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Suicides in The Nenets Autonomous Okrug, Russia

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Yury A Sumarokov

A dissertation for the degree of Philosophiae Doctor – September 2016



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Abstract

This is a study of suicides in the Nenets Autonomous Okrug (NAO), a region with a large proportion of indigenous Nenets. To our knowledge, this is the first study investigating the problem of suicide in the indigenous and non-indigenous populations of the Russian Arctic. Our study aim was to assess suicide rates in the indigenous and non-indigenous populations of the NAO, as well as the socio-demographic characteristics, differences in suicide methods, seasonal variations, and the potential role of alcohol in suicides in these two populations.

We conducted a retrospective, population-based mortality study of suicides in the NAO, using data from the autopsy reports of suicide victims in the region in 2002-2012. Socio-demographic data were obtained from passports and medical records, and then linked to total population data from the 2002 and 2010 censuses. Suicide rates for indigenous Nenets and the non-indigenous population were calculated according to different socio-demographic characteristics, and corresponding relative risks for these two populations were compared. Variations in suicide methods, seasonal variations, and variations in the day of the week suicides occurred in the NAO were compared with national data from the Russian Federal Statistics Service (Rosstat). Data on the presence of alcohol in the blood and blood alcohol content in suicide cases from the NAO were compared with data from the neighboring Arkhangelsk Oblast.

Suicide rates in the NAO were higher than corresponding national figures. Suicide rates were higher among the indigenous Nenets than the non-indigenous population, and were associated with different socio-demographic characteristics. We showed different relative frequencies of suicide by hanging, cutting, and firearm, as well as differences in suicide occurrence by month and day of the week in the NAO when compared with Russia as a whole.

The study results and conclusions may be useful to create suicide prevention programs that are targeted to different population groups in the Russian Arctic.

Key words: Nenets Autonomous Okrug (NAO), Arkhangelsk Oblast (AO), suicide rates, relative risks, person-years, indigenous Nenets, suicide methods, seasonality, alcohol.

Абстракт (Abstract in Russian)

Данная работа посвящена исследованию самоубийств в Ненецком автономном округе (НАО), регионе с высокой пропорцией проживающего ненецкого населения, относящегося к группе коренных малочисленных народов Севера, Сибири и Дальнего Востока.

Насколько нам известно, это первое подобное исследование по проблеме самоубийств среди коренного и некоренного населения Российской Арктики. В нашей работе мы попытались оценить уровни самоубийств в группах коренных и некоренных народов НАО, социально демографические характеристики, различия в способах самоубийств, сезонные колебания и потенциальную роль алкоголя.

Мы провели ретроспективное изучение смертности населения от самоубийств в НАО, используя данные судебно-медицинских исследований в регионе за период 2002-2012 гг. Социально-демографические характеристики были получены на основе паспортных данных и медицинских документов и затем связаны с данными переписей 2002 и 2010 гг. Уровни самоубийств для групп коренного и некоренного населения были рассчитаны в соответствии с различными социально-демографическими характеристиками. Для каждой группы населения были представлены соответствующие относительные риски.

Вариации способов самоубийств, сезонные колебания и различия частоты смертности от самоубийств по дням недели в НАО были проанализированы в сравнении с национальными данными Российской федеральной службы государственной статистики (Росстат).

Показатели наличия алкоголя в крови и уровни содержания алкоголя у умерших от самоубийств в НАО были сопоставлены с данными из соседней Архангельской области.

Уровни смертности от самоубийств в НАО были выше, чем соответствующие национальные показатели. Самоубийства среди коренного ненецкого населения

регистрировались чаще, чем среди некоренного населения и были связаны с различными социально демографическими характеристиками.

Мы обнаружили различия в относительных уровнях смертности от самоубийств в зависимости от способов: через повешение, применение огнестрельного и колюще-режущего оружия, а также различия в частоте самоубийств по месяцам и дням недели в НАО по сравнению с Россией в целом.

Результаты исследования и выводы могут быть полезны для разработки мероприятий по целевой профилактике самоубийств среди различных групп населения Российской Арктики.

Ключевые слова: Ненецкий автономный округ (НАО), Архангельская область (АО), самоубийства, относительный риск, человеко-год, коренное и некоренное население, ненцы, способы самоубийств, сезонность, алкоголь.

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Paper II. Sumarokov YA, Brenn T, Kudryavtsev AV, Nilssen O. Variations in suicide method and in suicide occurrence by season and day of the week in Russia and the Nenets Autonomous Okrug, Northwestern Russia: a retrospective population-based mortality study. *BMC Psychiatry* 2015;15:224.²

Paper III. Sumarokov YA, Brenn T, Kudryavtsev AV, Sidorenkov O, Nilssen O. Alcohol and suicides in the Nenets Autonomous Okrug and Arkhangelsk Oblast, Russia. *Int J Circumpolar Health* 2016;75:30965.³

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List of Abbreviations

AO - Arkhangelsk Oblast

BAC - blood alcohol content

BFME - The Bureau of Forensic Medicine Expertise

ICD-10 - International Classification of Diseases, Revision 10

NAO - Nenets Autonomous Okrug

PY - person-year

UiT - University of Tromsø - The Arctic University of Norway

Glossary

Blood alcohol content (or blood alcohol concentration) - the amount of alcohol contained in a person's blood

Available at URL:

http://www.hsrb.unc.edu/safety_info/alcohol/blood_alcohol_concentration.cfm

Person-year - the product of the number of years times the number of members of a population who have been affected by a certain condition

Available at URL: <http://www.medilexicon.com/medicaldictionary.php?t=67454>

Socio-demographic - of, pertaining to, or characterized by a combination of sociological (related to sociology) and demographic (relating to populations) characteristics

Available at URL: <http://www.macmillandictionary.com/dictionary/british/sociodemographic>

Suicide - the act of deliberately killing oneself

Available at URL: <http://www.who.int/topics/suicide/en/>

Suicide methods - methods used for committing suicide

Available at URL: <http://www.who.int/bulletin/volumes/86/9/07-043489.pdf>

Suicide rate - the number of deaths from suicide and intentional self-harm per 100,000 people

Available at URL:

http://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/health/suicide_rate.pdf

Acknowledgements

Our study is the result of a long-term cooperation between the University of Tromsø (UiT) - The Arctic University of Norway and the Northern State Medical University. First of all, let me thank the Administration and Rector of the UiT for the financial support they lent to this study.

I would also like to cordially thank the teachers and professors of the Department of Community Medicine, Faculty of Health Sciences and other departments of the UiT for offering the courses necessary for my PhD training and for giving me the possibility to use the UiT's facilities. Let me thank the IT Department and the University Library for giving me the opportunity to obtain basic research data and literature relevant to this study.

I would like to thank Professor Odd Nilssen, my main supervisor, for giving me a lot of support, direction, and advice, and for creating a very warm atmosphere of open discussion and creativity. Odd is the one who motivated me to start my PhD research, and he always inspired me during the study.

I am very thankful to my co-supervisor, Tormod Brenn, for methodological support in data analysis and in the writing of papers. Let me also thank my co-supervisor, Alexander Kudryavtsev, for the valuable input he contributed to the general study design and the many further comments during the preparation of papers.

I would like to thank all the people from the Nenets Autonomous Okrug (NAO) who were involved in the research and in this PhD dissertation: Andrey Apitsyn, Head of the Health Department of the NAO, who inspired me to start this study; all the friendly health workers, especially Tatiana Zueva, former Head of Zapolyarny Polyclinic in Iskately and Dr Anatoly Gorelik from the Nenets Okrug Hospital; special greetings to the Chief of the Bureau of Forensic Medical Expertise in Naryan-Mar, Nikolay Kolebakin, and his very professional team, especially Irina Lyapunova, who supported me a lot during data collection.

I would like to thank Oleg Sidorenkov and his small team in Arkhangelsk, who provided me with forensic data on suicides from Arkhangelsk Oblast. I want to especially thank Evgeny Andreev and Vladimir Shkolnikov for advisory support and for carrying out

calculations on suicides while data was being collected from the Russian Federal Statistics Service (Rosstat) on deaths from external causes.

I want to thank all my Northern ancestors for being my historical touchstones and for all my childhood memories, from my grandfather, Alexander Khatanzeyskiy, to all the reindeer herders of the Nenets tundra and Northern Ural. Let me also thank my father, Alexander Sumarokov, for showing me the historical significance of the local customs and regions, as well as the importance of showing respect to the local people of these regions.

Finally, I express my thanks to my family and friends, who have supported my work and have not judged my long-term absences far from home.

1 Chapter: Introduction

1.1 Background

In 2007 I met Andrey Apitsyn, Chief of the Department of Health of the Nenets Autonomous Okrug (NAO). This was at a time when we were promoting public health education in Northwestern Russia. I came there as a teacher of a module called “Mental health and addictive behavior”. We were recruiting students for our Master’s program in public health at the newly-opened International School of Public Health in Arkhangelsk, for which I was responsible. Dr Apitsyn specifically emphasized suicide and alcohol abuse as the main contributors to mental health problems in the NAO, especially in the indigenous population. During this conversation, I was motivated to look into this problem to see if it was suitable for my PhD research. From my point of view, a study of this type should explain the reasons for suicides in the NAO, define the high-risk groups, and come up with possible suggestions for prevention. In 2008, after repeated meetings with several representatives of the health sector, we started to prepare a more detailed research plan, and in 2010 we signed an Agreement of Co-operation with local health authorities (Appendix A.1). The project was preliminary called “Suicide in the Nenets Autonomous Okrug, Russia”.

1.2 Suicide as a public health problem

Suicide is an important public health problem in all cultures and all societies [1]. Indeed, suicide represents 1.4% of the Global Burden of Disease and its economic costs are in the billions of dollars. Over the past 50 years, the number of suicides worldwide increased by approximately 60%. Almost one million fatalities every year are attributed to suicide, and in most European countries, the annual number of suicides is larger than that of traffic fatalities. The World Health Organization (WHO) has recognized the seriousness of suicide as a public health problem and has begun a global initiative for the prevention of suicide [2].

Among countries that maintain registers on suicide, the highest rates are found in Eastern Europe and the lowest are found mostly in Latin America, in Muslim countries, and in a few of the Asian countries. However, there are few such registers in African countries. Although no reliable data is available on attempted suicides, this number is estimated to be 10-20 times higher than that of completed suicides, resulting in injury, hospitalization, emotional and

mental trauma. Suicide rates tend to increase with age, but the WHO has recognized an alarming worldwide increase in suicidal behaviors among the age group of 15 to 25 years. Estimates suggest that fatalities among all age groups could rise to 1.5 million by 2020 [1].

1.3 The terminology of suicide

Suicide is defined in the International Classification of Diseases, 10th revision (ICD-10) as “intentional self-harm” [3]. However, the terminology surrounding suicide varies across the forensic, administrative, and medical arenas. Now most of the definitions are based on a consensus within these arenas [4].

Suicidal ideation is also known as suicidal thoughts, i.e., considering and planning suicide [5]. Subtypes of suicidal ideation depend on the presence or absence of suicidal intent. Suicidal ideation with no suicidal intent is when an individual has thoughts of engaging in suicide-related behavior but has no intention to go through with it [4]. When an individual is unable to clarify whether suicidal intent was present or not, the term undetermined degree of suicidal intent is used [4]. Suicide-related ideation with some suicidal intent is when an individual has thoughts of engaging in suicide-related behavior and possesses suicidal intent [4].

Suicidal behavior is an intentional act of self-harm that could cause a person to die [6]. The outcomes of suicidal behavior include considering and planning suicide, attempted suicide, and completed suicide.

Attempted suicide is an act of self-harm that is intended to result in death but does not. A suicide attempt may or may not result in injury.

Completed suicide is an intentional act of self-harm that results in death.

Suicide is differentiated from deliberate self-injury. Deliberate (non-suicidal) self-injury is the act of deliberately destroying one's body tissue without conscious suicidal intent [7].

1.4 Suicide methods

It is well known that accurate information on preferred suicide methods is important for developing strategies for suicide prevention [8]. Evidence does exist about suicide methods used and the variation of these methods across countries and cultures. Information on suicide

method is usually available in mortality databases, and is generally registered by ICD-10 code. These codes include hanging (The ICD-10 codes X70–X70.9), use of firearms and explosives (ICD-10 codes X72–X75.9), poisoning (ICD-10 codes X60–X69.9), drowning (ICD-10 codes X71–X71.9), jumping from a height (ICD-10 codes X80–X80.9), fire (ICD-10 codes X76), hot vapors (ICD-10 codes X77), cutting/piercing with sharp object (ICD-10 codes X78), cutting/piercing with blunt object (ICD-10 codes X79), crashing of motor vehicle (ICD-10 codes X82), other specified and classifiable means (ICD-10 codes X83), and other unspecified means (ICD-10 codes X84) [9].

