Knowledge, Beliefs and Practice of Sleep Hygiene as a Determinant of Insomnia among the Employed Adult Population of Yerevan

Master of Public Health Integrating Experience Project

A Research Grant Proposal

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List of Abbreviations

ACTH – Adenocorticotropic Hormone

AIS – Athens Insomnia Scale

AMD – Armenian Drams

AMS – Acute Mountain Sickness

BMI – Body Mass Index

CBT – Cognitive Behavioral Therapy

CBT-I – Cognitive Behavioral Therapy for Insomnia

CD – Canadian Dollars

CHSR – Center for Health Research and Development

DAG – Directed Acyclic Graph

GH – Growth Hormone

ICSD – International Classification of Sleep Disorders

IRB – Institutional Review Board

KBP – Knowledge, Belief and Practices

MD – Medical Doctor

MPH – Master of Public Health

NREM – Non-rapid eye movement

PhD – Philosophy Doctor

PD – Parkinson's disease

REM – Rapid eye movement

SBS – Sleep Belief Scale

SD – Standard deviation

SHI – Sleep Hygiene Index

SKQ – Sleep Knowledge Questionnaire

SPH – School of Public Health

US – United States

USA – United States of America

USD – United States Dollars

Executive Summary

Background: Sleep is a crucial phenomenon that involves complex metabolic and nervous activities that help the human body grow, maintain and repair itself. A lot of key players in human physiology responsible for health are involved and enhanced during sleep. Insomnia is a sleep disorder distinguished by disruption of normal sleep and therefore restoration from sleep on the next day. It impacts the day to day activities of the individual and, overall, results in impairing consequences on general wellbeing. Its symptoms are reflected upon sleep initiation, maintenance, quality and morning awakening. Insomnia is of biological and psychological nature and is associated with immense physical and mental comorbidity. Its risk factors include older age, female sex, morbid conditions, mediocre sleep hygiene, alcohol and substance abuse, medications, and type of work shift.

The public health burden of insomnia is characterized by its high prevalence and association to a variety of health conditions. Moreover, the personal burden is quite high due to impairment of quality of life, daytime functioning and social relationships. Lastly, the economic losses associated by absenteeism and low productivity of the insomniac person at the workplace are substantial. Different types of treatments for insomnia are suggested but with arguable scientific evidence supporting each. Sleep hygiene therapy and/or education is one of those treatments with no empirical evidence supporting its efficacy since sleep hygiene was proven effective in treating insomnia only in conjunction with behavioral interventions. Sleep hygiene is a set of practices - during the day and at bedtime - and conditions of the surrounding sleep environment that promote high quality restorative sleep. Poor sleep hygiene shows significant association with insomnia and other sleep disorders and therefore deserves attention.

Data about Armenia reflects a prevalence of any insomnia complaint of 52.5% among the general adult population, and is no different from the profile of the burden revealed in the literature. The association of sleep hygiene and insomnia among population of Armenia has not been studied before.

Study aim and research questions: The aim of this study is to examine Knowledge, Beliefs and Practice (KBP) of Sleep Hygiene as a determinant of insomnia among employed adult population of Yerevan of age 18 and above through (1) Estimation of mean KBP score of sleep hygiene among the employed adult population of Yerevan, (2) Assessment of insomnia prevalence among the employed adult population of Yerevan, and (3) Testing for association between insomnia status and sleep hygiene KBP subdomain scores.

Methods: A cross-sectional household survey will be conducted and data collection will be done through interviewer-administered surveys. The target population is the employed adult population of Yerevan. The instrument of the study captures knowledge, beliefs and practices of sleep hygiene, insomnia status, covariates and sociodemographic variables. Double data entry, data merging and cleaning will be done in an SPSS database. Statistical analyses will include descriptive statistics for all variables, bivariate comparisons between insomnia and non-insomnia groups by running student t-tests for indiscrete variables, chi squared tests for categorical

variables, and fitting three logistic regression models to test for significance of association between insomnia status and the three sleep hygiene subdomains.

Ethical Considerations: The Institutional Review Board of the American University of Armenia approved the planned grant proposal.

