

Determinants of Adherence to Dental Treatment of Adolescents in Social Vulnerability in Primary Care

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Research article

Keywords: Treatment Adherence and Compliance, Adolescents, Social Vulnerability

Posted Date: May 18th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-27477/v1>

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Abstract

Background Different studies with adolescents refers to the difficulty they have to adhere to oral dental treatments. Therefore, better understanding the processes involved in adherence to treatment in this population is necessary. The aim of this study was to investigate the factors that influence adherence to dental treatment in social underprivileged adolescents in primary care.

Methods A longitudinal analytical study was conducted in Piracicaba, São Paulo, Brazil, between 2014 and 2015. The sample consisted of 1179 adolescents whom were examined in family health units, these 474 were referred for treatment (40,2%) and these 325 (68,6%) teenagers were reevaluated after 18 months. Adherence to dental treatment was the dependent variable. Independent variables were: individual (clinical, socio demographic, access to the service, reporting pain, oral impacts on daily performance, family cohesion) and the contextual (percentage of families in the neighborhood with income of 0.5 to 1 minimum wage).

Results Non-adherence rate to treatment was high in the studied sample (49.5%). Family income ($p = 0.039$) and household crowding ($p = 0.003$) were associated with non-adherence to dental treatment.

Conclusions It is concluded that the condition of social vulnerability of adolescents resulted in competing situations with adherence, a fact that makes it difficult dental treatment and action planning health services.

Background

Adolescents are a population exposed to the risk of developing major oral diseases as dental caries and periodontal disease. However, a similar aspect in studies with adolescents refers to the difficulty they have to adhere to health treatments[1]. Regardless of the disease, the teenager has more difficulty in adhering to treatment than younger people[2]. Therefore, better understanding the processes involved in adherence to treatment of diseases prevalent in this population is necessary.

In recent decades, there has been a change in the epidemiological profile of dental caries in developed and developing countries[3]. In Brazil, the same trend was found with a significant 35% reduction in decayed teeth in children and adolescents, between 2003 and 2010 [4]. Despite the reduction of dental caries prevalence in Brazil, the polarization of caries disease[5] with greater concentration of high levels of the disease is observed in underprivileged socioeconomic groups[6].

In addition to dental caries, other oral disease worrying at this stage of life is the periodontal disease. The World Health Organization (WHO) recently reported that most children and adolescents shows signs of gingivitis [3], where the prevalence is up to 80% in adolescents[8]. According to the latest Brazilian national survey of oral health, more than half of adolescents from 15 to 19 years old have signs of the disease such as bleeding (9.7%), calculus (28.6%) and periodontal pockets (10.8%)[9].

Multiple factors involved in the establishment and progression of oral diseases can be cited such as social, cultural, behavioral and economic determinants. Therefore, considering aspects related to the etiology of socioeconomic inequalities is possible, represented by differences in income, lifestyle and access to health[10].

Thus, it is important that the health system makes available access to treatment of oral diseases that affect the adolescents' health. However, offering only access to dental appointment does not guarantee the individual's adherence to treatment. Adolescents' relations with their family and social environment they live in and their living conditions can facilitate or hinder adherence to treatment [11].

The literature reveals a great number of studies about the different "adherence" concepts. This can be defined as an approach to the maintenance or improvement of health in order to reduce the signs and symptoms of a disease[12], but also by the degree of compliance with therapeutic measures, whether or not with drugs[13]. It is a complex behavioral process, heavily influenced by the environment, by health care professionals and medical care. When individuals fully follow the treatment they are classified as "adherent"; when they leave treatment they are "quitter" or "non-adherent"; and finally there are the "persistent", within the "non-adherent" group, which are those individuals that go to the appointments, but do not follow the treatment ¹⁴.

There is a common misconception in thinking that the factors related to the patient's behavior would be solely responsible for affecting a person's ability to adhere to treatment. However, the WHO, through the Adherence Project, believes that adherence can interact with several dimensions related to social and economic factors, the team/health care system, disease characteristics, therapy treatments of the disease and factors associated with that patient [14]. Therefore, considering such factors, the professional has the opportunity to understand the expectations and characteristics of individuals who do not follow the recommended treatment, which allows more individualized interventions to improve adherence and hence provide a more qualified service.