Suicide methods tend to be divided into two main categories [10]: violent and nonviolent. Use of a firearm or explosives, hanging, cutting and piercing with sharp object, jumping from high places, and getting run over by a train or other vehicle are categorized as violent methods. Ingestion of pesticides, poisoning by gases, suffocation, and overdose of medicines are categorized as nonviolent methods. Suicide methods vary by geographic area. Several studies [9, 11-14] have reported that hanging is the most prevalent suicide method in Europe among both males and females. Among European males, hanging was followed by use of firearm and poisoning by drugs; whereas among European females it was followed by poisoning by drugs and jumping from a height [9]. Poisoning by pesticides is common in Latin America [15] and in several Asian countries [16, 17], whereas poisoning by drugs is the most common suicide method in females in the Nordic countries and the United Kingdom [8, 18]. Suicide by firearm is common in the United States [8], jumping from a height is often used in Hong Kong [8, 17] and Singapore [19], and hanging is common in Eastern Europe and Pakistan [8, 20]. Violent suicide methods, such as hanging and firearm use, tend to be common in indigenous populations [21-25].

1.5 Suicide diagnosis

The diagnosis of suicide is normally established by medical professionals (forensic experts) after a medical examination and autopsy. The data and records from family, friends, and medical personnel are all useful in assigning this diagnosis, and a police investigation usually follows the diagnosis in order to rule out the possibility of a crime. If there is a suicide note it is also used as part of the diagnostic process to confirm the cause of suicide and sometimes to help understand what the situation was before the suicide.

1.6 Definition of indigenous peoples/populations

The United Nations Permanent Forum on Indigenous issues identifies indigenous people based on the following [26]:

1. Self-identification as indigenous peoples at the individual level and accepted by the community as their member.
2. Historical continuity with pre-colonial and/or pre-settler societies.
3. Strong link to territories and surrounding natural resources.
4. Distinct social, economic, or political systems.
5. Distinct language, culture, and beliefs.
6. Form non-dominant groups of society.
7. Resolve to maintain and reproduce their ancestral environments and systems as distinctive peoples and communities.

In the Russian Federation, indigenous nations are defined according to Federal Law. There are about 40 indigenous groups that reside in the Russian Arctic, Siberia, and the Russian Far East [27]. A governmental decree officially defines their status as “Indigenous small-numbered people of the North”. In the Russian Arctic, almost half of these ethnic groups coexist. Some of them are rather big, like the Nenets, the Khanty, the Mansi, the Nanai, the Chukchi, and the Evenks, with population between 10,000 and 40,000. Others have less than 1000 people, like the Aleuts, the Nganasanes, the Oroks, the Chuvans, etc. Their histories share common factors of assimilation, i.e., a loss of traditional lifestyles, occupations, and ethnic identity [28].

1.7 Methods used for suicide research

Suicide research is almost all quantitative [29], and there are three key topics therein: risk factors for suicide, efficacy of suicide prevention, and cultural factors in suicide and suicide prevention [30], with a focus on high-risk groups [31]. Here we focus on the research methods of studies of completed suicide, in which the completeness and quality of mortality data is important.

However, there are issues in suicide research that pertain to the lack of data on attempted suicide and on survivors of suicide [29]. Indeed, data on attempted suicide are often

unavailable or only available from sources other than mortality registers. For this reason most research on attempted suicides has been carried out using qualitative methodologies, but the number of qualitative studies on the topic of suicide in general has been growing in the last years.

When considering studies that took a quantitative approach to suicide research, we found four common study designs: cross-sectional, observational (descriptive, ecological), case-control, and cohort studies. The majority of the studies on suicide, be they qualitative or quantitative, are retrospective and descriptive. Detailed examples of our literature review on suicide studies can be found in subchapter 3.3.1.

1.8 Risk factors for suicide

The risk factors for suicide are well known and include individual behavior and psychosocial or societal conditions that increase the likelihood that an individual will die by suicide [32] [33]. These risk factors can be intrapersonal, such as mental illnesses, substance abuse, somatic disease causing severe pain or significant limitation of quality of life, or extrapersonal, such as problems in relationships with other people and society, exposure to violence, mental trauma, social stress, poverty, and unemployment [34]. The WHO defines three groups of risk factors [2]:

1. Factors associated with the health system and society at large include difficulties in accessing health care and in receiving the needed care, easy availability of the means for suicide, inappropriate media reporting that sensationalizes suicide and increases the risk of “copycat” suicides, and stigma against people who seek help for suicidal behaviors, or for mental health and substance abuse problems.
2. Risks linked to the community and relationships include war and disaster, stresses of acculturation (such as among indigenous peoples or displaced persons), discrimination, a sense of isolation, abuse, violence and conflictual relationships.
3. Risk factors at the individual level include previous suicide attempts, mental disorders (bipolar disorder, schizophrenia, personality disorders), harmful use of alcohol, financial loss, chronic pain, and a family history of suicide.

1.9 Cultural and religious views of suicide

The risk factors for suicide are connected with different cultural and religious beliefs [32]. Indeed, many cultures and religions have different attitudes toward suicide [35], and culture has an influence on suicide rates. For example, Western cultures have a mostly negative view of suicide, whereas in the Eastern and indigenous cultures, this is not the case, and suicide can sometimes be viewed as positive.

In Judaism, Christianity, and Islam suicide is considered sinful. Orthodox Christianity considers suicide to be one of the gravest sins, as it combines the sins of murder and despair, and the individual can no longer repent. Followers of these religions who commit suicide are denied a funeral service before burial. Victims of suicide used to be buried outside the cemetery, a practice which continued until the 1950s and continues to this day in places like the Russian North, mostly in the form of a ban against churchyard burial. There are, however, some exceptions and special circumstances, for example if the victim was suffering from insanity or a diminished mental capacity. Moreover, if a person deliberately deprives themselves of life with the aim to save another person or group of people, then the act is classified as self-sacrifice, not suicide. Those who commit such self-sacrifice do so based on the words of Christ: "there is no greater love than this, that someone lay down his life for his friends" (John, 15:13.).

The Koran also forbids suicide. In one Hadith the Prophet Muhammad said: "[He who] kills himself with iron will to the end of the ages carry on his crime. The poisoned will always drink his poison. The jumper from the heights will again and again fall into the bottomless pit of the underworld "(Koran, 4:29).

Views on suicide vary among the ancient Eastern religions. In Buddhism it is believed that karmically neutral suicide or self-sacrifice is possible only for the elderly. In all other cases, suicide is seen as a bad act caused by an ignorance toward or an aversion to human life. Moreover, those who commit suicide forfeit the possibility of moving on to better things in the next life [36].

In Shinto suicide is not prohibited, but it discouraged in the form of Seppuku. This type of suicide was sometimes performed voluntarily, in which case it carried the honor of the

Samurai, as a sign of loyalty to restore one's honor, or as punishment following a guilty verdict [37].

In Jainism, suicide, or "Sallekhana", by hunger strike is considered to be one of eight additional disciplinary vows, i.e., a vow of suicide a Jain gives if his body is too old or prone to incurable disease. According to Jainism, the spiritual practice of suicide is purifying karma for the next life [37].

The religions and beliefs of indigenous peoples also influence the value of life in these societies and have created many suicide traditions (see 1.14).

1.10 Protective factors for suicide

Major protective factors for suicide include access to appropriate medical and mental health care; high self-esteem, connectedness to individuals, family, community, and social institutions; having social support in the form of supportive and caring family and friends; being in a stable relationship; abilities relating to problem-solving, conflict resolution, anger management, impulse control, etc.; contact with caregivers; access to immediate and ongoing support and care; religious or spiritual commitment; cultural and religious beliefs that discourage suicide; and restricted access to lethal means [38, 39].

1.11 Suicides among indigenous populations

A study in 1979 by Grove and Lyngne [40] showed that suicide rates in the indigenous Inuit population in Greenland increased four-fold during the 1970s. The authors pointed to several factors, including alcohol consumption, that were associated both with suicide and the social and cultural evolution of the Inuit society. Various studies have also reported high suicide rates among indigenous Inuit populations from the Hudson Bay [41] and the Canadian Northwestern Territories [42]. Studies from Northern Norway showed there were more suicides among the indigenous Sami than the Norwegian general population [12, 23]. Studies from other indigenous populations, including Aboriginal communities in Australia [43-51], Native Americans in the United States [44, 52, 53], the Maoris in New Zealand [54], and Inuits in Greenland [40], have also shown high suicide rates. In Greenland [40], Canada [55], Norway [23], Australia [43, 56], and Brazil [57-59], high suicide risk clusters were found to coincide with the territorial distribution of indigenous populations. Suicide rates in

indigenous populations tend to be high, and violent suicide methods are common, especially among young males [12, 23, 60, 61].

G. Mulvad [62] concluded that indigenous peoples use multifactorial processes to define and understand the circumstances of their life, rather than taking a problem-specific approach. Many behavioral differences between indigenous and non-indigenous populations are based on their different cultural values (Table 1.1), and any damage to or pressure on the cultural values of indigenous peoples may lead to an increase in depression, violence, addiction problems, and suicides.

Table 1.1 Cultural values of indigenous and non-indigenous peoples (Mulvad, 2015).

Indigenous	Western (Non-Indigenous)
<ol style="list-style-type: none"> 1. Harmony with nature 2. Soul and body united 3. Feelings are important 4. Education from elders 5. Material wealth is shared 6. Behavior is cooperative 7. Leaders serve the people 8. To be > to have 	<ol style="list-style-type: none"> 1. Domination of nature 2. Soul and body are divided 3. Feelings must be rationalized 4. Education from professionals 5. Material wealth is hoarded and consumed 6. Behavior is competitive 7. People serve the leaders 8. To have > to be

1.12 Seasonality of suicides

Spring is the season with the highest occurrence of suicides in both the Northern and Southern hemispheres. Several studies from the United States and Canada [63], China [64], Japan [20], Australia [21], South Africa [65], and Europe [66, 67] have reported peaks in suicide occurrence in spring [68]. Variation in suicide occurrence by day of the week has also been reported in different studies, with more suicides occurring on Mondays [69, 70]. A higher suicide occurrence has also been observed in the days following important holidays, especially in men [71].

1.13 Alcohol as risk factor for suicide

There is worldwide evidence of a higher prevalence of suicide in individuals with depression [72]. Mental depression is therefore known to be the leading independent risk factor for

suicide. Other important risk factors are alcohol and drug dependence; chronic diseases, including serious psychiatric disease; negative life events like acute changes in social and human relations; economic problems; and shame or regret regarding one's own conduct, which leads to fear of facing any related consequences.

Alcohol dependence and alcohol intoxication has been described as an independent and powerful risk factor for suicide. Hufford [73] defined the relationship between alcohol and suicide in terms of two separate risks: a distal risk (alcohol dependence over time), and a proximal risk (acute alcohol intoxication) which can coincide with the timing of suicidal behavior by transforming distal risk into action. The main mechanisms of interaction between alcohol and suicide were suggested to be: a) escalation in psychological distress, b) growth of aggressiveness, c) driving suicidal ideations to action, d) constricted cognition, impairing the generation and implementation of alternative coping strategies [73].

A majority of studies have found a high level of alcohol consumption in populations with high suicide rates. Acute alcohol use prior to suicide fluctuated from 10% in South Africa [74], to 23% in the United States [75], to 69% in Finland [74]. Eastern European studies showed that alcohol was present in the blood of 47.9% of suicide victims in Estonia [76], 62% in Belarus [77], and 60.2% in Russia [78]. Studies among the Sami in Sweden [79], Native Americans [80-83], indigenous Canadians [84], and Aborigines in Australia [85] have demonstrated that suicide victims from these populations have alcohol present in their blood more often than do suicide victims from the corresponding local, non-indigenous populations. Lester [68] stated that knowledge about suicides in indigenous populations can challenge traditional theories of suicide, and he motivated investigators in this field to take ethnic background into account.

1.14 Suicides in the indigenous populations of the Russian Arctic: a historical overview

Our knowledge of the history of suicide in the Russian Arctic is based on ethnographic studies that started in the 18th century. Historical studies of suicide traditions [86] show that the Nenets and Chukchi had a custom of free-will (voluntary) self-inflicted death and self-inflicted death out of revenge in the middle of the 19th century. Kushelevsky said that such

deaths could be explained by a fear of punishment and considered them as a “sacrifice to the gods”. Interestingly, in the case of such sacrifice, hanging (“strangling”) was the preferred suicide method. Indeed, it was believed that disease demons could emerge from the body at the time of death, but that if hanging was used, the noose around the neck would keep any such demons from escaping. Ethnographers found several different suicide patterns and suicide traditions among indigenous people in Russia [86]:

- A custom of free-will (voluntary) self-inflicted death among the Chukchi and Nenets;
- A custom of voluntary death in the Chukchi called “battle with spirit(s)” (Lottery, 1765; Bogoraz, 1934);
- Suicide due to an inability to resist a disease (Chukchi, Nenets);
- The “*Taedium vitae*” phenomena (Bogoraz, 1916, 1934);
- The tradition of assisted suicide by hanging in the Chukchi (Bogoraz);
- Family suicides that have been described in Eastern Siberia (Kostrov, 1844);
- Suicide due to the belief that natural death was a shame in the Chukchi (Avgustinovich, 1878);
- Suicide due to a belief that natural death does not exist (Koty, 1933);
- Suicide as a survival strategy for families when the weak, old, and sick create problems (Bukharov, 1883);
- Suicide in expectation of a better life after death in the Nenets (Kushelevsky, 1868).

Ethnographic sources from the 19th century [87] say that Russian merchants played the most important role in the drinking habits of the Nenets, who have the highest level of alcohol consumption in Northwestern Russia. One source described how merchants from Mezen exchanged vodka for important staple items, like furs, meat, and other products with the Kolguev Nenets. All men, women, and at times even children, were drunk, and this drunkenness was often accompanied by violence, homicides, and suicides.