Logistical considerations: The proposed study will last for four months and will include a team consisting of a project director, statistician, data collectors and data entry operators. The estimated amount of funds to be allocated for this study is **4,130,000 AMD.**

I. Research Question, Study Rationale, Aims and Objectives

The literature reflects the importance of exploring the gap in research about the association between sleep hygiene and insomnia. Given the huge burden of this sleeping disorder on individual well-being, the economic burden as a consequence of absenteeism and low productivity, and the public health relevance due to presence of substantial morbidity and decreased quality of life, and finally, the absence of a similar study done in Armenia, this research grant proposal intends to answer the following research question:

- Is Knowledge, Belief and Practice (KBP) of Sleep Hygiene a significant determinant of insomnia among the employed adult population of Yerevan?

The aim of this study is to examine Knowledge, Beliefs and Practice of Sleep Hygiene as a determinant of insomnia among employed adult population of Yerevan of age 18 and above.

Objective 1 – Estimation of mean KBP score of sleep hygiene among the employed adult population of Yerevan.

Objective 2 – Assessment of insomnia prevalence among the employed adult population of Yerevan.

Objective 3 – Testing for association between insomnia status and sleep hygiene KBP subdomain scores.

II. Background/Literature Review

1- Sleep and Health

Sleep is indispensable and an essential physiological function. Merriam-Webster dictionary's definition of sleep is "the natural periodic suspension of consciousness during which the powers

of the body are restored".[1] It consists of alternating successions of Non-Rapid Eye Movement (NREM) and Rapid Eye Movement (REM) sleep, each of which has a unique task in the process of rest.[2] Non-Rapid Eye Movement Sleep is characterized by four stages; one through four – which are the portion of sleep during which the brain produces alpha and theta waves (Stage 1), then the brain's wave frequency abruptly increases to produce sleep spindles followed by a decrease in such frequency (Stage 2).[3] The first two stages represent the lighter sleep, from which one can be easily awakened, whereas stages 3 and 4 represent deeper sleep throughout which the brain starts releasing delta waves and awakening becomes more difficult due to the low responsiveness of the body to external stimuli.[3] As the name suggests, NREM sleep shows negligible eye movement and muscular activity.[3] Rapid Eye Movement (REM) sleep is when active processes in the body occur; this is the dynamic stage of sleep that comprises rapid twitching of the eyes, dreaming, consolidating things learned and memories by stimulating learning centers of the brain's cortex, in contrast to NREM sleep that includes processes such as promotion of growth, tissue and muscle repair, strengthens the immune system and restores energy for the next day.[3,4] Throughout development, the human brain releases growth hormones (GH) during sleep[5] that is vital for longitudinal growth and organ development in children and young adults.[6] Adequate sleep ensures the rejuvenation of organs and tissues and allows muscle relaxation; these mechanisms are essential for everyday functioning.[7] It has a role in mending heart and blood vessels cells.[8] Moreover, the removal of toxins from the brain, consolidation of memories and the creation of learning pathways all occur during sleep[9] and eventually shape focus and attention during wake-time.[10] Through such activity, sleep has an important influence on decision making and performance.[11] Sleep is also crucial for various physiological activities in the body such as the regulation of glucose metabolism through influencing responsiveness of

pancreatic β-cells to the concentration of glucose in the bloodstream and the sensitivity of tissues to insulin.[12] In the context of metabolism, sleep also regulates the secretion of leptin and ghrelin – the hormones responsible for controlling appetite – by innervating the autonomic nervous system through hypothalamic activity,[13] cholinergic[14] and adrenergic[15] nervous pathways. In this way, sleep is indirectly involved in determining Body Mass Index (BMI) and better sleepers tend to have lower BMI values and propitious metabolic profiles.[16] During sleep, the secretion of prolactin and growth hormones and the inhibition of cortisol secretion promote a suitable environment for the immune system in lymph nodes, allowing the consolidation of immunological memory by T4 (helper) cells, and the secretion of GH, leptin and prolactin altogether promote the secretion of interleukins and cytokines which are key to immune reactions and combat infections and inflammations.[17,18] Sleep has a key role in safety, especially when manipulating vehicles.[19] As claimed by the Center of Disease Control of the United States of America (USA), sleep deprivation puts drivers' safety at stake by impairing decision making and attention.[19] Besides sleep deprived persons, drivers with the highest risk of falling asleep on the wheel are ones who suffer from sleep disorders, who use sleep-inducing medications, shift workers and drivers who manipulate large transportation vehicles.[19] Two thousand thirteen data from The National Highway Traffic Safety Administration (USA) estimates 72,000 car accidents, 800 deaths and 44,000 injuries attributable to somnolent driving.[20] Also, theory suggests that sleep deprivation is suspected to negatively impact fertility through hyperactivation of the hypothalamo-pituitary axis, imbalance of reproductive hormones, disturbances in immune function, and circadian dysrhythmia.[21] Finally, sleep is an important player in the lives of adolescents, as circadian rhythms shifts potentially indicate the onset of puberty.[22]

