

Doctoral School of Interdisciplinary Medicine

**Health risk behaviors among adolescents in Mongolia: cross-sectional national school-based surveys from 2013 and 2019**

Summary of PhD Thesis

**Javzan Badarch**



Supervisor:

Prof. Edit Paulik MD, PhD

Department of Public Health

Albert Szent-Györgyi Medical School

University of Szeged

Szeged, Hungary

2022

## INTRODUCTION

Mongolia is located in East Asia. Its size of population is 3.2 million, and its territory is 1.564 million km<sup>2</sup>. Today, Mongolia is the 19<sup>th</sup> largest, and the least densely populated, country in the world. In 2020, approximately 31 percent of the population in Mongolia were residing in rural areas and had a traditional semi-nomadic lifestyle. Mongolia has experienced an epidemiological transition regarding non-communicable diseases (NCDs) since the 1990s.

According to the statistical data in 2019, there are 503.8 thousand 10–19 years old adolescents in Mongolia, which accounts for 15.3% of the total population. Altogether, the population of 0–19 years make up the largest proportion with almost 36%. With a shift away from labor intensive nomadic activities to sedentary urban lifestyles, changes in diet, and increased use of tobacco and alcohol from young age on, has led to increasing prevalence of NCDs.

Globally, cigarette smoking is one of the leading causes of cancers, and several lung and heart diseases. Every year, approximately 8 million patients die of tobacco-related diseases in the world. In 2003, the prevalence of cigarette smoking in Mongolian adolescents was 9.2% (15.4% males and 4.4% females); and being male, parental and peer influence were significant predictors of smoking. The Fourth Mongolian STEPS Survey on the Prevalence of NCD and Injury Risk Factors showed that the prevalence of current smoking in 2019 was 14.2% in people aged 15–24 years; the rate was significantly higher in males (25.4%) than females (2.6%). The mean age of initiation was 17.2 years among 15–24 years old (no difference was found between males and females).

Harmful alcohol drinking is an important public health problem and a risk factor for a broad spectrum of diseases. Drinking alcohol before the age of 15 increases the risk of alcohol dependence. In Mongolia, more than half of adolescents and youths started consuming alcoholic beverages at age of 16. The combined use of alcohol and tobacco may produce a multiplicative or synergistic increase of risk of negative health outcomes.

Healthy diet is important during adolescence because it has a long-term impact on health and lifestyle. In 2017 the prevalence of overweight and obesity was 48.8% in men aged 15–49 year; 46.2% in reproductive aged women; and 22.2% among children aged 6–11 year in Mongolia. The lack of adequate nutrition in the formative years remains a barrier to child and adolescent well-being in Mongolia.

In Mongolia, the physical activity deficit among children has become a serious problem in the recent years. Physical inactivity and sedentary behavior increased among young people, one in five of Mongolian people aged 15–69 year had insufficient physical activity in 2019.

Oral health is an essential component of well-being during the whole lifetime. Good oral hygiene (brushing tooth twice a day with fluoride toothpaste) is one of the most effective methods for the prevention of dental caries and other oral diseases. The World Dental Federation and World Health Organization (WHO) have indicated that more than 200 diseases can be the consequence of dental caries. According to a Mongolian survey 90% of the population suffers from dental diseases nationwide, dental caries in children is the highest among all age groups. Recommended tooth-brushing prevalence among school children was found to be 22.45% in four South-East Asian countries. The fourth national STEPS survey showed that only 59.4% (51.6% males and 67.5% females) of 15–24 years old young people cleaned teeth regularly at least twice a day.

Suicide and suicide-related behavior in young people have become serious and urgent global public health problems. More than 700,000 people in the world lose their life as a consequence of suicide each year. In 2016, more than one in every 100 deaths (1.3%) was the consequence of committing suicide, and among individuals aged between 15 to 19 years, it was the third leading cause of mortality. In Mongolia, mental health is the second among the top five challenges that children are facing. The average suicide rate of Mongolian adolescents is five times as high as in East Asia and the Pacific region. Moreover, in Mongolia, the suicide mortality among the young aged 10–14 years increased from 3.3 % in 2003 to 11.4 % in 2019.

