level includes three or more medium indicators, and the high level includes three or more high indicators.

The indicators of the development achieved by schoolchildren in groups at risk from smoking were systematically evaluated during the development of the different organizational forms in the teaching order, as well as extra-curricular and extracurricular activities carried out with them.

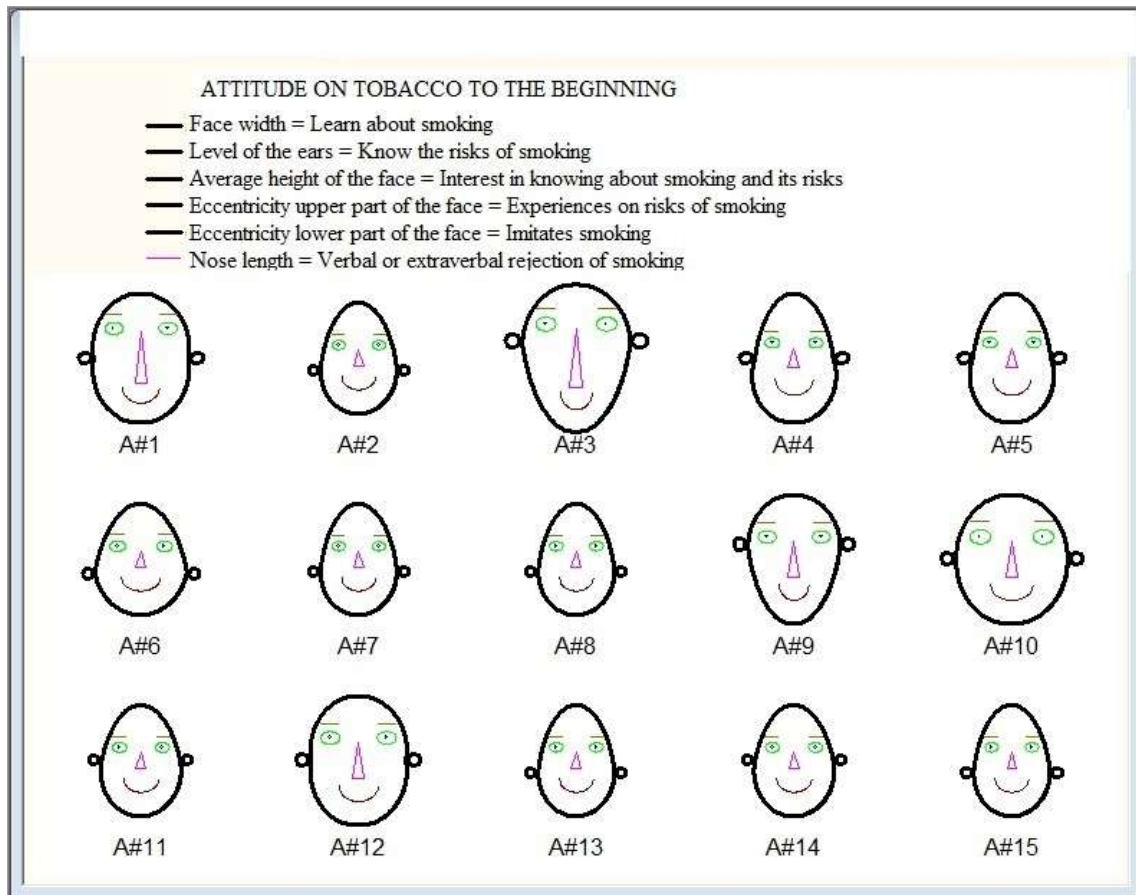
Different instruments validated from a preliminary stage were applied to measure how they behave. Among the methods at the empirical level, document analysis was used, with the objective of organizing and systematizing the sources of information according to the object being studied, observation, analysis of the products of the activity and pedagogical testing at the initial stage where there is no evidence of a systematization of results in the scientific order, which would declare the ways of working in relation to this problem.

By establishing the relationship between the study of normative documents, the results of observations of classes and extra-curricular and extracurricular activities and subjecting them to empirical verification, it became evident that the shortcomings had a negative influence on the direction of the process, on the learning and behaviour of the students.