2- Insomnia

Definition of Insomnia

Insomnia is defined as a sleep disorder, whereby the subject reports impaired sleep initiation and maintenance.[23–25] This subjectively reported condition occurs in the presence of convenience and opportunity of sleep and when not behaviorally induced by the subject.[23–25] The International Classification of Sleep Disorders (third edition, ICSD-3) comprises important elements of diagnosing insomnia; such as the impairment of daytime functioning, lack of motivation, and feelings of fatigue and malaise.[26] The subject experiences issues with attention, concentration and memory, and shows emotional instability such as aggression, irritability and depression.[26] Insomnia represents overall discontent with the quality of one's sleep.[23–25]

Insomnia Symptoms

Symptoms of insomnia include difficulty initiating and/or maintaining sleep, extended sleep latency (time required to fall asleep), multiple nocturnal awakenings, early morning awakenings and reduced sleep efficiency (i.e. ratio of total sleep time to total time in bed).[27,28] Initially, the American Academy of Sleep Medicine classified the diagnosis as chronic insomnia when these symptoms were observed as frequent as 3 times per week in a month's duration,[25] but the latest update of the International Classification of Sleep Disorders (third edition, 2014) ICDS-3 has extended this temporal window to three months of time to classify chronic insomnia.[26]

Biological and Cognitive Models

Psychological and physiological elements underlie insomnia, as it has complex neurophysiological and psychological factors characterizing the sleep disorder.[23] These factors should serve as the points of interventions for programs aiming to combat insomnia.[23] The somatic and cognitive traits of insomnia are inseparable by nature due to the interplay of neurophysiological and mental factors.[29] Such factors contribute to the predisposition of insomnia in conjunction with other perpetuating factors like unhealthy sleeping habits and poor sleep hygiene.[29]

The biological basis of insomnia lies within the concept of hyperarousal, which theoretically originates from the presence of cognitive stressors.[23] These type of stressors impact the sympathetic and parasympathetic nervous system and result in elevated metabolic rates and heart rates in insomniacs compared to good sleepers.[23] In the context of the biological model of insomnia, insomniacs show increased secretion of cortisol, increased cerebral metabolism of glucose and activation of the hypothalamo-adrenal axis.[23,28] Metabolites such as cortisol and adrenocorticotropic hormone (ACTH) have shown to be elevated in insomnia patients compared to normal sleepers, indicating the inevitable role of the hypothalamo-pituitary axis in the somatic pathology of insomnia.[23] On the other hand, the cognitive perspective suggests that distress related to lack of sleep, daytime stress and worry contribute to insomnia development.[23,27,30]

Diathesis-Stress Model

The diathesis-stress model suggested by Spielman et al[31] is a multi-axial model that depicts the three "P"s of insomnia – predisposition, precipitation and perpetuation – which underlie the chronicity of insomnia. Predisposing factors are diatheses that render the subject susceptible to

developing insomnia, such as unique genetic, physiological and psychological characteristics.[31] On the other hand, precipitating factors are external and internal stimuli that serve as stressors to the individual that trigger the acquirement of insomnia threshold level in the subject and result in the appearance of symptoms – in other words, they fixate the sleeping disorder.[31] Finally, perpetuating factors are ones of environmental, somatic, mental and behavioral nature that curb the return of the subject to a normal sleeping schedule.[31]

Transdiagnostic Model

Regardless of categorizing insomnia as a major independent disorder or a symptom of a morbid condition, there is a bidirectional nature between the development of insomnia and comorbidity, like a cycle.[32] A transdiagnostic approach means to perceive insomnia as both a cause and a result of comorbidities, as many health conditions can have it as a common symptom; treating insomnia can potentially improve individual health as a whole, on the long run.[32] Nevertheless, insomnia can occur independently from any other adverse health outcome in a subject. Therefore, it is a separate entity, a sleeping disorder that deserves focused attention and treatment as much as any other disease.