It is generally accepted that adolescent years are crucial in establishing lifestyle habits that will affect health during adulthood. Many unhealthy habits driving the NCDs epidemic begin in adolescence and health risk behaviors are multifactorial and complex. Many studies have shown that demographic variables such as gender, older age and residence location/urban area; unhealthy dietary behaviors, including carbonated soft drink and fast food consumption, inadequate fruit and vegetable intake; health risk factors such as cigarette smoking, other tobacco use, exposed to second-hand smoke (SHS), parental smoking, alcohol and illicit/marijuana use, poor oral hygiene, sedentary behavior, physical inactivity and sexual intercourse are associated with increased risk of health and well-being in youths. Psychological factors, including lack of close friends, anxiety-induced sleep disturbance, feeling lonely, suicide ideation and attempts; injury and violence, namely exposure to bullying/interpersonal violence, including suffering a physical attack, as well as a serious injury; parental factors

including truancy, poor parental supervision, connectedness and bonding have been found in a number of studies to be associated with adolescent health risk behaviors.

Gender differences seem to play a crucial role in health risk behaviors especially suicidal behavior of young people. Female adolescents are more prone to show internalizing disorders (e.g., anxiety) which may mediate the connection with suicidal behaviors, and females tend to have more suicide attempts than males. In contrast, completed suicide was more frequent in males, which may be associated with a higher prevalence of externalizing disorders (e.g., substance abuse disorder).

## **AIMS**

The overall aim of the study was to determine the prevalence of health risk behaviors among Mongolian adolescents, and to characterize the relevant risk and protective factors, based on the data of the Mongolian GSHS 2013 and 2019.

Our specific aims were:

1. to determine the prevalence of current smoking and its association with demographic factors (sex and age), other behavioral factors (dietary behaviors such as soft drink, fast food, fruit and vegetable intake; oral hygiene; alcohol and drug use; sexual activity; physical activity; sedentary behavior; parental smoking and exposure to second-hand smoke); psychological factors (loneliness, anxiety, presence or absence of close friend); and parental factors (truancy, parental supervision, connectedness and bonding) among school-going adolescents in Mongolia.
2. to determine the prevalence of poor oral hygiene and its association with demographic factors (sex and age), other behavioral factors (dietary behaviors such as soft drink, fast food, fruit and vegetable intake; smoking, alcohol and drug use; sexual activity; physical activity; sedentary behavior, parental smoking and exposure to second-hand smoke), psychological factors (loneliness, anxiety and close friend), and parental factors (truancy, parental supervision, connectedness and bonding) among school-going adolescents in Mongolia.
3. to determine the prevalence of self-reported suicide attempts and to identify the gender specific predictors including age, mental distress, injury and violence, and other risky behaviors among school-attending adolescents in Mongolia.

Finally, the information gathered and processed in this thesis on health risk behaviors including smoking behavior, poor oral hygiene and suicide attempts and the associated factors among adolescents in Mongolia, may be a starting point of the development of a comprehensive, school-based health promotion intervention for this population, and our results can be useful for the government, other policy makers and future researchers, too.

## **MATERIALS AND METHODS**

In 2013 and 2019, the Mongolian Ministry of Health (MMH) and National Center for Public Health (NCPH) conducted the second and third nationwide Global School-based Health Survey (GSHS) in Mongolia. The GSHS methodology was approved by the Scientific Council Meeting of the Public Health School, Mongolian National University of Medical Science (MNUMS) and the Committee on Ethics, under the MMH.