In order to establish the statistical tests to be applied, it was taken into account that these are dependent samples from a pre-experiment (the same group before and after), including the indices and their weighting by applying the Chernoff's faces statistical tool in the initial and final stages.

exist in the literature different studies that use the Chernoff's faces in multivariate analysis in different areas of knowledge as are marketing (Pitt, Mills, Chan, Menguc, & Plangger, 2011), the design of products (Garneau et al., n.d.), the analysis of conglomerates (Fukumori, 1990, 1995), among other applications. (Ocampo García, J, Ospina Betancur, J. :2013)

To diagnose and evaluate attitudes towards smoking in that age group of schoolchildren as shown in Figure 1.



**Figure 1.**

*Attitude towards smoking at the beginning of the pre-experiment in schoolchildren in risk groups.*

As part of these experiences, high levels of imitation of the smoking habit were reflected, especially at the time of the break and when expressing that when their relatives smoked, they inhaled the smoke and thus seemed to consume cigars. One schoolboy stated that his mother not only smoked but also sold cigarettes at home and he took some to share with friends on his block.

In view of the interest shown by the schoolchildren in learning about smoking and its risks at the beginning, the reasons for encouraging the schoolchildren to seek knowledge about smoking and its risks were very limited, since they saw this fact as normal in their lives, since more than 50% of the students have a low level and only one student reached a high level.

When analyzing the numerical characteristics of fashion and the quartiles of order 25, 50% reached the low level, which reaffirms what was described.

For what the rejection expressed in verbal and extra verbal form before the smoking at the beginning, they expressed manifestations of rejection before the smoking 2 students, from the familiar influence, were considered in a high level, 3 in a medium level and 10 of them (66, 7%), present a low level before the rejection for

having incitements to the consumption, tolerance and acceptance to the same one.

This information can be seen from the application and analysis of the faces of Chernof shown in Figure 1, where A#1 and A#3 are those who know most about smoking and its consequences, but do not have an attitude of rejection of consumption based on the indicators proposed.

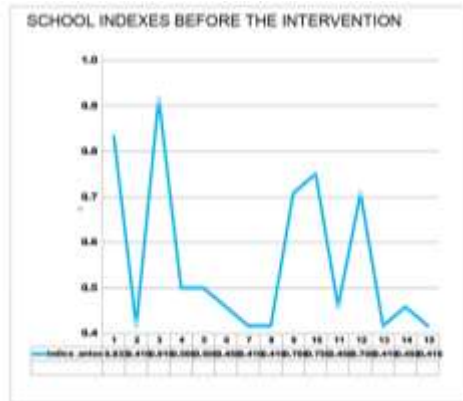
In the case of A#6 and A#13 they have similar behaviors, with interest in learning, A#7, A#8, A#9, A#10, A#11, A#14, A#15 are the ones that most denote the need to change experiences and attitudes towards smoking and its consequences.

School children A#1, A#2, A#4, A#5 and A#12 do not reject tobacco and at this early stage.

The polygonal graph presents the description of the pre-experiment behavior, before the application of the pre-experiment. It reflects the integral analysis of all the instruments applied when performing the triangulation of the results methods in the quantitative order.

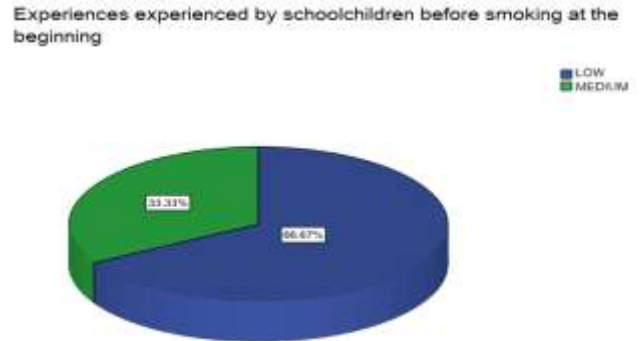
In the pre-test; in blue, after evaluating the indicators, 2 school children were left at a high level (13.3%), 3 at a medium level (20%), and 10 at a low level (66.6%).