Risk Factors of Insomnia

Risk factors for insomnia are mediocre sleep hygiene, night shift work, substance and alcohol abuse, and usage of medications that can interfere with sleep.[27,28,33–35] Higher latitudes are suspected to play a role of a risk factor for insomnia, a study comparing sleep patterns in Norway versus Ghana of latitudes – 5^0 N versus 69^0 N – revealed a longer sleep latency in Norwegian population compared to that of Ghana.[36] Another study conducted in Chile, which covers a fair

range of geographical latitude, revealed that generally shorter sleep duration was found in subjects living in the northern latitudes compared to those in the southern ones.[37] Insomnia is also a significant element of Acute Mountain Sickness (AMS), the latter can possibly serve as a risk factor for subjects ascending to high altitudes, but this phenomenon lacks empirical evidence and most data is reported in aggregate with AMS studies.[38]

A study among a sample of employed adults in Finland showed that economic difficulty is significantly associated with insomnia.[39] Another longitudinal study among employed individuals in Israel showed that those who suffered from insomnia symptoms had 150% increased likelihood of experiencing back pain.[40] Finally, there is a moderate link between insomnia and burnout among healthy employees.[41]

3- Public Health Burden

Globally, 30% of the general population report at least one complaint of insomnia symptoms and 10% suffer from insomnia disorder.[25] It is mainly prevalent in women, more frequent as the person ages and mostly observed in persons with physical and psychological conditions as a comorbidity.[27,30,34,42] Comorbidity associated insomnia occurs in approximately 6% of the general population.[23] Aging makes people more vulnerable to insomnia as they start experiencing circadian rhythm shifts.[23,25,35] Moreover, in women, menses and menopause associated insomnia is observed.[23] Insomnia is often associated with comorbid physical diseases and mental disorders (internalized and externalized).[30,35,43] It is proven to go hand in hand with a variety of somatic and psychiatric conditions like diabetes,[30] cardiovascular complications,[44] autistic spectrum disorder and epilepsy,[45] major depressive disorder,[46] general anxiety disorder and so on.[46] Moreover, insomnia can trigger the progression of other types of sleep disorders like

sleep movement and sleep breathing disorders and parasomnias.[23,25] While some sources classify insomnia as a symptom of another illness, others approach it as a disjoint disorder.[32]

4- Individual-Level Burden

Insomnia is associated with low physical and mental health-related quality of life, impairment of activity and low productivity during work.[47] Like all chronic diseases, insomnia is an impairing condition that affects a person's mood and overall wellbeing. It is associated with impairment during the day as a result of non-restorative sleep, that is when sleep does not feel refreshing or enough despite having slept enough hours in the night (poor sleep quality).[25,32,34,43] Data from a longitudinal epidemiological insomnia study revealed factors such as being predisposed to arousal and enhanced psychological symptoms and amplified perceived stress were associated with insomnia.[47]

Insomnia results in decreased quality of life and serves as a risk factor for other conditions. Insomnia increases the risk of occurrence of other adverse outcomes by approximately 75-90%.[23] It also increases the risk of accidents 2.5 – 4.5 fold.[23] Disease-specific quality of life among patients on maintenance dialysis was assessed and lower quality of life found to be associated with insomnia and Restless Leg Syndrome.[48] The social burden of insomnia is also noteworthy as it impairs social relationships of insomniacs.[25] Often being linked to physical and mental comorbidity, insomnia has an inevitable consequence on social ties and activities. With poor sleep quality, poor sleepers tend to have aversive social ties in contrast to good sleepers who tend to have more ambivalent and supportive ones.[49]

5- Economic Burden

Increased utilization of healthcare services, absenteeism, lost productivity, decreased performance are the direct and indirect costs associated with insomnia.[50] Insomnia patients utilize healthcare services 60% more often than healthy subjects.[23,25] Absenteeism and decreased productivity at the workplace cumulatively result in annual financial losses.[50] In a study done in Quebec,[51] the estimated total costs due to insomnia were about 6.6 billion Canadian dollars (the equivalent of about 4.9 billion United States dollars (USDs)) annually, of which 970.6 million Canadian Dollars (CD) were a result of absenteeism related to insomnia and 5 billion CD were losses due to insomnia related productivity – the average direct and indirect cost per insomniac per year was estimated to be 5,010 CD versus 421 CD for good sleeping individuals.[51] As the The National Commission on Sleep Disorders Research reports, insomnia related direct costs were 13.9 billion USD in the year 1995 – that is 3,000 USD per insomniac annually,[52] and annual insomnia cost in France was around 10 million francs (the equivalent of 2 billion USD) in 1995.[53] As of 2009, the annual insomnia related costs of US civilian workforce due to absenteeism, workplace accidents, low productivity, absences related to sickness and workplace injuries ranged from 15 billion USDs to 92 billion USDs.[54] The latest US data has shown an increase up to 63.2 billion USD in the year 2011 with a marginal cost of 2,280 USD per capita.[55]