In this context, longitudinal study in adolescents contributes to the pursuit of individual and contextual determinants associated with adherence to dental treatment and the identification of variables that make it difficult for adolescents' access in social vulnerability.

Methods

This is a longitudinal analytical study conducted in the city of Piracicaba, São Paulo, Brazil, between 2014 and 2015. The study had approval by the Ethics and Research Committee of FOP-UNICAMP, 027/2011 protocol.

Initial Phase

This study was directed to adolescents from 15 to 19 years living in the area covered by 34 Family Health Units (FHU) in the city of Piracicaba [15]. Among them, there are 12 units with oral health teams (dentist and dental assistant). These adolescents were enrolled in state schools in their territorial reference.

The family health teams provide primary care to about 1,000 families in the regions of greater social exclusion index of the municipality (≤ -0.75). The value of this index is evaluated by the Institute for Research and Planning of Piracicaba (IPPLAP, in Portuguese) and ranges from -1 (worst condition) to 1 (best condition) [16]. On average, 320 adolescents from 15 to 19 years old were enrolled in each of the 34 units, totaling approximately 11,000 individuals. Adolescents who participated in this study lived in areas of greater social exclusion, that is, they were in situation of social vulnerability. Before the search, the Free and Clarified Consent Term was delivered to the responsible for the adolescent in the home visits of Community Health Agents. For those parents who authorized the adolescent participation in the research, the agents scheduled the day and time for participants to attend the units.

The original probabilistic sample of this study was calculated based on previously published studies[13]. In that occasion, 1,179 adolescents were examined (evaluation of caries and periodontal disease) between the second half of 2013 and the first half of 2014. The sample size was calculated based on caries experience in the Brazilian Southeast region, using survey data from the previous National Epidemiological Survey[9].

This phase included the adolescents covered by the 34 FHU in the municipality. It is important to emphasize that the FHU are distributed in the less favored socioeconomic regions of the municipality. A sampling error of 5%, DMFT = 5.16

with SD = 4.54, sampling loss of 20% and a 95% confidence level were considered, obtaining a sample of 1,428 randomly selected individuals. Of this total, 249 did not show up on exam day. Thus, 1,179 adolescents were examined. The sample exclusion criteria were individuals with systemic diseases, communication difficulties, or neuromotor problems, severe hypoplasia and orthodontic brace. Individuals who did not agree to participate in the study and the absent on the day of the examination were also excluded from the sample. Adolescents belonging to the health unit were considered as inclusion criteria. Figure 1 explains the sequence of the developmental stages of the study.

Final Phase (study of adherence)

About 18 months after the completion of the initial examination, the researchers conducted an active search in order to locate the adolescents who were referred for treatment in the initial phase.

Of the total 1,179 adolescents examined in the initial phase, 474 (40.2%) of them needed dental treatment and 705 received promotion and prevention guidelines in oral health. Those who needed treatment were asked to schedule an appointment at the units of family health, which were already prepared to receive them, for the treatment. In the units with no dentists, a referral form has been given to the adolescent, whom was told to look for the reference unit for treatment. The criterion for scheduling or referral was the presence of caries and/or periodontal disease.

In this study, the term "adherence" was understood as the decision to seek a health service and follow the recommended treatment. To find out if the adolescent adhered or not to dental treatment, a new clinical examination was performed under the same conditions and with the same examiners of the initial phase. Those who have not sought or even sought care, but did not complete the treatment, were considered non-adherent patients.

Among the 474 surveyed, 325 (68.6%) participants were reexamined, of which 164 (50.5%) adhered to dental treatment (adherence group) and 161 (49.5%) did not adhere (non-adherence group). A total of 149 adolescents were not reexamined due to change of address and telephone number (n = 131), transferred to other municipalities (n = 9) and refusal to participate in the study (n = 9). As these adolescents were not found in the final phase of the study and did not schedule appointment at the FHU, it was not possible to know whether they performed or not the treatment in another public service or in the private sector, so they were not included in the analysis. The final sample (325 adolescents) provided a test power of 0.80 with a 95% confidence level in the analyzes performed considering adhesion of 50.0%.