When the Mezen merchants left Kolguev Island due to reindeer deaths (a result of regular tundra icing), reindeer herders from the island were hired by locals from the Nenets village of Oksino, and the situation changed radically. The reindeer herders of the Sumarokov family from Oksino banned the delivery and use of vodka on Kolguev Island. They supplied the island with all the necessary goods and did not allow other merchants into the area, fearing that the locals would fall into drunkenness. This may be the first case of intervention and prevention of alcohol abuse among the indigenous people in Russian history.

After the Russian revolution and the civil war in 1917-1920, alcohol abuse in the region worsened again, as did the preservation of the traditional way of life of the indigenous people. The supply of vodka to local residents was organized rather well. In 1919, local reindeer herder Nikita Ardeev noted importantly, "The Reds [new Bolshevik power] brought so much alcohol to the island that the locals will not be able to drink it all until the end of next spring" [88]. In 1929, new regulations forced private and family reindeer operations to merge into collective farms, and the final blow to the traditional life of the Nenets people came when intensive oil extraction began in the 1980s and 1990s. After this, the lifestyle of the indigenous communities in the Russian Arctic changed dramatically. Their socioeconomic status was suppressed by the invasion of state and private mining companies, and the balance of ethnicity and nature was broken. The environmental changes, along with an undeveloped infrastructure, affected lifestyle, livelihood, culture, and physical and mental health and well-being [89]. In the 1990s, the introduction of new economic rules finally destroyed the cultural values of the indigenous peoples of this region and increased the risk of social deprivation, stress-related mental disorders, depression, addiction, and suicidal behavior.

Nowadays, suicide rates in the Russian Arctic (Table 1.1) demonstrate the differences between the populations, lifestyles, and many other factors. The territories with a higher proportion of indigenous people (NAO, Chukotka) have higher suicide rates (Table 1.2)

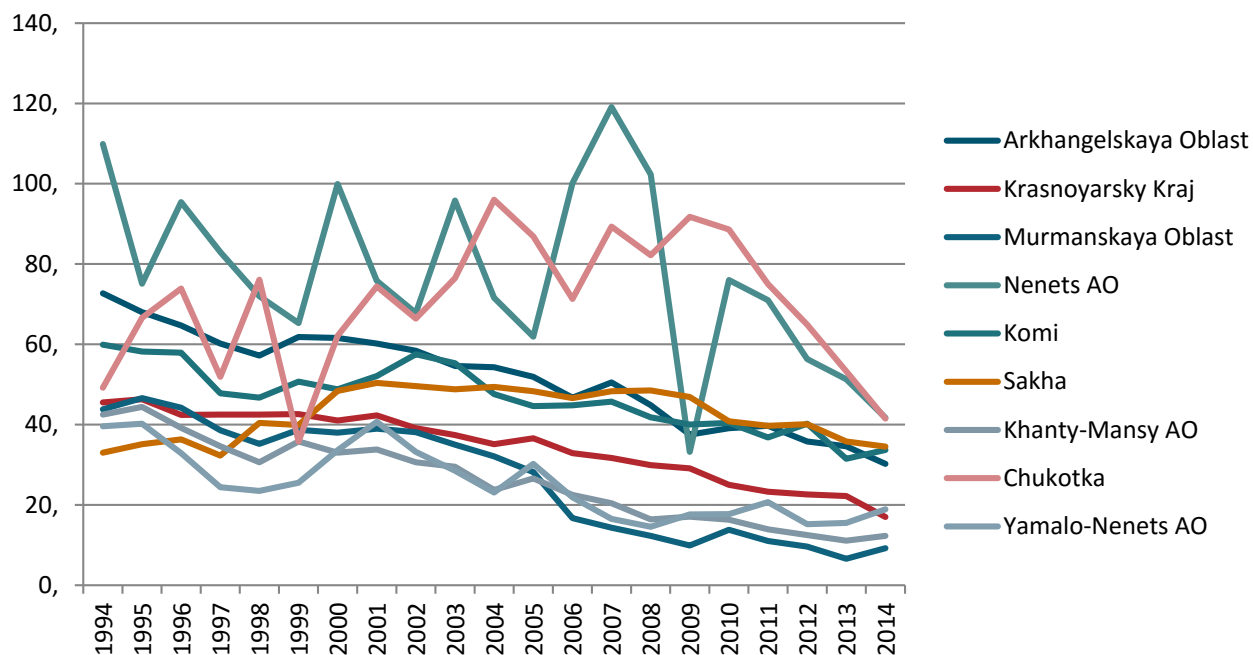


Figure 1.1 Suicide rates in the Russian Arctic (per 100,000 population), 1994-2014 Russian Federal Statistics Service (Rosstat)

AO: autonomous okrug

Table 1.2 Average suicide rates (per 100,000) for 1994-2014 and the proportions of indigenous people in the Russian Arctic by region

Region of Russian Arctic	Average suicide rate 1994 – 2014	Proportion of indigenous population (%), Census, 2010
NAO	77.0	17.8
Chukotka	63.1	32.8
Taymyr	50.1	24.8
Yakutia	40.1	3.8
Arkhangelsk Oblast	35.6	0.7
Murmansk oblast	26.9	0.2
Yamal-Nenets AO	26.2	9.8

AO: autonomous okrug

1.15 Risk and protective factors for suicide in indigenous populations

There have been many studies on the risk factors for suicide in indigenous populations. Most of the risk factors are common to many different population groups, and we can assume that some of these risk factors also exist in the Nenets society. Based on the existing evidence, we propose that the **risk factors for suicide** in indigenous populations are subject to several levels of influence [90, 91]:

1. National and regional-level influence: historical trauma, impact of collectivization and industrialization, forced relocation, and settlement.
2. Community-level influence: socioeconomic inequality and lack of access to health services.
3. Family-level influence: family history of suicide, intergenerational trauma, domestic violence, and boarding schools.
4. Personality-level influence: depression, substance abuse, mental disorders, history of self-harm, acute stress, hopelessness, and isolation.
5. Conditional-level influence: easy access to the most violent means of suicide (firearms, ropes, knives) and intoxication due to alcohol or drug use.

Protective factors for suicide in indigenous populations [91] are subject to the same influences:

1. National- and regional-level influence: cultural continuity and sustainability based on language, culture, and history.
2. Community-level influence: economic, social, educational, and health equity.
3. Family-level influence: supportive family with traditional life and native language environment.
4. Personality-level influence: access to ethnicity-specific mental health, social and emotional development, coping with acute stress, high level of resilience, and religious factors.

5. Conditional-level influence: restricted access to alcohol and drugs, alcohol and drug policy measures.

There is evidence that frequency of church attendance is associated with a decreased risk of attempted suicide among the Inuit (2). The Nenets religious culture is a mixture of traditional spirituality and Orthodox Christianity, which is probably why religion is not a crucial protective factor for suicide among the Nenets.

2 Chapter: Aims of the study

The overall aim of the study was to investigate suicide as a main mental health problem in the NAO.

The specific aims were:

- To describe the suicide rates among the indigenous and the non-indigenous populations of the NAO in 2002-2012 and to define the socio-demographic characteristics associated with suicide in each of these populations;
- To investigate variations in suicide rates, suicide methods, and suicide occurrence by month and day of the week among the indigenous and non-indigenous populations of the NAO and to compare the findings from NAO with national Russian statistics;
- To investigate the potential role of alcohol and alcohol consumption on suicides in the NAO in 2002-2012 and to compare NAO data with corresponding data from Arkhangelsk Oblast (AO) for the same period.

This study does not intend to describe cultural, sociological and anthropological aspects of suicides in NAO.

3 Chapter: Materials and methods

3.1 Study design

The present study is a retrospective, population-based mortality study, which includes all autopsied suicides in the NAO and the AO from 1 January 2002 to 31 December 2012. The variables used in each of three papers are presented below (Figure 3.1).

Variables considered in Paper I were: age group (<10, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, ≥70 years, unknown age), ethnic group (indigenous, non-indigenous), sex (male, female), area of residence (urban, rural), employment status (employers and employees; and other, including unemployed, retirees, students, dependents, and the disabled), education level (university/college, secondary school, incomplete secondary, or primary school), and marital status (married, divorced, widowed, single). All data were collected in the NAO. In Paper I, we answered the question: **who** commits suicide in the NAO? What were the socio-demographic characteristics of suicide victims?

Variables considered in Paper II were: ethnic group (indigenous, non-indigenous), sex (male, female), suicide method (hanging, firearm use, cutting, poisoning, jumping from a height, other), and month and day of the week suicide occurred. Data from the NAO were compared with national Russian statistics. In Paper II, the question was **how** are people committing suicide and **when** are they doing it? We described variations in suicide methods and suicide occurrence by month and day of the week between the indigenous and non-indigenous populations of the NAO.

Variables included in Paper III were: presence of alcohol in the blood, blood alcohol content (BAC, in ‰), age group (<10, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, ≥70 years, unknown age), ethnic group (indigenous, non-indigenous), sex (male, female), suicide method (hanging, firearm use, cutting, poisoning, jumping from a height, other) and alcohol sales in pure spirits per capita. Data from the NAO were compared with available data from the AO. In Paper III, we tried to explain **why** people in the NAO commit suicide more often than those in the AO. Our intention was to test the hypothesis of an association between prior alcohol use and suicide in the NAO.

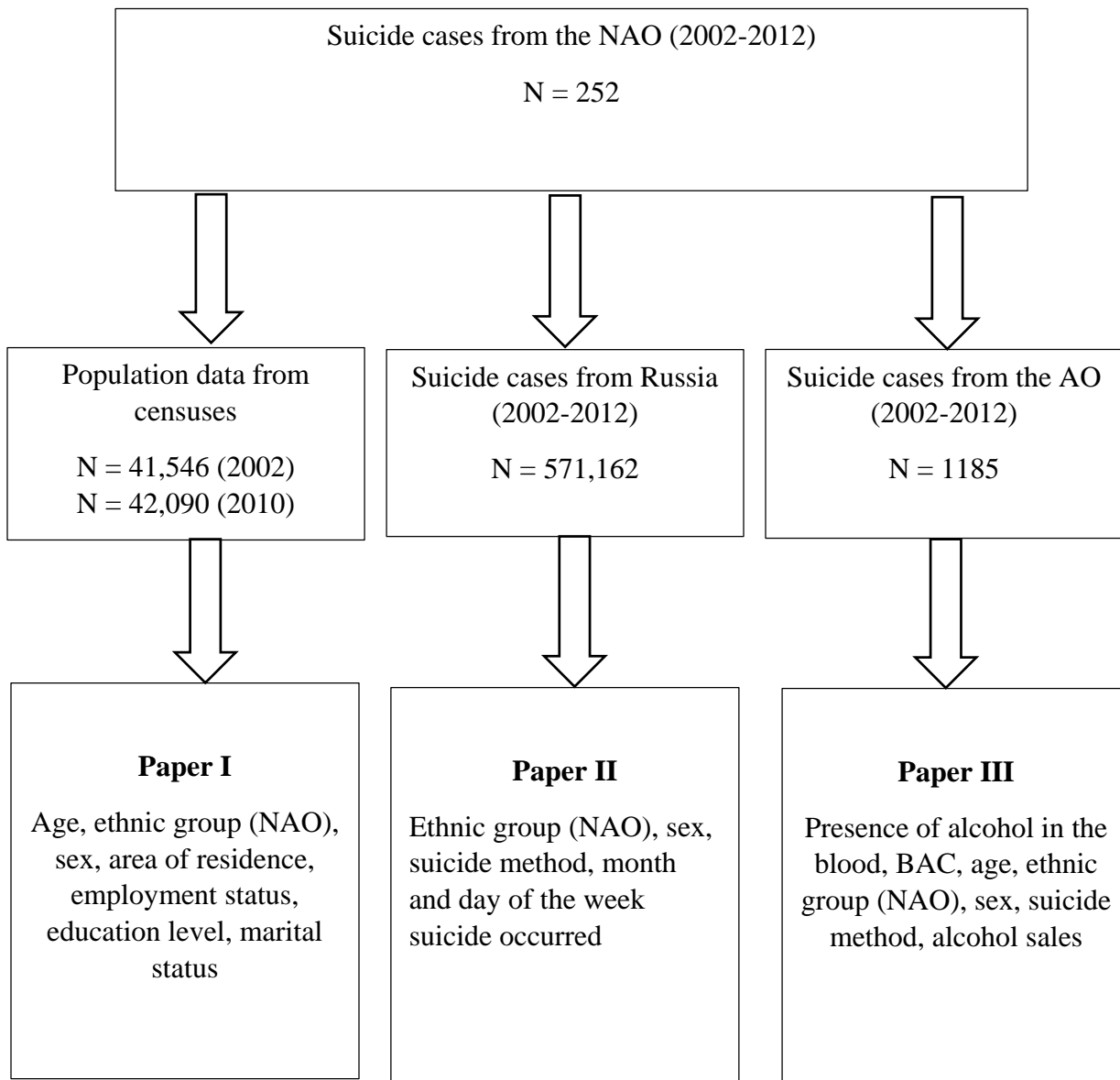


Figure 3.1 Flow chart of the study and included variables

3.2 Study setting and population

The NAO is situated in the Arctic region of the European part of the Russian Federation. The NAO covers about 177,000 square kilometers of Arctic tundra (including the islands of Kolguev and Vaigach), which is characterized by very short growing seasons and low temperatures (Figure 3.2).