Insomnia Treatments

The American Association of Sleep Medicine has developed and updated guidelines for the treatment of insomnia.[25] These guidelines' recommendations for treatment include:

- Psychological or Behavioral Therapies: “Stimulus control, relaxation training, cognitive behavioral therapy for insomnia (CBT-I), sleep restriction, paradoxical intention, biofeedback therapy, and sleep hygiene therapy.”[25]

Of the mentioned, only stimulus control, relaxation training and CBT-I are supported by empirical evidence as effective and standard recommendations for treatment. The rest are guideline recommendations supported by moderate clinical certainty.[25]

- Pharmacological Treatment: Includes treatment using either benzodiazepine or non-benzodiazepine drugs or melatonin receptor agonists.[25]
- Combined Treatment: It is basically used as long term management for insomnia and combines pharmacological treatment with behavioral interventions.[25]

6- Sleep Hygiene

Definition

Sleep hygiene is a collective term of various healthy sleeping habits.[56] An important element of Cognitive Behavioral Therapy (CBT) for insomnia, it entails behavioral interventions that help to create suitable environment for sleep, like avoiding naps, regulating time spent in bed after awakening, creating and maintaining a fixed sleep schedule.[57] In addition to those, sleep hygiene suggests the restriction or the abstinence from caffeinated beverages and unhealthy substances like alcohol and cigarettes before bedtime, and finally, encourages the introduction of lifestyle changes like exercising regularly, avoiding reading or viewing television in bed and creating the most comfortable sleep environment.[57] The American Association of Sleep Medicine guideline for insomnia treatment suggests that the effectiveness of sleep hygiene education solely has no

empirical evidence of being efficacious and recommends its use in conjunction with other methods or as a CBT element in a multi-modal therapeutic approach.[25] On the other hand many sources claim that sleep hygiene practices can improve sleep outcomes for individuals suffering from insomnia.[58] Findings from a study utilizing a representative, population-based sample of participants suffering from insomnia showed poorer adherence to sleep hygiene than their healthy-sleeping counterparts.[59] Also, a study conducted among insomniacs versus healthy sleepers in Taiwan showed an association between arousal-related measures of sleep hygiene and insomnia severity.[60] A pilot study of a single group comparison pre and post intervention among working women before and after a sleep hygiene education program resulted in improved sleep quality among these women.[61] Data from an internet-based study in the United States showed that individuals experiencing poor sleep had significantly higher cognitive activity in bed than normal sleepers.[62] When used in conjunction with zolpidem among a population of cancer patients, sleep hygiene counseling provided slightly improved sleep outcomes in insomniac patients.[63] Nevertheless, research about effectiveness of sleep hygiene education, and the affiliation between knowledge, beliefs and practice (KBP) of sleep hygiene with insomnia-related health outcomes or sleep-related measures – like daytime sleepiness, sleep quality, early morning awakenings, sleep agitation, restorative sleep and such – is very poor and the existing literature does not provide empirical evidence of sleep hygiene education programs' efficacy, although it is suggested to be effective and produces positive sleep outcomes – like improved sleep quality and restoration when rising in the morning – when administered in conjunction with other interventions like sleep restriction, Cognitive Behavioral Therapy, sleep logs and light therapy.[25]

In theory, improvement of sleep hygiene habits would not directly deal with chronic insomnia but could rather improve the abovementioned sleep outcomes which, in turn, could potentially alleviate the severity of insomnia.

7- Situation in Armenia

In electronic mail communication (9th of March, 2019) with Dr. Samson Khachatryan MD, PhD – head of Somnus Sleep and Movement Disorders Clinic, advisor to the Republic of Armenia Minister of Health for Neurology, president of the Armenian Sleep Disorders Association – prevalence data (unpublished) on sleep disorders in Armenia was provided; among the general population of age 18 and older, prevalence of sleep-initiation insomnia was 36.6% in a nationwide study conducted from 2015 through 2018. Later, during the World Sleep Day conference held at Yerevan State Medical University on the 15th of March, 2019, Dr. Khachatryan presented the findings of the same study (Appendix 1). Prevalence of any insomnia related complaint was about 52.5% among the participants, of which only 6-15% of the cases were diagnosed.[64] Sleep onset-insomnia was reported by 36.6% of the subjects and sleep-maintenance insomnia by 44.2%.[64] Of insomniacs, 43.4% were male and 56.6% were female.[64] Thirty-nine percent of all respondents reported to have daytime sleepiness and 15.7% reported to have ever slept while driving.[64]