Clinical Examination

The exams were performed on the premises of the FHU, by two examiners (previously calibrated and helped by two note-takers), in an outdoor setting, under artificial light using a flashlight and with brushing previously performed under the guidance of a Dental Assistant. For each exam, a ball point probe and plane oral mirror were used. Data were collected with reference to the clinical characteristics: caries by the DMFT index (total decayed, missing and filled teeth) and periodontal disease (Community Periodontal Index-CIP), in accordance with the World Health Organization codes and criteria[17].

Pilot Study

The pilot study was conducted with twenty adolescents who were not randomized to study. After completing the data collection, twenty reviews were performed and, for each ten individuals examined, the last one was reexamined.

Training and Calibration

The process of calibrating the two examiners for the clinical conditions was conducted by a Gold Standard examiner. The final calibration exercise consisted of 2 periods with mean inter-examiner Kappa values of 0.95. In order to verify

maintenance of the diagnostic criteria and intra-examiner error, 10% of the sample were re-examined, showing a mean Kappa values of 0.96.

Study Variables

At Level 1 were studied clinical individual variables, sociodemographic (gender, number of people in the family), access to the service (reason to seek the dentist), pain reported (pain in the last 6 months), dental social impact (OIDP) and family cohesion. At Level 2, the contextual variable, percentage of families in the neighborhood with income from 0.5 to 1 minimum wage was analyzed [15]. The minimum wage in Brazil at the time of data collection was US\$ 1.796,70.

In clinical evaluation the presence of caries, pain, abscess and/or periodontal disease were considered, according to the WHO criteria [17].

A semi-structured questionnaire based on the Goes model[18] was applied to the collection of individual variables (gender, income from 0.5 to 1 minimum wage, number of people in the family). In order to investigate the reason that led the adolescent to seek the dentist the following question was asked: "What is the most frequent reason for you to seek the dentist?". To this purpose, the respondent could choose from the following answers: "for frequent checking", "only when I have a problem" and "I do not know/I do not remember."

The instruments used in this study were OIDP – Oral Impacts on Daily Performances and FACES III (Family Adaptability and Cohesion Scale). The instruments were self-administered under supervision in case of doubt. OIDP is a socio-dental indicator measuring the impact of oral health conditions in daily activities [19] and was obtained by adding the scores of eight frequency items: "Over the last 6 months your mouth and/or your teeth caused you any difficulty to 1) eat, 2) speak and pronounce clearly, 3) clean the teeth, 4) sleep and relax, 5) smile without embarrassment, 6) maintain emotional state, 7) enjoy the contact with others, and 8) perform schoolwork. It has a logical approach to quantify the impact by evaluating the frequency and severity distributed in a five-point scale. The scale used ranges from (0) "never affected" to (5) "all or almost every day". The score of the severity measures shows the relative importance of the perception of the informant of impact in daily performance and ranges from (0) "no gravity" one (5) "extremely serious". FACES III questionnaire (Family Adaptability and Cohesion Scale), validated in Brazil[20], was applied to evaluate cohesion and family adaptability perceived. It consists of 20 questions; the odd numbered questions assess cohesion and the even numbered questions assess adaptability. Each question is assigned a value from 1 to 5; the value 1 corresponding to hardly ever and the value 5 to quite often. The sum of values is performed and the final score can range from 10 to 5 for each domain.

Data Analysis

Categorical individual variables were evaluated: adherence to dental treatment (yes or no), gender (male/female), reason to seek dental treatment (pain, extraction, treatment, checking, cleaning/fluoride and others), pain in the last 6 months (yes, no, I do not know and I do not remember). And also non-categorical variables classified in individual (number of people in the family, OIDP, and family cohesion), and contextual variable (percentage of neighborhood families with income of 0.5 to 1 minimum wage).

Adherence to dental treatment was considered as response variable. After the data descriptive analysis, multilevel logistic regression models were estimated by the GENMOD procedure, of the statistical program SAS. In the analysis, the individuals' variables were considered as level 1, neighborhood as level 2, and the setting model was evaluated by the QIC (Quasi Likelihood Under Independence Model Criterion).

Initially, a model with only the intercept was estimated (model 1). Next, variables of individuals were tested (model 2). In model 3, the significant variable in model 2 and including contextual variable remained ($p < 0.05$).