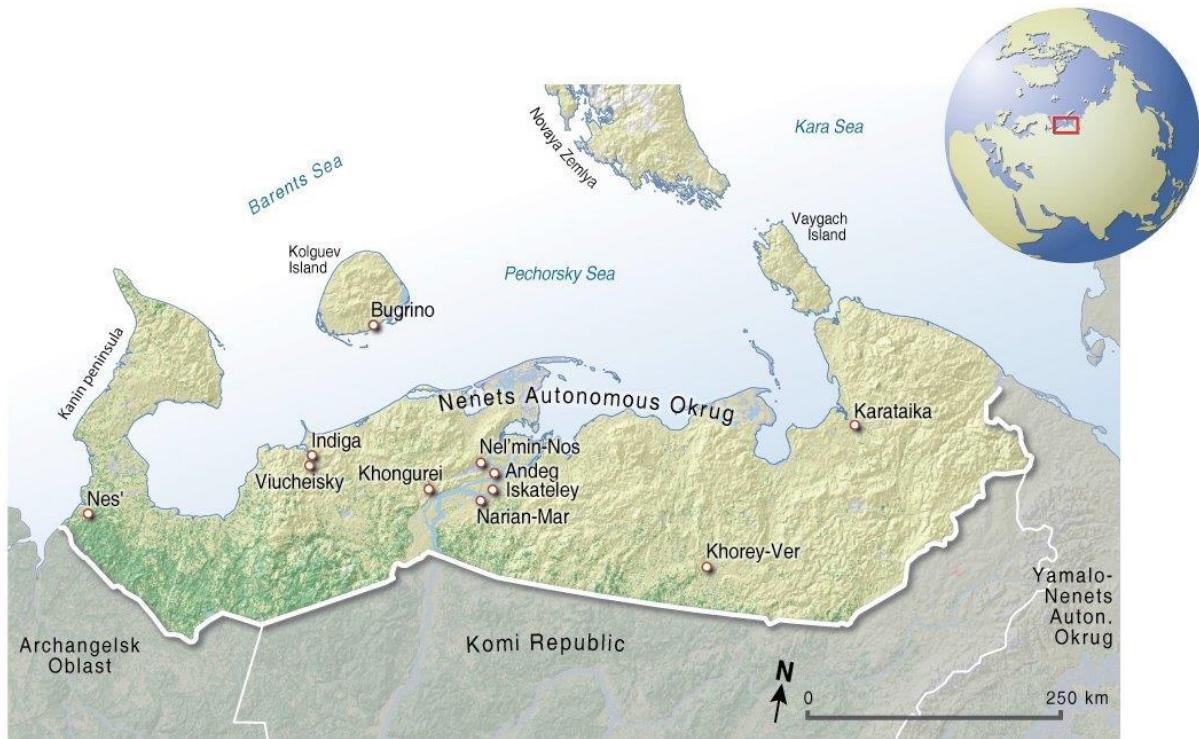


Figure 3.2 Map of the NAO (Source: GRID-Arendal)

All population data were extracted from the Official Census Reports compiled after the censuses of 2002 and 2010 [92, 93].

The total population of the NAO was 41,546 in 2002 and 42,090 in 2010 [92, 93]. The main ethnic groups residing in the NAO in 2010 were Russians (26,648, 63.3%), Indigenous Nenets (7504, 17.8%), and Komi (3623, 8.6%) [92, 93]. The Nenets are one of the largest indigenous population groups in Russia (more than 40,000 in 2010). They live mostly in four territories of the Russian Arctic: the NAO, the Yamalo-Nenets Okrug, the Taymyr Okrug, and the Khanty-Mansi Okrug. The Nenets language belongs to the Samoedic group of the Ural-Yukagirian language family. Ethnographers from the 19th and 20th centuries

characterized the Nenets as modest, quiet, composed, and laconic [86]. For many centuries, the traditional lifestyle of the Nenets was nomadic or semi-nomadic. Many Nenets still live in temporary (seasonal) settlements. The most common occupations are reindeer herding, hunting, fishing, harvesting, and production of handicrafts [94].

State support for the Nenets population was regulated by the Federal Law on Guarantees of the Rights of Indigenous and Small-Numbered Peoples, passed in 1999, which gave the Nenets a favorable status when applying for financial aid for families, children, and women, including several social security benefits, early pensions, easy access to higher education, etc. The passage of this law was followed by big lifestyle changes in the Nenets population, and these changes became more numerous during and after the Russian transition to a market economy in the 1990s. There remains a contradiction between the Russian legislation regarding the rights of indigenous populations and the international standards on this issue. For instance, Russia does not support the United Nations Declaration on the Rights of Indigenous People of 2007, and land and governance rights have not yet been introduced [27].

The neighboring area to the NAO is the AO. It covers a big part of Northwestern Russia, with an area of 587,400 square kilometers. The population of the AO in 2010 was 1,227,626 [93]. The AO is one of the most mono-ethnic Russian areas; the proportion of Russians was 95.6% in 2010, whereas the proportion of indigenous Nenets was only 0.6% [93]. The economies and prevailing industries are different across the two regions. In the NAO, incomes are mostly based on oil and gas extraction taxes (more than 90% of regional income). In the AO, woodworking, the pulp industry, minerals (diamonds), and transportation are considered the main sources of income. Average salaries in these regions are also different. During the study period (2002-2012), the AO demonstrated per capita incomes that were in line with average Russian figures (Figure 3.3), whereas incomes among the inhabitants of the NAO were much higher. The magnitude of this difference could be explained by the fact that the most common professions in the NAO include oil-miners, civil servants, and several other professional groups that are highly paid. However, the salaries of these groups are far higher than those of local reindeer herders. Indeed, the average salary in agriculture and reindeer herding was 19,607 rubles, compared to the regional average of

62,322 rubles. This income difference probably makes indigenous population in the NAO poorer and economically more deprived than the non-indigenous population.

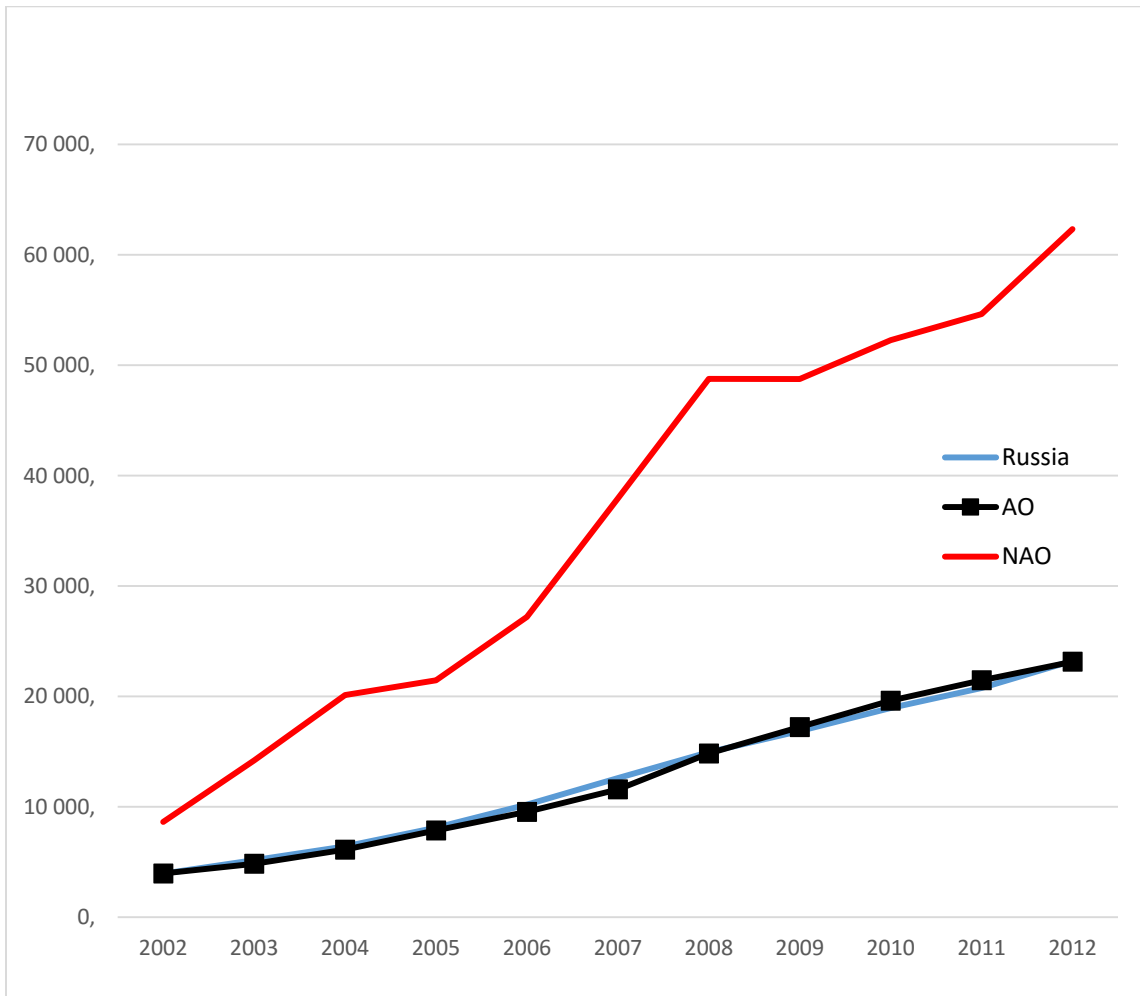


Figure 3.3 Monthly per capita income in Russia, the AO, and the NAO (in Rubles), 2002-2012 (Calculated from: Rosstat).

3.3 Data sources and description

3.3.1 Literature review and examples of studies on indigenous suicide

The databases Medline/PubMed, PsycINFO, and eLibrary were searched for publications on suicide in indigenous populations employing the search terms “indigenous suicide” and “aboriginal suicide”. To be considered in the literature review, retrieved articles had to meet the following eligibility criteria: full text in either English or Russian that contained descriptions of data on suicide rates, suicide risk factors and protective factors, suicide methods, seasonal variations, and patterns of suicide. One of the main selection criterion was based on the quantitative study approach. The reference lists of the retrieved articles were also searched for other relevant papers. Information on geography, study description, study design, sample description, and main outputs (conclusions) were taken from each article. Thirty-two of the retrieved articles on suicides among the indigenous people met the criteria above and thus were relevant for our study (Table 3.1). These papers were divided into five groups according to their study design. There were 10 studies with a cross-sectional design, nine observational (descriptive, ecological) studies, four case-control studies, and three cohort studies. The remaining papers were literature reviews (6). Most of the studies were concentrated in few countries (Australia, United States, Canada, Brazil, and Norway). The overall picture the retrieved publications showed was that most recent studies on indigenous and ethnic suicidology in the world were descriptive or cross-sectional studies, with a lack of information on suicide risks, seasonal factors, and cultural factors, and a low geographical distribution.

Table 3.1 Studies on suicide in indigenous populations

NN	Country, year, reference number, study description	Study design	Data description, variables used	Results
1.	Greenland, 1979 [40] Investigation of all cases of attempted or completed suicide among Greenlanders	Observational study	Social, emotional, somatic, and environmental predisposing factors	Almost 2 per 1000 adults committed suicide yearly, while attempted suicide was five times as frequent.
2.	Canada, 1992 [42] Review of the epidemiology of injuries in the multiethnic population	Observational study	Mortality, hospital morbidity, and health survey data	Of the three major groups in the Northwest Territories, the overall injury mortality rate was comparable between Indians and Inuit, but these rates were twice as high as those of the non-native population.
3.	Fiji, 1996 [25] Study of autopsy reports of individuals who committed suicide by hanging and poisoning from two distinct regions of Fiji	Cross-sectional study	Autopsy data	The rate of autopsy among Indians (19.5 per 100,000) was significantly greater ($p < 0.0001$) than among Fijians (1.53). There was a significant racial difference in the rates of suicide, but the influences of region, age, and suicide method were relatively slight.
4.	United States, 1996 [53] Cases of completed suicides over a 6-year period and cases of attempted suicide over a 15-month period were identified on the Plains Indian Reservation. The pattern of utilization of health services by these subjects prior to completed or attempted suicide was compared with that of control subjects who were	Case-control study	Cases of completed and attempted suicide	American Indians who committed suicide were less likely to use clinical services provided by the Indian Health Service prior to their death. However, there was a relatively strong association between attempted suicide and prior use of health services, particularly the use of mental health services.

	matched for age and sex			
5.	United States, Australia, 1998 [44] Study on commonalties and differences in injury experience among the indigenous people in the United States and Australia	Cross-sectional study	Mortality data from the registers of USA and Australia	Suicide accounted for more deaths in Native Americans (15.5 per 100,000) than Australian Aboriginals (11.1 per 100,000), whereas the injury death rate in Australian Aboriginals due to poisoning was almost twice that of Native Americans.
6.	Australia, 1999 [51] Study of patterns of victims, circumstances, and locations of drownings in Australia in 1992-1997	Observational study	Population figures and available details of all drownings (accidental non-boating drownings, boating incidents, homicide, suicide) were obtained from the Australian Bureau of Statistics	Indigenous people had a much higher drowning rate than the general population.
7.	Canada, 2000 [41] Review of recent research on the mental health of the First Nations, Inuit, and Métis of Canada	Literature review	Summary of the evidence on the social origins of mental health problems	Cultural discontinuity and oppression have been linked to high rates of depression, alcoholism, suicide, and violence in many communities, with the greatest impact on youth. Research is needed to identify the factors that promote wellness. Cultural psychiatry can contribute to rethinking mental health services and health promotion for indigenous populations and communities.
8.	Russia, 2000 [28] Study of peculiarities of suicide prevalence in different ethnic groups of one Russian region (Udmurt Republic).	Observational study	Records of National Health Statistics	The Finno-Ugric had a suicide rate of 113.4 per 100,000, which was 1.8 times higher than the similar index in the Slavic population (62.5 per 100,000). Suicide rates in Finno-Ugric males were 177 per 100,000. Historical traditions and peculiarities (high sensitivity) were found among the Finno-Ugric.