As of Health System Performance Assessment in 2016,[65] sleeplessness was one of the top twelve described health complaints among the Armenian population of age fifteen and above. Of the respondents, 37.9% reported sleeplessness in 2012 and this trend has increased to 43.1% in the year 2016,[65] with a higher rate in females than in males. The prevalence of sleeplessness showed an increase in older age groups and was highest among respondents with lowest socioeconomic

status.[65] A pilot study[66] conducted in Erebouni medical center revealed that 96.3% of patients with Parkinson's Disease (PD) had at least one symptom of insomnia and 52% of those PD patients complained of difficulty initiating and maintaining sleep. In another study with a larger sample,[67] about 80% of patients diagnosed with Parkinson's disease had insomnia complaints. Moreover, this study showed that these insomniac patients reported a significantly higher intake of Levodopa.[67] A secondary data analysis[68] of *Somnus* Sleep and Movement Disorders Clinic data showed that 40.2% of insomniacs had depression co-occurring with insomnia and 27.5% of patients diagnosed with depression suffered from insomnia as comorbidity. Another pilot study involving shift-working hospital nurses and physicians in Yerevan revealed 42.1% had some kind of sleeping disorder with insomnia being at 15.8%, which – together with sleep-disordered breathing – was associated with increased night shift frequency.[69] Insomnia was found to be more prevalent among patients with epilepsy compared to healthy controls – 47.3% versus 27% respectively – and different insomnia complaints were significantly associated with different depression subgroups; difficulty initiating sleep with mild depression, and mixed-symptomatic insomnia with moderate or severe depression.[70] In a cross-sectional survey among Yerevan State Medical University students, 60.1% of the respondents reported excessive daytime sleepiness and the study unveiled that only around 30% of the respondents ever practiced good sleep hygiene.[71]

III. Study Methodology

8- Study Design

In order to have an analytical approach and meet the objectives of the proposed study, a cross-sectional interviewer-administered household survey design will be utilized – the design will

allow to obtain a quantifiable snapshot of the situation of interest regarding a chronic health outcome such as insomnia.[72] The design is chosen for its appropriateness in describing *knowledge, beliefs* and *practices* and its relatively low time, personnel and resource requirements.[73] Household surveys often assure higher response rates, provide spatial convenience for conducting interviews, offer fair coverage of populations and permit cross-validation of results.[74]

9- **Study Population and Setting**

The study population will be the employed adult (18 and older) population of Yerevan.

The *eligibility* criteria will be the following:

- Being a resident of Yerevan city
- Being an adult of 18 years and older
- Being fluent in English or/and Armenian languages
- Being employed or/and having private work practice for at least three months

Yerevan is chosen because it comprises more than 35% of the entire population of the Republic of Armenia.[75,76] The employed population is specifically selected because in this group, insomnia poses an effect on daytime functioning, according to the literature. Moreover, the literature shows that by impairing daytime performance insomnia impacts productivity and leads to increased absenteeism, producing financial losses that in turn create an economic burden. Finally, about 59.5% of the total permanent Armenian population is economically active (as in employed),[76] which also justifies the choice of the employed population. Moreover, as of 2017, Yerevan city includes 27% of the nation's **total** employed population and 52.2% of the employed **urban** population in Armenia.[77] The rationale for choice of a three-month timeframe

for employment is that according to the specification of the ICSD-3 diagnostic criteria of chronic insomnia, symptoms should last more than three months to identify the insomnia of the subject as *chronic.*[26]

The *exclusion* criteria will be the following:

- Extreme impairing health conditions
- Inability to read, write and understand Armenian or/and English languages.

10- Study Variables

A summary of the all study variables measured in the survey is shown in Table 1.

- Independent Variables: Knowledge, Beliefs and Practice scores of Sleep Hygiene (continuous)
- Dependent Variable (outcome): Insomnia status (binary)
- Covariates: gender (binary), smoking status (categorical), comorbid conditions (mental or physical – binary variable), usage of medications interfering with sleep (benzodiazepines or other hypnotic drugs, melatonin supplements… etc.) (binary).