All of these data are demonstrated by the low rates achieved in the initial stage of the research shown in Figure 2.



**Figure 2.** Anti-smoking education rates of school children before the application of the Preexperiment

to the risks of smoking, it is concluded that their interventions were very limited, so much so that 10 of the 15 students showed a low level (66.67%), medium (33.3) in this sense and none of them high. As shown in the pie chart. (Figure 3)



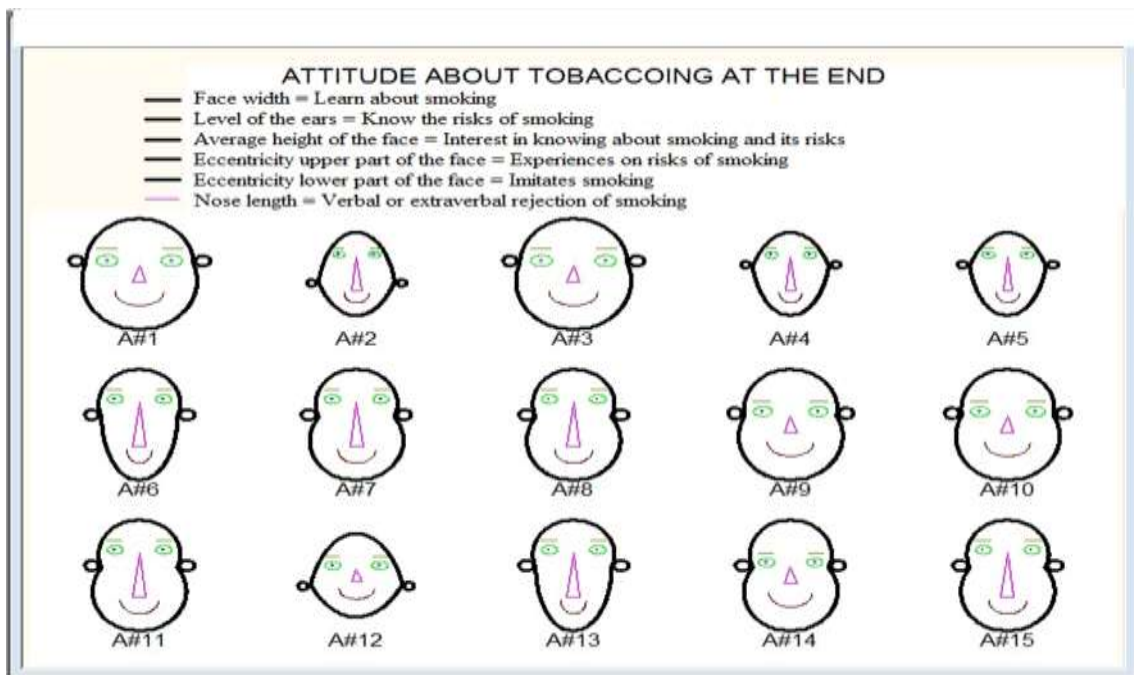
**Figure 3.** Once the instruments and the triangulation of methods were applied in the initial diagnosis, it was found that the development achieved by school children in groups at risk of smoking remained at low levels, and only in indicator 1 was a trend towards a high level in two school children, since they knew that smoking was a disease, for 13.3%. It is evaluated that the indicators, mostly when applying this diagnosis, the evaluation indices are low, corresponding to the results of the pretest, which is shown in Figure 4.

**Table 1.** The statistical processing of the pre-test results is expressed in the frequency table 1.

Experiences of school children in relation to the risks of smoking at the beginning

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LOW	10	66.7	66.7	66.7
	MEDIUM	5	33.3	33.3	100.0
	Total	15	100.0	100.0	

If it is concluded that when evaluating the experiences experienced by the students related



**Figure 4**

*Attitude towards smoking at the end of the pre-test in school children in risk groups*

The following results were obtained by applying the educational actions with the schoolchildren from the pre-experiment:

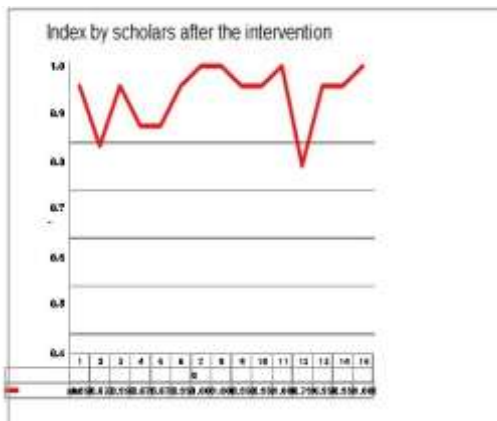
When evaluating the attitudes of school children after applying the educational actions on smoking and its consequences on health, Chernoff's faces of and their corresponding indexes are analyzed, where it is corroborated that A#1 and A#3 are the ones who know and act the most about the rejection of smoking.

Similar behaviours have A#6 and A#13 and they denote with interest to learn, they improve in all their behaviours referred to the subject.

Both A#7, A#8, A#9, A#10, A#11, A#14, A#15 have a radical change when faced with smoking and A#2, A#4, A#5 make modest changes for the better, fundamentally in the rejection of smoking.

A#1, A#12 know about this issue but remain at a medium level and A#14 improve in all their rejection actions.

In the polygonal graph (Figure 5), the comparison of the weighted index per schoolchild appears, where the progress of the whole group can be seen once again. This graph reflects the integral result of all the instruments applied in the Educational Program, evaluating the indicators that have been measured during the application and validation of the pre-experiment, from the changes produced also in the post-test evaluating their indicators, which are shown in red, where finally 9 schoolchildren remained in a high level, for a (60.0%), and 6 in a medium level for a (40%), and no schoolchildren remained in the low level.



**Figure 5.** *Anti-tobacco Education Rates of Schoolchildren after Application of the Preexperiment*

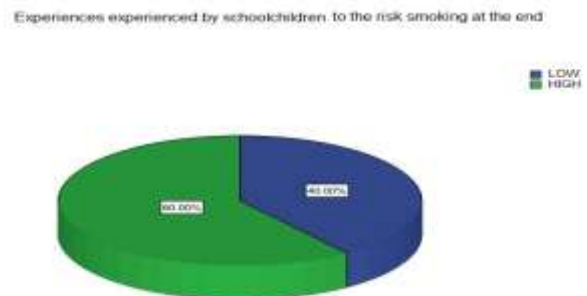
The statistical processing of the post-test results is expressed in the frequency table 2.

**Table 2.**

Experiences of school children regarding the risks of smoking at the end

		Frequen- cy	Perce- nt	Valid Perce- nt	Cumulati- ve Percent
Valid	MEDIU M	6	40.0	40.0	40.0
	HIGH	9	60.0	60.0	100.0
	Total	15	100.0	100.0	

During the post-test, the experiences of the experienced students, related to the risks of smoking, showed a higher level, in addition to expressing the support that their parents began to give them with these activities in their homework and in their extracurricular activities, with 60% of them at a high level and none of them at a low level. Of the 10 who initially had a low level on this indicator, in the end, 5 passed to a medium level and 5 to a high level, and the other 4 with a medium level at the beginning reached a high level as shown in Figure 6.



**Figure 6.**

**Results and Discussion**

Through the application of the methods and materials used, the attitudes manifested by the schoolchildren at risk of smoking were determined, as well as the ways in which tolerance, acceptance and lack of preparation for learning and behaviour in the face of smoking were corroborated from the initial diagnosis.

To carry out the measurement itself, the Descriptive Statistics were used and it was necessary to determine an index from the indicators of Anti-tobacco Education that were established for the research.

The index that is presented as a practical result of the research allows for the measurement of the impact before and after on the changes that occurred in the Anti-tobacco Education acquired by the students.

In this case, the need for this weighting is justified because the indicator: Verbal and extra verbal rejection of smoking should express the

greatest aspiration for schoolchildren to develop the beginning of a consolidation in the processes that form Anti-tobacco Education from the system of educational influences exercised when applying the proposal.

The expression of calculation of the index sought responds to the formula:

$$\frac{(\sum_{i=1}^4 IND_{-i}) + 3 IND_{-5}}{21}$$

It should be noted that division by 21 expresses the greatest possible sum of the simple indices that make up the composite index under study.