9.	Canada, 2001 [22] Case-control study of completed suicides between 1982 and 1996, and population-based living control subjects	Case-control study	Medical charts were reviewed for data on socio-demographic characteristics, medical and psychiatric history, childhood separations and family history, and use of health care services	The two principal means of suicide were hanging (in 39 cases [54.9%]) and firearm (in 21 cases [29.6%]). About 33% of subjects had been in contact with medical personnel in the month before their death. Case subjects were significantly more likely than control subjects to have received a lifetime psychiatric diagnosis. Case subjects had experienced more severe types of non-psychiatric illnesses and injuries than control subjects. Case subjects had more lifetime contacts with health care services than control subjects.
10.	United States, 2002 [83] Study the relationship between alcohol use prior to suicide among the descendants of American Indians in New Mexico for the years 1980 through 1998	Observational study	New Mexico Vital Statistics and toxicology reports from the New Mexico Office of the Medical Investigator	Presence of alcohol was detected in 69% of all suicides of American Indians with some variation by major tribal cultural group (range: 62.1%-84.4%). This was higher than that found in suicides among the overall population of New Mexico (44.3%). The mean BAC of the Indian decedents who had been drinking at the time of suicide was 0.198 (SD 0.088). Mean BACs were high for both males (0.199) and females (0.180) who had been drinking. Over 90% of the Indian decedents who had been drinking had BACs greater than the legal intoxication level of 0.08.
11.	Australia, 2002 [24] Investigation of coronial files related to suicide in Aboriginal people and other people in the	Cross-sectional study	Coronial determinations of suicide in the Top End for the years 1991-1998 were examined using a structured coding instrument	Hanging was a prominent method of suicide among Aboriginal people. Aboriginals who committed suicide were more likely to have a history of self-harm behavior. The study

	Top End			showed regional differences in suicide risk among different Aboriginal populations in the Top End.
12.	Australia, New Zealand, Canada, United States, 2002 [61] Review of the literature on self-harm and suicide among indigenous populations in four nations with histories of British colonization	Literature review	Studies on self-harm and suicides from four countries with a more detailed exploration of patterns and primary care considerations in the Australian Aboriginal and Torres Strait Islander populations	Issues of definition, under-reporting, lack of reporting, varying coronial practices, and the influence of race on investigative procedures make comparisons of suicide rates among these indigenous populations problematic. However, international interpretations highlight the impact of the breakdown of cultural structures and historical processes associated with colonization.
13.	New Zealand, 2003 [54] Description of patterns of suicide and attempted suicide among the indigenous (Maori) population of New Zealand	Observational study	Data from the New Zealand Health Information Service	The majority of Maori suicides (75%) occurred in people aged <35 years. Rates of suicide were higher among Maori males and females aged <25 years than in their non-Maori peers.
14.	Australia, 2006 [56] Retrospective descriptive analysis of completed suicides from the Northern Territories between 1981 and 2002	Cross-sectional study	Australian Bureau of Statistics death registration data and data from the Northern Territories Coroner's Office	The age-adjusted suicide rate in the Northern Territories increased significantly between 1981 and 2002 ($p < 0.001$). Over this period, the rates among the indigenous and non-indigenous male populations increased by 800% ($p < 0.05$) and 30% ($p > 0.05$), respectively. Indigenous males aged <45 years and non-indigenous males aged ≥ 65 were most at risk. In the Top End, a history of diagnosed mental illness was present in 49% of suicide cases, and misuse of alcohol or other drugs around the time of death was

				associated with 72% of suicide cases.
15.	World, 2006 [68] Review of the studies of suicides in indigenous peoples	Literature review	Suicides in indigenous peoples were explored in different nations, both within nations containing many types of indigenous peoples and across cultures	Studies of indigenous peoples can be used to test existing theories of suicide and generate new theories of suicide.
16.	Norway, 2006 [12] Examination of suicide mortality between 1970 and 1998 in a Sami cohort	Cohort study	Cohort of 19,801 persons categorized as indigenous Sami in Arctic Norway. Standardized mortality ratios (SMR) were calculated, using the suicide rates of the rural population of Arctic Norway as a reference	There was a significant, moderate increased risk of suicide among indigenous Sami (SMR=1.27). In the study period, 89 suicides occurred in the cohort (70 men and 19 women), with increased suicide mortality both for indigenous Sami males (SMR=1.27) and females (SMR=1.27). Significant increased suicide mortality was found among Sami aged 15-24 for both males (SMR=1.82) and females (SMR=3.17). Significant increased suicide mortality was found for indigenous Sami males residing in the Sami core area (SMR=1.54) and for indigenous Sami males who were not semi-nomadic reindeer herders (SMR=1.30). Clusters of suicides in the Sami core area may explain the increased suicide mortality found in subgroups of indigenous Sami.
17.	Canada, USA [39] Literature review of papers on indigenous resilience research	Literature review	Papers on indigenous resilience research	Two frameworks could help to orient indigenous resilience research. One is the enculturation framework (refers to the degree of integration within a culture). A second conceptual framework is the cultural spiritual orientation, which distinguishes between cultural spiritual orientations and tribal spiritual beliefs.

				Enculturation and cultural orientations are protective against alcohol abuse, suicidal ideation, and attempted suicide.
18.	Norway, 2009 [23] Register-based follow-up study (Study I) and the North Norwegian Youth Study (Study II)--a longitudinal questionnaire study conducted in 1994-1995 and 1997-1998	Register-based cohort study	The cohort from Study I included 19,801 persons with Sami ethnic ancestry, 10,573 (53.4%) men and 9228 (46.6%) women. The cross-sectional sample analyzed in Study II (1994/1995/T1) included 2691 adolescents (1402 females, 52%, and 1289 males, 48%) aged 16-18 years	There was a significant moderate increased risk of suicide in indigenous Sami (SMR=1.27) compared to the reference population. When it comes to attempted suicide, no ethnic differences in the prevalence of attempted suicide were found between Sami adolescents and their non-Sami peers.
19.	Australia, 2011 [21] Study of trends and methods of suicides the indigenous population in 1994-2007	Cross-sectional study	Queensland Suicide Register	Between 1994 and 2007, indigenous populations had suicide rates 2.2 times higher than non-indigenous Australians did. Age-specific suicide rates for indigenous men were highest in the 25-34-year age group, while in women they were highest among 15-24-year-olds. In children <15 years, the suicide rate for the indigenous population was almost ten times higher than that of their non-indigenous counterparts. More than 90% of indigenous suicides occurred by hanging.
20.	Brazil, 2012 [57] This study compared suicide mortality rates between the indigenous and non-indigenous people in five regions of the country in 2006-2010	Cross-sectional study	Suicide rates	The suicide rates among indigenous people in Brazil were more than double that observed among non-indigenous people.

21.	Australia, 2012 [45] Study of the factors related to cases of Indigenous suicide recorded in Queensland between 1994 and 2007. Comparison of the reported prevalence of mental disorders in Indigenous and non-Indigenous suicide cases. Examination of possible differences in previous suicidal behavior and communication of suicidal intent (e.g., verbal statements and suicide notes)	Cross-sectional study	Data obtained from the Queensland Suicide Register.	Compared to non-Indigenous suicides, Indigenous cases had lower odds of being diagnosed with unipolar depression, of seeking treatment for psychiatric conditions, or of leaving a suicide note. Indigenous cases of suicide had greater odds of verbally communicating suicidal intent and of having a history of alcohol and substance use.
22.	Australia, 2012 [46] This study explored the spatial pattern of suicide risks for the whole of Australia with a reliable set of suicide data from the NCIS	Observational (ecological, descriptive) study	Suicide data from the National Coroners Information System. Population figures from the census.	Socioeconomic deprivation, compositional factors, high risks for indigenous people and low access to mental health services were the underlying explanations of the elevated suicide rates in some areas
23.	Australia, 2012 [47] Thematic analysis of key factors associated with indigenous and non-indigenous suicide in the Northern Territory, Australia	Cross-sectional study.	The sample of coronial reports (411) from the national internet-based data storage and retrieval system for Australian coronial cases, the National Coroners Information System	The relative importance of social and contextual factors was confirmed for people at high risk of suicide in rural, remote, and indigenous populations.
24.	Australia, 2013 [48] Study of suicidal ideation and attempted suicide in a community cohort of urban Aboriginal youth	Cohort study	Data were obtained from the Victorian Aboriginal Health Service, Young People's Project, a community-initiated cross-sectional dataset	Suicidal ideation and attempted suicide were common in this cross-section of indigenous youth with an unfavorable profile for the emotional, social, cultural, and behavioral factors investigated.
25.	Canada, 2013 [95] Review of 16 studies with	Literature review	Systematically reviewed electronic databases for studies that included	Low sense of belonging had a weak association with suicidality. However, current concepts made it

	assessments of suicidality and sense of belonging		assessments of suicidality and belonging	hard to distinguish low sense of belonging from loneliness or other measures of social support. An alternative view of belongingness, as a sense of connectedness to things other than people and in the past as well as the present, may generate alternative ideas about useful clinical interventions that may be especially relevant to indigenous populations.
26.	Brazil, 2013 [58] Analysis of mortality rates and the demographic and epidemiological characteristics of suicides recorded in the state of Amazonas	Observational study	Mortality data (2005-2009) from the Informatics Department of the Unified National Health System	Suicide rates were 6-8 times higher in the municipalities, where the proportion of self-reported indigenous population was high. It was observed that most of the suicides occurred among men; among young men aged 15-24 years; at home; by hanging; during the weekend; and among the indigenous population.
27.	Australia, 2014 [49] Study aimed to identify socio-demographic and contextual characteristics of suicide clusters from national and regional analyses of suicide clusters	Case-control study	Data from the National Coroners Information System for all suicides in Australia from 2004 to 2008	Suicides by people who lived in rural and remote areas were more likely to be part of a suicide cluster than suicides by people living in other areas. Suicides by Indigenous people had heightened risk of being clustered.
28.	Australia, 2014 [50] Suicides in Indigenous children (10-14 years) were compared to those in other Australian children of the same age	Cross-sectional study	Register-based data on suicides in children	Indigenous children were significantly more likely to commit suicide outside the home, to be living outside the parental home at the time of death, and be living in remote or very remote areas. Indigenous children were found to consume alcohol more frequently before

				suicide compared to other Australian children. Current and past treatment for psychiatric disorders were significantly less common among Indigenous children compared to other Australian children.
29.	Canada, 2015 [55] Suicide cases among the Inuit (n=120) that occurred between January 1, 2003, and December 31, 2006 in Nunavut. For each case subject, a community-matched control subject (n=120) was selected.	Matched case-control study	Suicide cases and matched controls. Structured interviews with informants to obtain life histories.	Among Inuit in Nunavut, as in the general population, mental health disorders and early life adversity were major risk factors for suicide. In addition, control subjects also presented high rates of psychiatric disorders.
30.	Ireland, USA, 2016 [60] Review of research literature on teenage suicide	Literature review	Publications from 2003 to 2014 were extracted from comprehensive, relevant psychological and medical databases	The sex paradox of elevated suicidality in females and higher completed suicide rates in males was observed in teenage populations worldwide, with the exception of China and India. Native and indigenous ethnic minority teens are at significantly increased risk of suicide in comparison to general population peers.
31.	Brazil, 2016 [59]	Observational (descriptive ecological) study	Mortality data from the Information Department of the Brazilian Unified Health System	The suicide risk among the indigenous population was 8.1 times higher than in the non-indigenous population. For indigenous residents in the 15-24-year age group, the risk was 18.5 times higher than in the non-indigenous population. The majority of indigenous cases were concentrated in a few villages.

32.	<p>USA, 2016 [96]</p> <p>The analysis of cross-sectional data from the tribal suicide surveillance systems collected in two cycles 1990-2000 and 2001-2009 in the rural Northwest region of Alaska</p>	Cross-sectional study	Data from suicide surveillance systems	<p>The study found a significant seasonal pattern in suicidal behavior, with monthly variation (summer peak between April and August) in non-fatal suicidal behavior among younger age groups, and among both males and females.</p>
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3.3.2 Obtaining forensic and medical data from the NAO and the AO

Autopsy reports from the Regional Bureau of Forensic Medicine Expertise (BFME) (Figure 3.4) in the city of Naryan-Mar in the NAO were used to identify cases of suicide (Appendix A.3).