Results

The average age of the adolescents reexamined was 17 years (standard deviation = 1.3). Among them, 188 (57.8%) were female and 137 (42.2%) were male. Table 1 presents the descriptive analysis of individual variables studied in the initial phase. Regarding the reason to seek dental treatment, 34.2% answered that sought the dentist to treat the teeth, and 36.6% had tooth pain in the last 6 months.

Table 1
Distribution and frequencies of the variables evaluated in the sample of adolescents that needed dental treatment (Initial phase) 2013–2014.

Variables	n	%
Gender		
Female	188	57,8
Male	137	42,2
Reason to go to the dentist		
Pain	55	16,9
Teeth extraction	12	3,7
Dental treatment	111	34,2
For checking	54	16,6
Cleaning, fluoride	41	12,6
Other	26	8,0
Did not answer	26	8,0
Dental pain in the last 6 months		
Yes	119	36,6
No	182	56,0
Do not know / Do not remember	20	6,2
Did not answer	4	1,2

Table 2 shows that the number of people in the family ranged from 1 to 6, with a median 4, and the percentage of families with income from 0.5 to 1 minimum wage ranged from 4.1–16.9%, with median of 10.4%.

Table 2

Median, minimum and maximum of individual and contextual variables evaluated in the sample (initial phase), 2013–2014.

Variables	Median	Minimum-Maximum
OIDP	0	0-135
Family cohesion	32	13–46
Number of people in the family	4	1–6
% income 0.5 to 1*	10.4	4.1–16.9
OIDP: Oral Impact on Daily Performance; * % of families with income from 0.5 to 1 minimum wage (the minimum wage at the time of data collection was US\$ 1.796,70)		

Table 3 shows the multilevel model for the response variable adherence to dental treatment (yes and no). Model 2 showed an association between non-adherence people and crowding situation ($p = 0.003$). Higher percentage of the non-adherence group was also observed in adolescents from neighborhoods of families with lower incomes ($p = 0.039$), according to the model.

Table 3
Multilevel model for adherence to dental treatment, 2014–2015.

Variables	Model 1			Model 2			Model 3		
	Estimate	SE	p-value	Estimate	SE	p-value	Estimate	SE	p-value
Intercept	0.0062	0.1296	0.9621	1.0025	0.3361	0.0029	1.9146	0.5766	0.0009
Individual level									
Number of people in the family				-0.2538	0.0700	0.0003	-0.2432	0.0678	0.0003
Contextual level									
% income 0.5 to 1*							-0.0846	0.0411	0.0396
QIC	453.2737			440.0044			437.7239		
* % of families with income from 0.5 to 1 minimum wage (the minimum wage at the time of data collection was US\$ 1.796,70); SE = StandardError									

Discussion

It is important to note that studies that associate factors related to adherence of adolescents to dental treatment are scarce in the literature. Existing studies assessing adherence are restricted to therapeutic treatment and follow-up of recommendations by health care professionals, especially in relation to chronic diseases [21, 22].

Adherence is a process in which many factors have influences and different value loads, such as the nature of the disease, individual's personality, their social environment, relationship quality of the therapeutic team and the patient, health service conditions, and factors arising from the treatment itself [14].

When managing health services one of the great challenges is to enable adherence of adolescents to dental treatment, considering individual characteristics related mainly to life context and the adolescents' family.

Special attention should be given to adolescents of greater social vulnerability, considered "underprivileged", because social, political and economic inequality influence directly in family dynamics and, therefore, increased personal and social risk situation experienced by this individual. Additionally, adolescents, in their capacity as "developing people", have an intrinsic condition of vulnerability, lacking physical, mental and moral care, that is, a comprehensive understanding at their needs [23].

In this study, adolescents coming from neighborhoods with the worst social exclusion rates in the city of Piracicaba (State of São Paulo), that is, considered underprivileged, were reexamined. Among the subjects evaluated, 50.5% adhered to the dental treatment and 49.5% did not. Non-adherence has important clinical and social consequences. The most direct consequence is the dental treatment failure, which may result in oral diseases complications, and consequently, worsening the diagnosis and delay in the control and cure of these diseases. Moreover, no treatment of the disease may lead to deterioration of oral health and, consequently, increase the demand for specialized services and budget expenditures of the public sector.