The Mongolian GSHS employed a two-stage cluster sample design to produce a representative sample of all students in grades 6–12, aged 12–17 years in nine districts of Ulaanbaatar and 21 provinces to determine their health behaviors and the possible risk and protective factors. The first-stage sampling frame consisted of schools (urban, rural, public, or private) containing any of grades 6–12. The second-stage sampling frame consisted of randomly selecting classes (using a random start) from each school to participate. All relevant classes in each selected school were included in the sampling frame.

The Mongolian GSHS questionnaire contained 84 questions addressing the following topics: demographics, dietary behaviors, hygiene, violence and unintentional injury, mental health, tobacco use, alcohol use, drug use, sexual behaviors, physical activity and protective factors. Of the 84 questions, 58 questions were from the core questionnaire modules and 26 questions were expanded GSHS and country-specific questions.

The survey questionnaire was answered by 5393 students in 2013 and 4514 students in 2019 in grades 6–12. In 2019, two types of questionnaires were applied, depending on the age of the target population (10–12-year-old and 13–18-year-old). From the point of the study presented in this thesis, an important difference was in connection with the question about attempted suicide. This question was asked only from the 13–18-year-old students, and this question was answered by 2850 students, so in the suicide related analysis, these students were considered as total.

In the study presented in this thesis, adolescent smoking behavior, poor oral hygiene and suicide attempts were used as the dependent variables. The independent variables were

demographic factors, dietary behaviors, health risk factors, psychological factors, injury and violence and parental factors.

Statistical analysis was carried out with IBM SPSS version 24.0 and 27.0 (SPSS Inc., Chicago, IL, USA). We used simple descriptive statistics including frequency, percentage, median, interquartile range (IQR) and chi-square tests to describe the overall characteristics of the sample. Univariable logistic regression analyses were conducted to examine unadjusted associations between dependent (smoking behavior, poor oral hygiene and suicide attempts) and independent variables one by one. Multivariable logistic regression analyses were conducted to examine the associations of smoking behavior and poor oral hygiene with all independent variables. Multivariable forward stepwise logistic regression analysis was used to assess the independent contribution of demographic factors, mental distress, injury and violence, and risky behaviors to suicide attempts.

Odds ratio (OR), adjusted odds ratio (AOR) and 95% confidence interval (CI) of OR (AOR) were used to indicate the association between the health risk behaviors and the selected list of independent variables. Statistical significance was defined at  $p < 0.05$ .

The Mongolia GSHS study was approved by the Ethical Committee of the NCPH (Ethical committee approval codes 18 in 2013 and 88 in 2019). All students and their parents in each selected class were given a written consent form and asked to participate voluntarily in the survey.

## RESULTS

The Mongolian GSHS 2013 was conducted with a total sample size of 5393 students, while the GSHS 2019 sample in the present analysis involved only 2850 students.

Nearly one-tenth of the students (8.5%) reported current smoking in the previous 30 days of the survey. According to the univariable logistic regression analyses, male sex, older age, alcohol consumption, marijuana use, other tobacco use, carbonated soft drink and fast food consumption, feeling lonely, being bullied, having suicidal ideation, having poor oral hygiene, exposed to SHS, having had sexual intercourse, spending more than 3 hours a day sitting, being absent from school without permission, parents not controlling children's homework, poor parental connectedness, and parents not knowing what their children do were in significant relationship with current smoking among school-aged adolescents in Mongolia.

Multivariable logistic regression analysis showed that males were more likely (AOR: 2.23) to smoke than females. The increase in age by each one year (from 12 years old and younger

as the first age group) increased the odds of smoking (AOR: 1.89). Concerning substance use, students who consumed alcohol (AOR: 5.05), and other tobacco product (AOR: 18.34) were more likely to report current smoking in the last 30 days. Similarly, students who consumed carbonated soft drinks (AOR: 1.44), and fast food (AOR: 1.71) were more likely to smoke than students who did not consume these foodstuffs. For the health risk factors, students who were exposed to SHS (AOR: 2.56), and who have had sexual intercourse (AOR: 3.05) had also higher chance to report current smoking; similarly to those who had sedentary behavior (spent sitting more than 3 hours a day) (AOR: 1.51), and ideation of suicide (AOR: 1.83), compared to students free of these risk factors. Students who missed class without permission (truancy) (AOR: 2.29), and students whose parents did not know what they do (AOR: 1.55) were also more likely to report current smoking compared to participants without these risk factors.