Figure 3.4 BFME in Naryan-Mar, February, 2014

A forensic expert becomes involved in suicides to rule out any criminal aspect. Usually, the expert performs an autopsy, during which he/she establishes the cause of death, conducts a study of clothing and physical evidence, does a toxicological analysis, and looks for objects for laboratory examination. All of this culminates in an expert conclusion and an autopsy report, as well as contributions to the police reports. This includes interviewing anyone who might be able to contribute information about the circumstances of the death, such as family members, friends, and work colleagues. determining if the suicide victim had any interactions with the police prior to the event, collecting evidence of the victim's suicidal

intentions, as well as information regarding the victim's mood, state of mind, level of intoxication, and other appropriate matters. Formal public investigations are sometimes held in specific circumstances, such as deaths in police custody, prison, or hospital (Appendix A.3).

Autopsies in the NAO are performed either at the BFME in Naryan-Mar or on-site. Planes and helicopters are often used to transport experts to distant areas of the Nenets tundra when on-site autopsies are required. Otherwise, representatives of the police or prosecutors transport the corpses, as well as material evidence. At times only parts of the corpse are available for autopsy, and at times the corpse has not been identified at the time of autopsy. After delivery, the forensic expert receives orders and accompanying documents, as well as a copy of the minutes of the examination of the corpse on-site. If the corpse comes from a medical institution, the corresponding medical file is also sent. To ensure that an autopsy is complete, it is preferable to have the same expert who examined the corpse on-site to conduct it. Representatives of the police and prosecutors monitor the autopsy.

Autopsies are performed at varying intervals after death, sometimes months after death, but in our suicide cases autopsies were usually performed according to regulations and no earlier than 12 hours after death. Moreover, at the time of autopsy, the forensic expert did not always have the provisional information on the circumstances of death or the medical history of the subject.

For the cases of suicide included in our study, data on ethnic group, urban/rural residence, occupation, education level, and marital status were obtained from passports and medical records at local primary care units, with support from primary health care workers (doctors, nurses, and "feldshers"- rural doctor's assistants), who underwent special training for data collection and registration in December 2010. Correctness of the data obtained from medical records was checked by primary health care workers and double-checked by the first author (Appendix A.2). Cases were classified as being of Nenets ethnicity based on the ethnicity of family members, passport information, and anthropological findings [97]. All the information on suicides was consolidated in the annual reports of the BFME (Appendix A.4).

Forensic data on suicides from the AO (2002-2012) were obtained from the forensic records and reports of the Regional BFME in Arkhangelsk. The forensic experts from both regions – the NAO and the AO – used the same standards of autopsy and the same equipment. All cases of death by suicide in the NAO and the AO were classified in accordance with the ICD-10 (ICD-10 codes X60-X84 and Y87.0) [3]. The ICD-10 has been used in Russia, the NAO, and the AO since 1999. Forensic data from the AO included presence of alcohol in the blood, BAC, age, ethnic group, sex, and suicide method. Data from the AO and the NAO did not include psychiatric diseases, genetic predisposition, or suicide attempts. Data from the AO did not include socio-demographic variables, or the month and day of the week when suicide was committed.

3.3.3 Measuring BAC

Postmortem measurement of BAC is standard procedure at both the BFME in the NAO and the AO [98]. An expert classifies the detected concentration of ethanol in the blood. Each interval of alcohol concentration has a corresponding degree of alcohol intoxication. In accordance with the guidelines of the Ministry of Health and the criteria for practical expertise, the following approximate schema was used to determine the severity of inebriation:

- lack of effect of alcohol: $\leq 0.5\text{‰}$
- light degree of intoxication: 0.6-1.5‰
- moderate degree of intoxication: 1.5-2.0‰
- strong degree of intoxication: 2.0-3.0‰
- heavy poisoning: 3.0-5.0‰
- fatal poisoning: $> 5.0\text{‰}$

The bodily location of blood sampling for analysis was of particular interest. Peripheral venous blood is taken from the femoral or brachial vein. It is prohibited to take a blood from the heart due to the risk of postmortem diffusion of alcohol from the stomach to the heart. BAC was measured in the BFMEs in Naryan-Mar and Arkhangelsk by gas chromatography.

Alcohol in decomposed samples was interpreted with caution, as alcohol may be lost due to evaporation or produced by microbial activity during the decomposition process [99]. This was also a reason to exclude some victims from BAC testing.

3.3.4 Data collection

We collected data (Figure 3.1) on suicides that occurred in 2002-2012 in the NAO and the AO. We also obtained National data on suicides from the Russian Federation (2002-2012).

For suicides occurring during the study period in the NAO (N=252), we had data on age, ethnic group, sex, area of residence, employment status, education level, marital status, suicide method, date, month, and day of the week suicide occurred, presence of alcohol in the blood, BAC, and alcohol sales. Data on the general population of the NAO, including population size, population distribution by ethnic group, and other considered socio-demographic characteristics (sex, urban/rural residence, occupation, education level, and marital status) were obtained from the Official Russian Censuses of 2002 and 2010. No other socio-demographic data were available on the NAO population between or after these two censuses.

For suicides occurring during the study period in the AO (N=1185), we had data on presence of alcohol in the blood, BAC, age, sex, suicide method, and alcohol sales, which were collected from the forensic records of the Arkhangelsk BFMG

Data on suicides that occurred in the Russian Federation during the study period (N=571,162) were obtained from the Russian Federal Statistics Service (Rosstat), using anonymous micro-data on all deaths from external causes recorded in the National Mortality Database in 2002-2012, and disaggregated by sex, suicide method, and month and day of the week suicide occurred.

3.4 Statistical analysis

The person-year (PY) approach was used to estimate suicide rates for the Nenets population and the non-indigenous population, as well as according to the considered socio-demographic characteristics within these populations. No information on history of self-harm or attempted suicide was available for the cases of suicide in the present study. For these reasons the

denominators in our calculations of suicide rates were estimates rather than true numbers. The number of PY of risk in each population was computed as the average population for each ethnic group in the 2002 and 2010 censuses multiplied by 11 (number of years of observation). Suicide rates were calculated as the number of suicides per 100,000 PY. Relative risk estimates were calculated as ratios of suicide rates in analogue socio-demographic subgroups of the Nenets population and the non-indigenous population.

Data in all three papers were presented as absolute numbers and proportions. The Chi-square test and Fisher's exact test were used to calculate the differences in categorical variables between the studied groups. To test whether the distribution of suicides in the studied groups was equal on the time axes (months of the year and days of the week), the observed distribution of suicides was compared with a hypothesized equal distribution by the Chi-square goodness of fit test. Microsoft Excel and IBM SPSS Statistics v.21.0 were used for data storage and analyses.

3.5 Ethical considerations

The study was approved on 23 June 2010 by the Ethical Committee of the Northern State Medical University, Arkhangelsk, Russia. None of the data variables accessed for the purposes of this study by non-employees of the health centers and forensic bureau could be used for personal identification.

4 Chapter: Main results

4.1 Paper I

Based on autopsy data, 252 suicides were recorded in the NAO in 2002-2012. The crude suicide rates were 79.8 per 100,000 PYs in the Nenets population and 49.2 per 100,000 PYs in the non-indigenous population. The corresponding standardized estimates were 72.7 per 100,000 PYs and 50.7 per 100,000 PYs. The highest suicide rates in the Nenets population were observed in the age group 20-29 years (391 per 100,000 PYs), and in females aged 30-39 years (191 per 100,000 PYs). Socio-demographic characteristics associated with high suicide rates in the Nenets population were age 20-39 years, male sex, urban residence, having a secondary school or higher education, being an employee or employer, and being single or divorced. Males aged 20-29 years, and females aged 30-39 and 70 years and above had the highest suicide rates in the non-indigenous population (137.5, 21.6, and 29.9 per 100,000 PYs, respectively). The elevated suicide rates observed in the non-indigenous population were associated with male sex, rural residence, secondary school education, being an employee or employer, and being single or divorced.

4.2 Paper II

Data on all variables of the 252 suicide cases diagnosed in the NAO in Paper I were considered in Paper II, in addition to suicide methods, and month and day of the week suicide occurred.

There were 571,162 cases of suicide (474,882 males and 96,280 females) identified in the Russian Federation during the study period, giving a suicide rate in 2002-2012 of 36.0 per 100,000 PY. Data on suicide method were available for all cases; data on month and day of the week of suicide were obtainable for 455,489 (79.7%) cases.

Hanging was the most common suicide method in the NAO in both indigenous and non-indigenous populations. The proportion of suicides by hanging among males was lower in the NAO than in national data (69.3% vs 86.2%), but the inverse was true for females (86.5% vs 74.9%). Suicide by firearm and by cutting was significantly higher among the indigenous population in the NAO when compared with national data. The peaks in suicide occurrence were in May and September in the NAO, whereas national data showed only one peak in

May. Among the indigenous population of the NAO, suicide was highest in April, while the non-indigenous population showed peaks in May and September. Suicide occurrence in the NAO was highest on Fridays; in national data this occurrence was highest on Mondays.

4.3 Paper III

Data on BAC were obtained from 228 of the suicide cases in our NAO dataset. Mean age for these cases was 36.02 and 39.12 years for male and females, respectively. Mean BAC was 2.02‰ in males and 2.14‰ in females.

The autopsy data on BAC from the AO during the same period included 1185 suicides (977 males and 208 females) with a mean age of 44.54 and 50.21 for males and females, respectively. Mean BAC levels were 2.54‰ in males and 2.56‰ in females.

Of the 228 suicide cases with BAC data in the NAO, alcohol was found in the blood of 74.1% of males and 82.9% of females. That was significantly higher than the proportion of suicides with alcohol found in the blood in the AO (59.3% of male and 46.6% female cases). Low and high BAC (<1.0‰ and 2.0-3.0‰) were more frequently found among suicide cases in the NAO than in the AO.

5 Chapter: Discussion

5.1 Methodological considerations

5.1.1 Reliability of diagnoses

Using the diagnosis of “suicide” for analysis and comparison in this study seems to be a well-accepted model. Doctors and forensic experts established the diagnoses we used for comparison, and we assumed that they were of an acceptable quality. However, this may not be the case. Indeed, medical diagnoses in Russia have been questioned for many years. Zaridze et al [100] published a study on forensic autopsy diagnoses, mainly on deaths from cardiovascular disease, and concluded that a large amount of the forensic diagnoses were “mal-classifications”. Mathers et al [101], Naghavi et al [102], and Ahern et al [103] described what they called “ill-defined codes” or “garbage codes”. According to the WHO, garbage diagnoses represent a major national and international diagnostic problem.

The ICD-10 (and preceding ICD-9) includes a broad spectrum of classifications that can be used when it is not clear if a diagnosis of suicide is appropriate. For example, the classifications within “injury deaths of undetermined intent” (ICD-10 codes Y10-Y34) are widely used for making vague diagnoses in cases where there is insufficient information for medical and legal experts to draw solid conclusions. These codes enable experts to classify deaths that may include both violent and suicidal aspects as having more innocuous causes. Thus these diagnoses cannot be used to conclude whether or not a given death was an accident or was due to violence, murder, or injury [104]. A quantitative analyses showed that the interviews performed by professionals involved in the diagnosis and coding of causes of death were reliable to diagnose suicide in the Russian Federation [105]. But a more detailed analysis showed that this was not the case when it was compared with the reality, for example for teenage suicides [106].

The use of the forensic-expert-assigned diagnosis of “suicide” as the cause of death likely does not causes any problems in our study. We assume the specificity of this diagnosis to be relatively high, whereas the sensitivity may be slightly lower because some suicides may have gone undetected or were given other codes of unintentional self-harm (e.g., vehicle

crashes, drownings, falls, acute alcohol and drug poisonings, or homicides). This issue probably exists in other studies as well, and thus had no substantial effect in our study.

On the other hand, the unwillingness of competent authorities to attempt to understand the cause of death in detail is such that if no external cause is apparent, it is imperative to have a forensic expert and investigator leading the case. The under-reporting of suicides may be due to how it is calculated in the official statistics system. Indeed, although Russian legislation states that investigations into deaths should be completed within 1 month, in reality this deadline is often not respected, thus the death certificate indicates "Manner of death is not defined". Paradoxically, an underestimation of deaths from socially important causes like suicide, especially suicide among teenagers, can lead decision-makers to turn their attention away from these important issues. For example, a group of researchers found that there has been systematic underestimation of teenage suicides in Russia throughout the 2000s amounting to 13.8% in young men and 22.1% in young women [106]. Unfortunately, in such situations the regional leadership often seeks not to solve existing problems, but to downplay their scope.

5.1.2 Representativity and strengths

The comprehensive information collected and recorded in autopsy reports by forensic experts may be seen as a strength of our study. Indeed, this work was well organized in the NAO, with planes and helicopters used when necessary to transport forensic experts to the sites of possible suicides. The region is relatively transparent, and it is easy to get a good overview. Moreover, we had the cooperation of all local primary health care centers and rural health care workers for the present study.

The police and the Investigation Committee of the Russian Federation investigate all suicides in order to identify potential criminal cases, and forensic examination immediately follows the primary police investigation. The role of forensic experts is to classify the cause of death according to the ICD-10 [98]. The final classification is assigned based on the autopsy and the investigative process, all of which improve the validity of the classification.