In the results of this study, individuals who did not adhere to dental treatment were those from the lower income neighborhood families (0.5 to 1 minimum wage), corroborating with Carvalho [24], who associated non-adherence to antiretroviral treatment to the income of the surveyed families. Another study evaluated the level of adherence to treatment with antimicrobials and found that subjects with monthly family income above six minimum wages showed 8.3 times greater adherence than those with an income of five or less wages[25]. Thus, income can be related to adherence mainly in extreme cases of poverty, since this condition brings difficult to adhere to treatment [26].

Family income directly influences the way of living of people, since greater purchasing power can help in maintaining health, treatment and prevention of diseases. At the same time, low wages negatively act on the acquisition of healthy behaviors by the population. Housing conditions are also identified as risk factors, and home should be evaluated when setting up a social exclusion situation [26] .

The variables related to family status and socioeconomic levels are very important in determining low adherence to treatment. Therefore, the results of this study showed that these variables have had greater effect on adherence than those arising from the diseases characteristics, the treatment or the adolescents.

In this sense, the prevalence and factors associated with adherence of children on antiretroviral therapy were evaluated in a previously study [27]. It was found that the profile of children who do not have good adhesion was extremely related to the profile of their caregivers as well as income below the minimum wage and variables related to the family environment (presence of many children in the family and high degree of poverty).

In the present study larger number of people in the family (crowding) was associated with lower adherence to treatment. This variable was also found in studies on adherence to drug treatment [21], and adolescent adherence to psychiatric treatment [28]. Some recent international publications indicate crowding as a risk factor for hospital admissions of children [29]. However, there are no studies relating crowding with adherence to dental treatment.

With this variety of factors, the health team must know the determinants that may interfere with adhesion; it is imperative to recognize the specifics of their particular population. The understanding of the sociocultural factors that guide the adherence may help to define what to recommend to the patient, the communication between the patient and the professional and further following the proposed treatment [30].

Thus, the literature points out that adherence should be built and, in its presence, the individual appropriates the treatment, that is, there is a commitment resulting from understanding the effectiveness and meaning. Thus, non-adherence is a phenomenon that should be working with the patient, developing actions that promote effective work of professionals and an incorporation of the treatment by the patient.

The results of this study point out to a greater possibility of non-adherence by adolescents from crowding families. In addition, it must also consider that the family is an important means of dissemination of ideas and behaviors. Therefore, focusing numerous and low-income families is, mainly, a health education action with far-reaching potential.

Thus, developing communication strategies and team relationship with the patient and family is essential. These include the need to strengthen the link, enhance creativity and promote dialogue between the team, adolescents and their families, aiming to increase adherence[3]. It is also important to empower the professional to handle this situation by implementing the ongoing assessment, discussion of team cases, in addition to maximizing the resources of health service actions in health awareness and promotion of health aimed at young people.

The relevance of this study is due to the lack of studies on adherence to treatment in health. Perhaps this is one of the first studies to discuss this topic in oral health. In addition, the longitudinal nature of the study (18-month evaluation) may be an important point to be raised. Furthermore, studies on adherence are essential for the prevention and control of complications of untreated oral diseases, and generate benefits that extend to patients, families, health systems and the economy.

It is important to note that the data was analyzed using multilevel analysis model, whose relevance has been pointed out by many researchers[10]. This type of model is known by providing a more accurate assessment of the relationship between the environment and people. Probably, to date, this study is one of the first to use this technique to study factors that influence adherence to dental treatment of underprivileged adolescents.

However, we can mention a few limitation. The main limitation, of course, is related to the non-response rate, since we had difficulty locating important part of the sample of adolescents, although they have been sought in schools where they studied, in the Family Health Units, and also in their homes. Furthermore, qualitative studies could be suggested to complement the present results thus offering a better understanding of the factors impacting the adherence of adolescents in dental treatment.

Conclusions

The non-adherence rate to treatment was high in the studied sample, and the variables - family income of the neighborhood and crowding - were statistically associated with non-adherence to dental treatment in primary care.

List Of Abbreviations

World Health Organization (WHO)

Family Health Units (FHU)

Institute for Research and Planning of Piracicaba (IPPLAP)

Decayed, Missing and Filled Teeth (DMFT)

Dental Social Impact (OIDP)

Declarations

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the Research Ethics Committee of the Piracicaba Dental School, University of Campinas (UNICAMP) (protocol number #027/2011) in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. Written consent was obtained from the parents before starting the study. Written consent from adolescents of legal age was also obtained.