One-third of the students (33%) reported to have had poor oral hygiene in the 30 days preceding the survey in 2013. According to the univariable analysis, students who reported poor oral hygiene tended to be males and be in age group older than 12 years. They consumed carbonated soft drinks and fast food, had inadequate fruit and vegetable intake, smoked cigarettes, one or both parents were smokers, were exposed to second-hand smoke, and suffered from poor parental supervision and disconnectedness. Parents of these students typically did not know what their children did, and the students were physically inactive and spent more than 3 hours per day sitting. All the listed factors were in a significant relationship with poor oral hygiene among Mongolian school-going students.

Multivariable analysis showed that males were 1.54 times as likely as females to have poor oral hygiene. Concerning dietary behaviors, students who consumed carbonated soft drinks and fast food were 15% (AOR: 0.85) and 26% (AOR: 0.74) less likely to be associated with insufficient tooth brushing. Moreover, students who had inadequate fruit and vegetable intake were 80% [(AOR: 1.80) and (AOR: 1.80)] more likely to have poor oral health than students who ate adequate amounts of fruits and vegetables. As to smoking behaviors, students whose parents (one or both) were smokers were 1.23 times more likely to report poor tooth brushing, and those being exposed second-hand smoke were 1.22 times more likely to report poor tooth brushing. Regarding protective factors, students whose parents did not check homework were 17% more likely to report poor dental hygiene compared to fellow students (AOR: 1.17), and those whose parents did not understand trouble were 1.30 times more likely to report poor dental hygiene compared to fellow students. Students who were physically inactive were 1.51 times

as likely to report brushing tooth less than 2 times a day. Furthermore, students who spent sitting more than 3 hour per day were 1.39 times as likely to have poor oral hygiene.

The prevalence rate of attempted suicide was 32.1% in the total sample, 33.3% in males, and 31.3% in females. According to the univariable analysis, male suicide attempters were less likely to have older age; more likely to be bullied, physically attacked, injured, smoke cigarettes, and drink alcohol. Female suicide attempters were less likely to have older age; more likely to live in urban location, have anxiety, feel lonely, be bullied, be physically attacked, be injured, smoke cigarettes, and drink alcohol. In the total sample, all factors showed a significant relationship with suicide attempts except sexual intercourse. Female students who had no close friends were less likely to have suicidal behavior than female students who had one or more close friends. The highest odds were found in connection with the risky behaviors, and with the injury and violence factors, especially among females.

Compared with the results of univariable analyses, the last step of the stepwise logistic regression models showed small differences in the predictors of attempted suicide in males and females. The living place and feeling lonely were no significant predictors in all models. Age remained significant in case of females; each one-year increase in age was associated with progressively fewer suicide attempts (AOR: 0.84). Anxiety and feeling lonely were not involved in the stepwise model in males, as it was expected from the univariable results ( $p>0.05$ ), while in females, anxiety was a significant predictor (AOR: 2.02). In males, the attempted suicide was more likely among those having a sexual intercourse (AOR: 2.14). Altogether, male suicide attempters were less likely to have close friends, and more likely to having been bullied, physically attacked, injured, smoke cigarettes, and drink alcohol, and have had a sexual intercourse. Within the female subgroup, lack of close friends, anxiety, being bullied, being physically attacked or injured, cigarette smoking, and alcohol drinking significantly increased the odds of reporting a suicide attempt.



## DISCUSSION

The aim of our study was to determine the prevalence of health risk behaviors among Mongolian adolescents, and to characterize the relevant risk and protective factors, based on the data of the Mongolian GSHS 2013 and 2019.