To our knowledge, this is the first time that detailed information on suicides from all of Russia has been published. Thus, not only can we present data from the NAO, but we can

also compare those data with the rest of Russia with respect to suicide method, and month and day of the week of suicide occurrence.

This study also benefited from standard Russian forensic procedures, which allow for autopsies to be performed in 100% of accidental death cases. The same methods and procedures were used to determine and measure BAC in both forensic centers. All data used in the study were checked and double-checked by health workers at the site and by the authors. The collection of data for all suicides in both regions, as well as complete autopsy data including BAC, gave us the unique opportunity to compare these indicators of alcohol consumption in the suicide cases of two neighboring regions in the Northwest of Russia: one populated with almost 100% ethnic Russians (AO), and the other with a considerable proportion of indigenous peoples (NAO).

5.1.3 Weaknesses and limitations

No information on mental disorder and depression, history of deliberate self-harm, or attempted suicide was available for the cases of suicide included in the present study. Neither was there any information on history of mental disease, especially depression, among the cases. Data for the general population of the NAO were obtained only from the 2002 and 2010 censuses. There were no other available data on age and sex distribution and other socio-demographic variables in the NAO during the study period. For these reasons the denominators in our calculations of suicide rates were estimates rather than true numbers. This may have biased our results to some degree, but this potential bias would not be sufficiently large to explain our findings.

Marital status was not available in 50 (19.8%) cases. Census data consisted of the different subgroups of jobless individuals, including retirees and those receiving different types of financial aid from the state. The proportion of those officially “unemployed” (registered in the database of labor services) in the NAO is very low. Otherwise, we have tried to minimize the limitations by performing a detailed analysis of each case included in the database.

Many of the observed differences can only be presented as tendencies of variations. Indeed, although differences were observed, only some of them reached statistical

significance. This may be explained by the small absolute number of cases in a sparsely-populated area. The study included all suicides reported in the NAO during the 11-year study period (252 cases), but this sample did not have sufficient statistical power to firmly investigate differences between the indigenous and non-indigenous populations, and specifically in subgroups of these populations defined by other variables in the study. Altogether, 24 cases with missing or incomplete values on BAC in the NAO and 13 from the AO were excluded from further analyses. This probably did not have any substantial impact on the general picture, and thus likely did not influence our results. This missing data was mainly due to the considerable amount of time that had passed between the date of death and the date the bodies were found and identified, conditions that made an exact determination of BAC almost impossible.

The dataset from the AO was not complete for the entire oblast, as some of the smaller districts have their forensic examinations done at local laboratories. All data from the AO in the study was based on examinations performed at the main regional forensic center in the city of Arkhangelsk. Nevertheless, we do not think that the mentioned conditions impacted our results in any substantial way.

5.1.4 Measurement errors

Statistics of incidence of certain diagnoses in a small population group is a source of measurement error. Suicide rates easily inflate in a small population like the NAO and deflate in a big population like the AO and Russia [107]. This may also happen when we compare suicide rates in indigenous and non-indigenous populations. For example, a single falsely-registered or non-registered suicide case could produce much more influence on the suicide rate in a small population group than a big one.

Assessment of BAC can produce some errors, as it may change shortly after death. When the body is properly stored in the morgue (temperatures of approximately +5⁰ C), BAC is maintained at the same level for many days. The decomposition process may increase BAC up to 1.5‰ due to the vital activity of microorganisms in the blood. For example, widespread injury may cause bacteria to spread, which can lead to ethanol production after death.

However, forensic experts take ante mortem ingestion and postmortem synthesis of ethanol into consideration when BAC is decided [108].

5.2 Discussion of main findings

5.2.1 Suicide rates

Males showed higher suicide rates than females in both the indigenous and non-indigenous populations of the NAO. Similar findings have been underlined by Durkheim [109] and confirmed by many sources [72]. In our study, males 20-29 years of age in both the indigenous and non-indigenous populations had the highest risk of suicide. This is probably the most vulnerable age for males, as it is at a time when they graduate from school, attend military service, or start their independent life. They may not get the job they want; they may get lost between fantasy and reality; they may fall in love or a relationship with a partner may end. These life events can cause emotional stress and confusion. Adults may have an easier time dealing with these feelings, but young people have little or no such experience. Furthermore, it is between 20 and 29 years of age that males are exposed to alcohol and can legally consume it.

Nenets females had the highest risk of suicide in the age group 30-39 years. In these high-risk age groups (20-29 years in males and 30-39 years in females) many struggle to find themselves and their place in society, and when they cannot manage to solve their social problems, they become more vulnerable. The critical age period for suicide may be later for females due to factors like marriage and family building, as having small children and family obligations may postpone suicidal ideations [110]. The defined age and sex associations we found for suicide in the NAO are in line with the findings of other studies performed in Russia [72] and abroad [111, 112]. Relatively low suicide rates in Nenets males over 50 may be connected to the short life expectancy of Nenets males, which was below 56 years during the study period [92, 93].

Some of the problems happen due to lack of access to suitable mental health care professionals with whom difficulties can be discussed and lack of formal support. Indeed, indigenous people often have difficulty talking about their problems and have many reasons for not talking with family and peers. Indigenous people of all ages face barriers in sharing

their distressing emotions, and this inability to seek and get help can lead to self-harm and suicide [113].

Regarding suicide rates, we took into account the potential for a lower sensitivity, which may contribute to an under-reporting (underestimation) of suicide rates. This is closely connected with the reliability of the diagnosis of suicide discussed in paragraph 5.1.1.

5.2.2 Socio-demographic factors

Nenets living in urban areas had higher suicide rates than did non-indigenous populations. This is opposite to what has been seen in other areas of Russia, where rural populations have higher suicide rates than urban populations [11, 114]. Again, one reason for this may be a lack of integration in the traditional lifestyle, accompanied by easier access to alcohol in urban areas. Indeed, a suicide-protective effect of traditional lifestyle and a strong sense of belonging [39, 95] have been reported in studies from other indigenous populations [68, 115, 116]. It is possible that urban life may create an unusual social and cultural environment for some of indigenous people. In fact, they are not accepted as minorities in the NAO. Racism and discrimination in the area was a historical fact in the beginning of the 20th century. Nowadays this racism has probably transformed into other types of separation – economical, cultural, and social. The territory and cities of the NAO are actively exploited by newcomers from all over the world, and the Nenets living in urban areas feel the acculturation stress caused by “imported” cultures, traditions, and relations. This influence should be investigated in detail in further studies.

The non-indigenous population living in rural areas showed high suicide rates. This is in line with the situation in most Russian territories. For example, individuals living in a rural area of the AO had higher suicide rates than those living in urban areas of the same region [11]. Social deprivation is more common among those living in rural than in urban areas of Russia, especially among non-indigenous populations. Economic depression, unemployment, and heavy alcohol consumption are also more widespread in Russian rural areas [11]. Similar findings have been reported in other studies [28, 117]

5.2.3 Suicide methods

Hanging was more often used as a suicide method in Russia, and was one of the main suicide methods among the indigenous population, especially in females. Indeed, it was used considerably more often among females in the NAO than has been reported in other world studies [8], perhaps because rope is more available to females in the NAO. According to the custom of free-will self-inflicted death among different indigenous populations, the use of strangulation was based on a fear of punishment. Moreover, in the traditional understanding and spiritual culture of the indigenous peoples of the Russian North and Far East, strangulation closes the route for “bad spirits” to escape. Thus suicide victims that use hanging protect the community from harm that could be imposed by these spirits [68]. Nevertheless, our finding that hanging was less common in the NAO than in Russia may represent a change in traditional thinking. It may also be explained by the availability and access to other, more violent methods, like firearms and knives used in hunting, a survival instrument for hunters and reindeer herders, especially among men. Suicides by firearm increased in the NAO, and suicides by cutting were more prevalent in the NAO than in Russia at large. It seems impossible to limit access to ropes and knives for the purpose of suicide prevention, but restricting access to firearms may be possible [17, 66].

5.2.4 Variations in suicide occurrence by month and day of the week

National data on seasonality of suicides from 2002-2012 showed a peak in spring (May) and a winter decrease (November-December). This is in accordance with previous Russian studies [118]. Our study population in the NAO lives far up in the Arctic, where winter depression might be seen as a potential risk factor for suicide. However, the opposite seemed to be true; the peak in suicide occurrence was seen at the end of winter/beginning of spring, when sunlight increased. Like in Russia, spring was the most frequent time to commit suicide in the NAO.

Spring peaks of suicides have also been reported in many studies and from different countries [119]. According to Durkheim, suicidal behavior is related to social stress, which depends on agricultural and other circular activities [109]. Studies from Europe [66], the United States and Canada [63], Japan [64], Australia [120], and South Africa [65] also

showed that suicides were more frequent in spring. Nevertheless, some exceptions are possible. The newest study showed a summer peak in suicides among Alaskans [96].

Previous studies have suggested various reasons for the spring seasonality of suicides. This season is related to increases in melatonin, cortisol, serotonin, and L tryptophan activity [121]. All these hormones play key roles in the regulation of emotions. Emotional dysfunction may lead to depression, which in its turn may lead to suicide. The social situation in spring, with longer working days, may also have an impact on stress levels and alcohol misuse and lead to psychosocial problems and an increased risk of suicide.

The traditional Nenets lifestyle is one of cyclic agricultural activity and reindeer herding. Winter is a period of hard work, the movements of families and reindeer, and major changes in everyday life. On the other hand, April is the time of completion of winter reindeer activities, and spring often brings sexual relationships and sometimes complicated loves and losses, which may increase the risk of suicide.

The increase in sunshine in the spring may also explain the April-May peak in suicide occurrence observed in both ethnic groups in the NAO. A recent study based on mathematical modeling [122] suggested that sunshine may be a potential driver of suicide, as sunlight can affect the human mind after a long period of little light or darkness. This study supported the hypothesis that sunshine up to 10 days prior to suicide may actually facilitate suicide [122].

The distribution of suicides in Russia by day of the week showed a peak on Mondays, which has been reported in previous studies [118, 123]. This is more related to the traditional urban lifestyle, in which weekends and holidays are followed by a higher risk of hopelessness, loneliness, and despair. Post-holiday and Monday suicide risk was explained by Durkheim's theory of "anomia" [70, 109]. The traditional lifestyle of indigenous people in the NAO does not differentiate between weekends and work days, but this does not apply to the non-indigenous population. This difference only influenced the males in our study. For females, the inverse was observed, with indigenous females being more likely to commit suicide on the weekend. Our suggestion is that holidays are riskier periods for suicide in indigenous females and non-indigenous males in the NAO.

5.2.5 Suicide and presence of alcohol in the blood

Our findings from the AO on the presence of alcohol in the blood (59.3% of males and 46.6% of females) showed the same tendency as other Russian regions [123, 124]. Results from the NAO showed a higher prevalence of alcohol in the blood of suicide cases in both sexes compared with Russia and the AO (74.1% in males and 82.9% in females).

Mean BAC in the AO and the NAO was higher than in studies from other countries. Mean BAC in Native American suicide victims from New Mexico was 1.99‰ in males and 1.80‰ in females [83]. A Swedish study showed mean BAC of 1.34‰ in male suicide cases and 1.25‰ in females [79]. A Brazilian study of suicides reported a BAC of 1.84‰ for females and 1.8‰ for males [125]. There were no available studies on BAC from other Russian regions.

Our study is in accordance with a previous conclusion that the presence of alcohol in the blood of suicide victims in Russia is high [126]. This suggests that alcohol drinking has an important role in suicides in the NAO and other indigenous territories. We found a higher suicide rate and a higher prevalence of alcohol in the blood of male and female suicide cases in the NAO than in the AO. This may be understood as an outcome of the proximal risk (according to Hufford): acute intoxication is an important risk factor for suicidal behavior, as alcohol helps to overcome resistance to committing suicide [73].

The relationship between alcohol abuse and suicidal behavior is not a direct, causal one. The effect of alcohol on suicide rate is mediated by several factors and, above all, a degree of social anomie and the general level of deviance in society [127].

After death, ethanol in the body can be lost due to evaporation or produced due to microbial activity. When the body is properly stored in the morgue (temperatures of approximately +5⁰ C), BAC is maintained at the same level for many days, but bacteria released during the decomposition process may increase BAC up to 1.5‰. Thus, in order to exclude the potential confounding impact of postmortem time difference, we calculated the postmortem time for suicide cases in the NAO and the AO, our concern being that the time-span between death and the measurement of BAC might be longer in the NAO (due to logistical difficulties in its large, sparsely-populated areas). However, the postmortem time

for suicide cases in the NAO and the AO were not significantly different (5.3 and 4.8 days, respectively), and thus did not explain the difference in BAC we observed across the two regions.

The forensic literature on the issue of BAC measurements and time after death did not lend any support to our idea [128, 129], and in forensic practice, the need to distinguish between ante mortem ingestion and postmortem synthesis of ethanol persists. The forensic expert took into consideration ante-mortem alcohol ingestion and post mortem alcohol synthesis when establishing BAC [108]. We thus concluded that the higher BAC levels in suicide cases from the AO could not be explained by more frequent heavy drinking prior to suicide.

5.2.6 Overall study perspective

Our study is a first attempt to explore the phenomenon of suicide in the indigenous and non-indigenous populations of the Russian Arctic. Our findings do not reflect all the possible patterns of suicide in the NAO. The wider perspective of this study and new approaches will be used in future studies.