CONSENT FOR PUBLICATION

Not applicable

AVAILABILITY OF DATA AND MATERIALS

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

COMPETING INTERESTS

The authors declare that they have no competing interests.

FUNDING

No funding was obtained for this study.

AUTHORS' CONTRIBUTIONS

JVB, FLV, KLC, and LMG participated in the conception, design, and data collection. AKK and IPC participated in the article writing. GMBA, ACP participated in the critical review.

ACKNOWLEDGMENTS

The authors thank the volunteers, the school principals and FHU, for allowing the research carried out.

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Figures

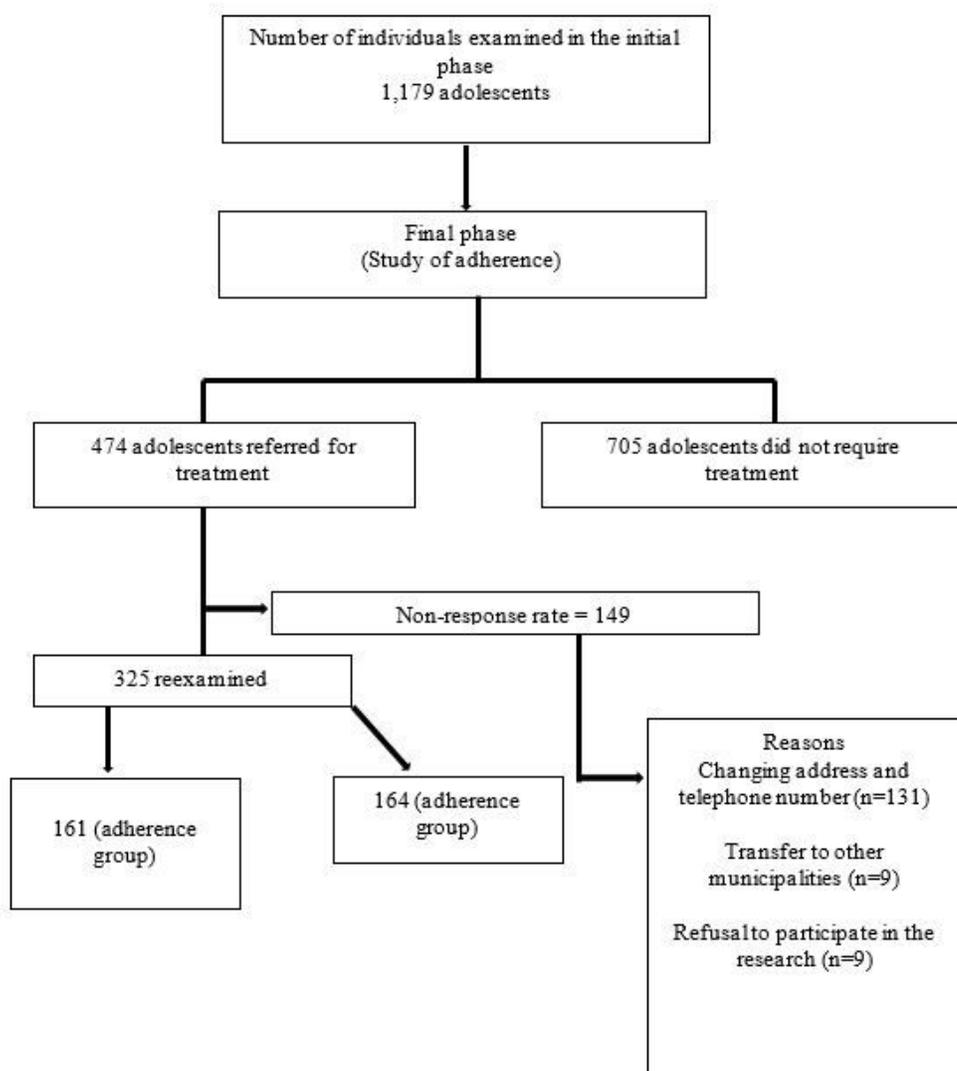


Figure 1

Representative flowchart of the study phase13.