We found that the *prevalence of current smoking* in 2013 was 8.5% (12.5% in males and 5% in females). The self-reported current smoking in Mongolian adolescents was in relation with being male, older age, alcohol use, other tobacco use, fast food and carbonated soft drink consumption, ideation of suicide, exposed to SHS, having had a sexual intercourse, spending more than 3 hours a day sitting, school truancy, and parental bonding in 2013. As regards sex differences, smoking may in many Asian cultures be an accepted behavior for men but not for women, which tends to defame girls who smoke, whereas the society exerts higher tolerant attitude toward smoking males. Therefore, most of the female students may hesitate to confess their smoking status, which may distort the outcome of a survey. Cigarette smoking and drinking alcohol share similar etiological factors, and generally the habits coexist. The current study indicated that the current smoking of adolescents was also associated with the intake of carbonated soft drinks and fast food. Absence of both behavioral traits may reflect the person's "healthy choice": the young who chooses not to smoke is also likely to avoid carbonated soft drinks and fast food. Parental supervision/connectedness may also be linked to avoidance of carbonated soft drinks and junk food and tobacco use.

Furthermore, our study showed that adolescents who had current smoking were also more likely to have had engaged in sexual intercourse. Young people are interested in discovering the unknown, venturing a "cluster" of risk factors including sexual intercourse and substance uses. Our findings proved that adolescent smokers were more likely to follow sedentary behavior (e.g., sitting and watching television, playing computer games) in contrast to non-smoking peers. In our study, SHS exposure was higher among current smokers, which is also supported by others' findings. Non-smokers tend to stay away from smokers in order to reduce their own environmental tobacco smoke exposure. Our results further indicated, in agreement with previous investigations, that current smoking was associated with truancy. Parent-child connectedness is one of the effective ways to reduce risky behaviors such as tobacco use. Due to the modern lifestyle and socioeconomic changes, parents cannot spend enough time with their children during their secondary school years. Therefore, poor parental connectedness and supervision proved to be predictors of current smoking. However, in our study, parental connectedness and parental supervision, together with marijuana use, loneliness, being bullied,

poor oral hygiene, and parental smoking, were not significantly associated with current smoking in school-aged students in Mongolia

We found that the prevalence of *poor oral hygiene* was 33% (including 37% of male students and 29.5% of female students). Self-reported poor oral hygiene was in correlation with male gender, inadequate fruit and vegetable intake, one or both parents being smokers, exposure to SHS, poor parental supervision and disconnectedness, and physically inactive and sedentary behavior. In addition, fast food and carbonated soft drink consumption were protective factors for poor tooth brushing (i.e., less than 2 times a day) according to the 2013 data.

Our study identified males as showing poor oral hygiene behavior (less frequent tooth brushing) more frequently, while girls were more considerate of their body and appearance, and thus for their oral health, than boys.

In a previous study, high consumption of soft drinks among both younger and older adolescents was described as a predictor of poorer oral health and unhealthier lifestyle compared to those with lower consumption. Our study confirmed the association between inadequate fruit and vegetable intake and poor dental hygiene, indicating that among young people, the consumption of unhealthy foods (lacking fruits and vegetables) is a part of wrong oral and general health behavior. It is also possible that low parental control may result in a higher prevalence of inadequate fruit and vegetable intake and poor oral health.

Furthermore, in this study, smoking behaviors (parental smoking and SHS exposure) were higher among poor tooth brushers. Adolescents with good oral health behavior tend to avoid smokers, thus reducing their SHS exposure. Parental involvement appeared to be determinant in several health behaviors, including oral health among adolescents; the results of this study indicate that a low level of parental bonding is associated with poor oral hygiene in adolescents.

We found that the prevalence of the past 12-month *suicide attempts* was 32.1% (33.3% for the males and 31.3% for the females). Adolescents who had sexual intercourse, alcohol drinking, anxiety-induced sleep disturbance, had no close friend, being bullied, physically attacked and injured were significantly higher risk of suicide attempts among Mongolian adolescents in 2019.