With this index a value between zero and one is obtained, corresponding to zero a null Anti-tobacco Education and one as a rejection to smoking in a more optimal way.

In the application of this index, it is possible to have a first approach to the situation that each student presents individually with respect to smoking and the average of these indices, accompanied by the corresponding variation coefficient, can be an indicator of the global situation of the group of study, from which one can go to the qualitative investigation of each student and of the system of influences that surrounds him/her.

In the process of research, this index contributes to knowing in depth the magnitude of knowledge and behaviour shown by the schoolchildren in terms of smoking, where comparisons can be made before and after applying the activities in the research and having an individual and global vision of the group studied that can be shown in a graphic way in later moments of the work.

In order to measure and assess whether the change produced by the indices has been significant, they also favour this analysis.

From the indexes, statistical processing is facilitated, which would have been more difficult without having the indicators grouped in the way they are presented previously. On the other hand, it is possible to appreciate the change that took place in the schoolchildren before and after applying the research in a graphic way.

All of the analyses expressed above led the authors to apply the Chernof indices and faces at different points in the research.

Once the instruments and the triangulation of methods were applied in the initial diagnosis, it was found that the development achieved by the schoolchildren in groups at risk from smoking remained at low levels, and only in indicator 1 was a trend towards a high level in 2 schoolchildren, since they knew that smoking was a disease, for 13.3%. It is evaluated that the indicators, mostly when applying this diagnosis, the evaluation rates are low.

The behaviour of the application of the knowledge and exchange checks with the

schoolchildren during this stage showed that, out of 15 schoolchildren, 7 are at a high level for 46%, in 3 schoolchildren the results are at a medium level for 20% and the remaining 5 at a low level for 33.3%, offering them greater intentionality in their actions.

When evaluating the experiences experienced by the students related to the risks of smoking, the conclusion is reached that their interventions were very limited, so much so that 10 of the 15 students demonstrated a low level (66.67%) in this sense and none a high level.

Based on the emotional experiences and patterns of imitation in the face of consumption, actions were intended to encourage stimulation and interest in the damage caused to men by this addiction, which helped the schoolchild understand and establish comparisons between addicts and people who do not consume cigarettes. These traits allowed the schoolchildren to acquire knowledge that is evident in the verbal and extra verbal rejection of the influence received.

For this final evaluation, different methods and instruments were applied: analysis of the product of the schoolchildren's activity, the pedagogical test and the completion of sentences based on the experiences obtained.

As an expression of the attitude that the subject assumes about the risk, when evaluating at the end the rejection expressed in a verbal and extra verbal way before smoking, the 15 students (100 %), reject this consumption from their manifestations expressed in the pedagogical test, which collects the information in a consensus of evaluating in their opinions a marked rejection before smoking at a high level, so the 10 with a low level, and 3 with a medium level at the beginning reached, at the end, the high level, which demonstrates at a descriptive level the effectiveness of these weighted indicators.

When the results were tabulated, it was possible to evaluate the final state in which n (60%), showed attitudes of rejection of smoking, which revealed a positive change in terms of emotional bonding to the attention offered from the areas of education and family.

A final analysis of the product of the activity, also evaluated from the indicators in the results of teaching activities, and demonstrations in extracurricular and extra-curricular activities showed that, when applied, there was a very favorable change in the schoolchildren from the knowledge acquired and the rejection behavior expressed to the extent that they were involved in these activities, discovering potential and skills in several areas in them.

The weighted index per schoolchild at the end of the applied research is shown through the application of the pre-experiment, where the

progress of the whole group is once again observed.

With the initial, systematic and final control in the research, the validity of the results obtained by the students in the assimilation of knowledge and behaviour is guaranteed in terms of developing an attitude towards smoking and its effects.

## Conclusion

By applying an educational influence on smoking from the school in the form of pre-experiment, applying instruments and statistical tests to validate its implementation and results on smoking in schoolchildren in risk groups and its effects, they can appropriate a set of conceptual, procedural and attitudinal knowledge, with a preventive character, resulting in a rejection of consumption.

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