1. Many of the possible risk factors for suicide besides the alcohol abuse were not investigated. Psychiatric diagnoses were not included in the study due to the lack of access to psychiatric care in remote areas of the Arctic. Previous studies [45] showed that indigenous people who committed suicide had lower odds of being diagnosed with unipolar depression, of seeking treatment for psychiatric conditions, or of leaving a suicide note compared to non-indigenous people who committed suicide.
2. The Nenets society is characterized by high level of social and income inequality. The high average salary (Figure 3.3) in the NAO does not reflect the real-life conditions of most indigenous reindeer herders, whose incomes are much lower than those of oil-miners or civil servants in the region [94].
3. Many of the indigenous children and adolescents from reindeer herding families have lower access to education and family support. Boarding schools still exist in the region and try to create the proper conditions for study and support. But these schools still separate children from their families, traditional life, and things like their language and

culture, which are protective factors against suicide. As a result, the schools do not prepare these youngsters for a traditional life. Although the indigenous Nenets have easy access to higher education, they still have lower educational status than the non-indigenous population [93]. So being lost between the “Western” lifestyle and traditional Nenets culture may constitute one of the highest risks for suicide.

4. We did not carry out analyses within subgroups of Nenet reindeer herders, as their numbers were small. It is likely that a dedicated study of suicide is warranted in this subgroup, and it should include reindeer herding from several Arctic regions, including the NAO, Yamal, Taymyr, and Sakha. Widening the study area will increase the sample size, which will help to identify differences and similarities within the occupation group represented by different ethnicities.
5. There is evidence that indigenous people who committed suicide were more likely to verbally communicate their suicidal intent [45]. On the personality level, we know very little about resilience in the Nenets population. Perhaps traditional lifestyle, language, culture, and other attitudes should be investigated more. We have many anthropological and ethnographic data, but we still have no links between these studies and medical and psychological studies of indigenous peoples in the Russian North.
6. Higher suicide rates among the indigenous Nenets may also be explained by biological and genetic factors. Unfortunately, at present there are no any studies on this topic that have been performed in Russia, and there is a lack of evidence from studies abroad. This gap may be closed in future studies.

6 Chapter: Conclusions and further research

The most relevant findings from the study are:

The suicide rate in the indigenous Nenets population of the NAO is higher than in the non-indigenous population in the region, and higher than the national average in Russia. The most vulnerable age groups were 20-29 years in men and 30-39 years in women. Single or divorced individuals also showed a higher risk.

Hanging was the most common suicide method in females, whereas men more frequently used firearms and cutting. April was the month with the highest occurrence of suicide, and Friday was the weekday with the highest suicide incidence.

Alcohol was found in the blood of three-quarters of male suicide cases and more than four-fifths of female suicide cases in the NAO, compared with 59.3% and 46% in the AO, respectively. Corresponding figures for the indigenous population of the NAO were even higher, with 78.3% in males and 92.3% in females. The highest occurrence of alcohol in the blood was found in females who committed suicide by hanging and in males using knives or firearms.

Finally, we moved to a better and deeper understanding of the main mental health problems, emphasized at the beginning by Dr Apitsyn. Here, the NAO could be used as an example of an Arctic region with a high indigenous population. How could this information be applied in prevention programs for the indigenous population in the NAO?

First, the indigenous population needs to get information about the results of this study. This must take place in meetings with local health authorities and leaders of the indigenous population. It is crucial to focus on the indigenous lifestyle and activities in the seasons when most suicides take place, and to identify potential stress factors that may increase the risk of suicide. A variety of hypotheses should be discussed and tested, including the change in physiology and hormonal activity, darkness – lightness problems, and change in lifestyle connected with seasonal activity, which characterizes the life of indigenous peoples. Emphasis should be put on the age groups with the highest risk, and on the single and divorced individuals within these age groups.

Old superstitions and beliefs may represent an extra risk for females (see paragraph 1.4) who commit suicide by hanging. Firm and convincing information on this item from health authorities is essential if these old beliefs are to be ruled out as an important act to honor the gods.

Alcohol seems to play an important role in suicides among indigenous peoples, as has been seen in similar populations in other countries. Lawmakers and local authorities must be convinced that measures need to be taken in order to reduce alcohol intake in the population [130]. Accessibility to and prices of alcohol are essential in this connection, and some restrictions have already been introduced in the NAO. In addition to accessibility and prices, opening hours, an age-limit for buying liquor, restricted opening hours before holidays and long weekends, not selling to drunk people, and eventual quota regulations should be considered [130].

This is the first study of suicides among the indigenous people of the Russian Arctic, and there is a strong motivation to continue our research. Further studies of suicide among the Nenets and other Arctic indigenous groups are needed. These studies should also give us more information on attempted suicide among the Nenets, and provide data on the frequency, severity, and duration of suicidal thoughts. These studies should combine different approaches, including quantitative and qualitative methods, and analyze environmental, genetic, and psychological factors that influence suicidal behavior among the Nenets. For this large-scale surveys will be necessary [131].

To increase the knowledge on the situation that existed before suicide, a psychological autopsy could be applied: a forensic psychologist or a skilled clinical psychologist would interview the family, friends, or colleagues of suicide victims. The resultant information on the status of deceased individuals before they took their life may be of use for preventive measures.

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Appendices

A.1 Agreement on cooperation between the Northern State Medical University and NAO health authorities (Russian and English versions)

СОГЛАШЕНИЕ

о сотрудничестве в рамках выполнения научно-практической работы
«Изучение факторов риска суицидов в Ненецком автономном округе»

г. Нарьян-Мар

" 28 " декабря 2010г.

Государственное образовательное учреждение высшего профессионального образования «Северный государственный медицинский университет» Росздрава (г. Архангельск) в лице ректора, академика РАМН, профессора Сидорова Павла Ивановича, именуемый в дальнейшем "Университет", с одной стороны, и Управление здравоохранения и социальной защиты населения Ненецкого автономного округа в лице Начальника Управления Апицина Андрея Ананьевича, именуемое в дальнейшем "Управление", с другой стороны, при совместном упоминании «Стороны», заключили настоящее соглашение о нижеследующем:

1. ПРЕДМЕТ СОГЛАШЕНИЯ

Предметом настоящего соглашения является осуществление Университетом по поручению Управления научно-практической работы – «Изучение факторов риска суицидов в Ненецком автономном округе».

2. ОБЯЗАТЕЛЬСТВА СТОРОН

2.1. Обязательства Университета:

- осуществить исследование факторов риска суицидов на территории Ненецкого автономного округа;
- выполнение работ осуществлять в строгом соответствии с этическими нормами и правилами;
- на основе полученных результатов подготовить предложения в перечень мероприятий по профилактике суицидов в Ненецком автономном округе;
- отчитаться перед Управлением по результатам работы.

2.2. Обязательства Управления:

- содействовать проведению научно-исследовательской работы;
- обеспечить внедрение результатов работы в практику здравоохранения Ненецкого автономного округа.

AGREEMENT

on cooperation within framework of performance of research and practice work
“Study of Suicide Risk Factors in the Nenets Autonomous Area”

Naryan-Mar

28 December 2010

The State Educational Institution of Higher Professional Education “Northern State Medical University” Roszdrav (Arkhangelsk) represented by the Rector, Academician RAMS, Professor Sidorov Pavel Ivanovitch, hereinafter referred to as “University” for one part and the Department of Healthcare and Population Social Security represented by the Department Head Apitsin Andrey Ananyevitch hereinafter referred to as “Department” for the other part, the jointly mentioned “Parties” have concluded the present Agreement on the following:

1. SUBJECT OF AGREEMENT

The subject of the Agreement is implementation by the University on behalf of the Department of the research and practice work - “Study of Suicide Risk Factors in the Nenets Autonomous Area”.

2. OBLIGATIONS OF PARTIES

2.1. Obligations of University:

- to implement the study of suicide risk factors on the territory of the Nenets Autonomous Area;
- to carry out the work in strict compliance with the code of ethics;
- on the grounds of obtained results, to prepare proposals for the list of suicide prevention measures in the Nenets Autonomous Area;
- to report the work results to the Department.

2.2. Obligations of Department:

- to assist in the research work performance;
- to assure introduction of the work results into healthcare practice in the Nenets Autonomous Area.

3. SPECIAL TERMS

- 3.1. The obtained and created research and practice information on the subject of the present Agreement is intellectual property and is to be protected in the framework of the current legislation.
- 3.2. The obtained results can be used by both Parties independently.
- 3.3. The Parties will exert joint efforts in search of potential sources of financing of research works.

4. PERIOD OF AGREEMENT

- 4.1. Period of the present Agreement:
 - 4.1.1. Beginning: 28 December 2010.
 - 4.1.2. Termination: 31 December 2011.
- 4.2. The period of the present Agreement can be extended by mutual consent of the Parties.

Head of Department of
Healthcare and Population
Social Security of Nenets
Autonomous Area

Rector SEI HPE "Northern
State Medical University" Roszdrav
Academician RAMS, Professor

_____/ A.A. Apitsin

_____/ P.I. Sidorov

A.2 Suicide registration form (Russian and English versions)

Регистрационная форма суицидов

Уважаемый коллега! В рамках подготовки региональной программы профилактики суицидов планируется изучение ряда вопросов, связанных с эпидемиологией суицида на территории НАО. Просим Вас заполнить прилагаемую карту по каждому случаю незавершенного суицида. Результаты исследования позволят нам учесть различные факторы, влияющие на суицидальный процесс и суицидальное поведение. Просим (по возможности) выслать заполненные анкеты на **E-mail:** sumja@nsmu.ru или sioury@mail.ru

1. Номер
2. Дата суицида
3. Пол
4. Возраст
5. Этническая принадлежность (национальность)
6. Профессия
7. Образование
8. Семейное положение
9. Тип самоубийства (отметить)
 - повешение,
 - нанесение порезов,
 - огнестрельное,
 - отравление лекарством, химическим веществом
 - прыжок с высоты
 - другое
10. Уровень алкоголя в крови (если известен) _____
11. Другие комментарии

Благодарим Вас за сотрудничество!

Registration form for completed suicides.

Dear colleague! In the framework of preparation of a regional program for suicide prevention, it is planned to study a set of issues connected with suicide epidemiology in the NAO territory. Please fill in the enclosed card for each case of completed suicides. The study results will allow us to take into account different factors effecting suicidal process and suicidal behavior. Please (as far as possible) send filled in forms to **E-mail: sumja@nsmu.ru или sioury@mail.ru**

1. Number
2. Date of suicide
3. Sex
4. Age
5. Ethnicity (nationality)
6. Employment
7. Education
8. Marital status
9. Suicide type (specify)
 - hanging,
 - cutting,
 - firearm use,
 - medicine poisoning, chemical substance poisoning
 - jump from a height
 - other
10. Blood alcohol level (if it is known)_____
11. Other comments

Thank you for co-operation!

A.3 Forensic autopsy act (Russian and English versions)

АКТ СУДЕБНО-МЕДИЦИНСКОГО ИССЛЕДОВАНИЯ (образец)

Дата, место и условия.

Имя и данные эксперта.

Труп. ФИО и год рождения

Присутствующие при исследовании:

ВОПРОСЫ, ПОСТАВЛЕННЫЕ ПЕРЕД ЭКСПЕРТОМ:

ОБСТОЯТЕЛЬСТВА ДЕЛА:

НАРУЖНОЕ ИССЛЕДОВАНИЕ:

ВНУТРЕННЕЕ ИССЛЕДОВАНИЕ:

ДАННЫЕ ЛАБОРАТОРНЫХ ИССЛЕДОВАНИЙ: Из акта судебно-химического исследования

СУДЕБНО-МЕДИЦИНСКИЙ ДИАГНОЗ:

ЗАКЛЮЧЕНИЕ:

На основании судебно-медицинского исследования трупа ФИО, хх года рождения, принимая во внимание обстоятельства дела, изложенные в направлении, данные лабораторных исследований, прихожу к следующему заключению:

1. Смерть наступила от...(причина)
2. Телесные повреждения в виде (описание) **причинены от нескольких минут, но не более 1 часа до момента наступления смерти,**
3. При **судебно-химическом исследовании** в крови от трупа обнаружен этиловый спирт. Концентрация ... промилле. Другие алифатические спирты (не) обнаружены.

THE FORENSIC AUTOPSY ACT (example)

Date, place and circumstances.

Name and data of Expert.

The body: Name and birth year

Autopsy was performed in presence of:

QUESTIONS POSED TO THE EXPERT:

THE CIRCUMSTANCES OF THE CASE:

EXTERNAL STUDY:

INTERNAL STUDY:

LABORATORY STUDIES: From the Act of forensic chemical study

MEDICAL DIAGNOSIS:

CONCLUSION:

Based on the forensic examination of the corpse's name, xx year of birth, taking into account the facts of the case, laboratory data, I'm concluding the following:

1. The death was due to ... (main cause of death)
2. Injuries (description) **were ... in a few minutes but not more than 1:00 before the moment of death,**
3. Ethanol was (or was not) discovered in blood of the body during **forensic chemical study**. The blood alcohol content is....promille. Other aliphatic alcohols (not) found.

A.4 Summary report on persons died from suicide and registered in the NAO Bureau of Forensic Medical Expertise (Russian and English versions).