This study found that having no close friends was a risk factor for suicide attempts among adolescents. It has been reported that adolescents showing high levels all characteristics of anxiety disorder, including low distress tolerance and uncontrolled emotion, tend to have suicide attempts. Anxiety in itself was found to be correlated with attempted suicide in the present study. Being bullied is known to increase the risk of mental health problems, including

poor motivational control, which may lead to increased risk of adolescent suicide attempts; findings from the present study suggest that being bullied was strongly associated with suicide attempts. The results of this study, namely that the social adversities of being physically attacked increased the odds of suicide attempts, were consistent with evidence from the GSHS in other South East Asian countries. The present study found that injury contributed to the increased likelihood of high psychological distress including suicidal behavior among young people. This study confirmed previous findings showing an association between substance use, including current smoking and alcohol consumption, sexual intercourse and suicide attempts in the adolescent population. An association between substance use and poor mental health or suicide attempts may refer to a clustering of risky behaviors. Our findings show only small differences in the predictors of attempted suicide in males and females.

Although, the Mongolian Government issued the tobacco control law in 2005, approved the “National Oral Health” program in 2006, and introduced a nationwide “24/7 Child Helpline 108” in 2014 to promote the emotional support of children and adolescents and related adults, the availability of comprehensive health promoting programs for the adolescents is limited.

Our study results showed that a remarkable proportion of school-attending adolescents were current smokers, had poor oral hygiene, and had a history of attempted suicide. Between the health damaging behaviors, the following correlations were revealed in the present study. Adolescents who used substances (e.g. alcohol), or followed unhealthy diet (e.g. inadequate fruit and vegetable intake), had other risky behaviors (e.g. physical inactivity), and mental distress (loneliness, anxiety-induced sleep disturbance, etc.). Those being injured and/or bullied and not being controlled by their parents were more likely to smoke, having poor oral hygiene and attempting suicide. The findings of our research showed that on the one hand the unfavorable behavior of adolescents is related to the school as an important setting of health promotion, on the other hand it is influenced by the parents’ behavior and attitude.

Based on our results we can conclude that a comprehensive health prevention program/intervention involving both schools and families is needed in order to improve the health and health behavior of Mongolian adolescents. These activities should be implemented by schoolteachers, students, school nurses or other community members. Interventions focusing on individual factors have to involve the training of teachers, the education of students on relevant health subjects, and the training or sensitization of students’ parents or communities.

## CONCLUSIONS

Using a large and representative sample of adolescents in Mongolia, our study found that the prevalence of current smoking was 8.5%, poor oral hygiene was 33%, and a high prevalence (32.1%) of suicide attempts was observed. Several demographic factors, including male gender and older age; substance use including alcohol and other tobacco use; dietary behaviors including carbonated soft drinks, fast food, inadequate fruit and vegetable intake; risky behaviors including having had sexual intercourse, sitting more than 3 hours a day, being physically inactive, one or both parents smoking and exposure to SHS; psychological factors including anxiety-induced sleep disturbance and having no close friend; injury and violence including being bullied, having been frequently physically attacked or injured; and parental factors including truancy, poor parental supervision, connectedness and bonding were found to be significantly associated with health risk behaviors such as current cigarette smoking, poor oral hygiene, and suicide attempts.

This study was focused on health risk behaviors including smoking behavior, poor oral hygiene and suicide attempts and its relation to risky behaviors. A better understanding of these relationships will contribute to designing a better health promotion and wellness education program.

Our results underline that the problem is increasing among adolescents, and the results may call the attention of the Mongolian government to the need to develop an independent and comprehensive adolescent school-based health promotion programs. Such programs should be combined with prevention of tobacco use, general, oral and mental health promotion, and lifestyle intervention programs for this young population as the future adult generation.

Most of the school-based programs were developed and implemented in the western countries, and the availability of school-based intervention programs for adolescent health promotion in Asian countries, especially in Mongolia, is limited. Parallel with the implementation of a school-based program an indicator system has to be developed to measure the achievements of the program. The indicators based on the GSHS questionnaire are suitable to follow the changes, but some school and program specific indicators are also needed. The development of these specific indicators can be done in the framework of another study in parallel with the characterization of the school programs. These specific indicators are best developed parallel with shaping the school-based programs.

## **ACKNOWLEDGEMENT**

I would like to give my utmost respect and appreciation to my supervisor, Prof. Edit Paulik for her guidance and continuous support for the completion of my study. Her endless care and kindness for this past four years has left me with lot of good memories to treasure for the years to come.

Furthermore, I would like to thank all the colleagues of the Department of Public Health, University of Szeged for their contribution to my professional development during my PhD work.

I am especially thankful to my parents for their endless perseverance with they brought me up, and to my precious Mother for always taking care of me from heaven. This thesis is dedicated to my beloved Mother who lives forever in my heart.

Last but not least I want to express my big thanks and love to my husband Bayar Chuluunbaatar and my beloved sons Bat-Ulzii Bayar, Batsarai Bayar and Batgun Bayar for their encouragement, support and faith in me.

## LIST OF PUBLICATIONS

### Publications related to the subject of the thesis

1. **Badarch, J.;** Batbaatar, S.; Paulik, E. Prevalence and Correlates of Poor Oral Hygiene among School-Going Students in Mongolia. *Dentistry. Journal.* **2021**, 9, 12. doi: [10.3390/dj9020012](https://doi.org/10.3390/dj9020012)  
**Impact factor: -; Q2**
2. **Badarch, J.;** Chuluunbaatar, B.; Batbaatar, S.; Paulik, E. Suicide Attempts among School-Attending Adolescents in Mongolia: Associated Factors and Gender Differences. *International Journal of Environmental Research and Public Health.* **2022**, 19(5):2991. <https://doi.org/10.3390/ijerph19052991>.  
**Impact factor: 3.390; Q2**
3. **Badarch, J.;** Batbaatar, S.; Paulik, E. Risk and Protective Factors of Smoking among Adolescents: Results from the Mongolian Global School-Based Student Health Survey. Singapore Medical Journal (*the article is in progress*)

### Presentations related to the subject of the thesis

1. **Badarch, J.;** Paulik, E. (2019). Factors influencing smoking behavior of adolescents in Mongolia. 21<sup>st</sup> Danube-Kris-Mures-Tisza (DKMT) Euroregional Conference on Environment and Health. Novi Sad, Serbia. 2019.06.06-2019.6.08. In: Škrbić, B (szerk.) *Book of Abstracts*. University of Novi Sad, Faculty of Technology (2019) pp. 98-98., 1 p.
2. **Badarch, J.;** Paulik, E. (2019). Factors associated with poor oral hygiene among school-aged students in Mongolia. 24<sup>th</sup> Congress of the European Association of Dental Public Health. Ghent, Belgium. 2019.09.12-2019.09.14.
3. **Badarch, J.;** Batbaatar, S.; Paulik, E. (2021). Factors associated with smoking and alcohol consumption among adolescents in Mongolia. Népegészségügyi Képző- és Kutatóhelyek Országos Egyesülete XIV. Konferencia. Szeged, Hungary 2021.08.26–2021.08.27. *Népegészségügy*, 98:2:280.

4. **Badarch, J.**; Paulik, E. (2021). Determinants of fruit and vegetable consumption among in-school students in Mongolia. 2<sup>nd</sup> EUGLOH Annual Student Research Conference in virtual edition. 2021.09.29-2021.10.01.
5. **Badarch, J.**, Paulik E. (2021). Changing pattern of cigarette smoking among adolescents in Mongolia: Results from the GYTSs (2003-2019). 14<sup>th</sup> European Public Health Conference in virtual edition. 2021.11.10-2021.11.12. *European Journal of Public Health*, 31:Supplement 3, p. 545