  Sociodemographic variables: age (continuous), education (ordinal), household income (ordinal), type of working shift (categorical), average weekly working hours (continuous), physical activity at work (ordinal).

11- Sample Size

In order to detect whether KBP score is significantly associated with insomnia status, two approaches can determine sample size:

Method 1 – A one-sample proportion formula for estimating the prevalence of insomnia while using $\alpha=0.05$, power of $1-\beta=0.8$ and a precision of 4% will yield a sample size of:

$$n = \{(Z_\alpha)^2 P(1 - P)\} / d^2$$

Where "n" is the sample size

"Z_α" is the standard normal one sided z-value for a 95% confidence interval = $Z_{0.05} = 1.96$

"P" is the estimated prevalence of insomnia in Armenia[64] = 52.5% = 0.0525

"d" is the precision for the 95% confidence interval = 0.04

Plugging the values;

$$N_0 = \{(1.96)^2 * 0.525 * 0.475\} / (0.04^2)$$

$$N_0 = 598.74 = \mathbf{599}$$

Method 2 – The sample size can be calculated by treating insomniacs and non-insomniacs as separate groups and assessing the mean KBP score differences between them; in this manner, if a significant difference in means for KBP scores is detected between the two groups, then KBP is a significant predictor of insomnia. Using the comparison of two sample means formula:

$$N = \{2\sigma^2. (Z_{\sigma/2} + Z_\beta)^2 \} / \delta^2$$

Where:

"n" is the sample size

"σ" is the standard deviation for KBP score

"$Z_{\alpha/2}$" is the standard normal two sided z-value for a 95% confidence interval = 1.96

"Z_{β}" is the standard normal z-value for power of 80% = 0.84

"δ" is the difference in means to be detected

With a newly assembled instrument, total scores for KBP are not available. Therefore, Knowledge, Beliefs and Practices will be treated as separate subdomains each.

The authors of the Sleep Knowledge Questionnaire found that sleep *knowledge* score showed a difference of the mean scores among poor sleepers to be 16.47 compared to that of the total sample (17.23) and a standard deviation of 7.98 and 7.76 respectively.[78] Thus a difference of 1 in knowledge score will be used as δ and the average of the SD as $\sigma_1 = 7.87$. Plugging the values, we obtain:

- $N_1 = \{2 * (7.87^2) * (1.96 + 0.84)^2\} / (1)^2$

$$N_1 = 131.71 = \mathbf{132}$$

A study among Romanian adults showed a mean score difference between good sleepers and poor sleepers of approximately 1 point on the Sleep *Belief* Scale (12.41 versus 11.25) with a similar standard deviation of 3.14 and 3.10 respectively.[79] Another study with an Italian and Spanish sample found a standard deviation of 3.46 in Sleep Belief Scale scores.[80] Thus the average of the SD will be taken as $\sigma_2 = 3.23$. When plugged in the sample size formula, it yields:

- $N_2 = \{2 * (3.23^2) * (1.96 + 0.84)^2\} / (1)^2$

$$N_2 = 163.58 = \mathbf{164}$$

Finally, mean sleep practice score is 34.66 and SD 6.6 (σ_3).[81] Bearing in mind the arbitrary chosen differences of one point in each of the knowledge and belief scores which are

approximately 6% and 8% of the mean scores for knowledge and belief respectively, taking a mean score difference of 2.42 points – which is a proportionate-to-the-overall score value; that is approximately 7% of 34.66, – and replacing the value of the SD yields:

- $N_3 = \{2 * (6.6^2) * (1.96 + 0.84)^2\} / (2.42)^2$

$$N_3 = 116.62 = \mathbf{117}$$

In order to be conservative, the larger sample size $n = N_0 = \mathbf{599}$ will be selected. After adjustment for a response rate of 80%:

$N = 599/0.8 = 748.75 = \mathbf{749}$

When using cluster sampling, the sample size should also be adjusted for design effect to control for homogeneity; thus the final sample size becomes

$$N = 749*(1.2) = 898.8 = \mathbf{899} \approx \mathbf{900}$$

The sampling will be done proportionate to size, therefore each district of Yerevan will contribute to the total sample according to their percentage of total population (see Table 2).[82]

12- Study Instrument

The study instrument (interviewer administered) is an assembled survey consisting of different domains (Appendix 2).

- The KBP tool consists of the Sleep Knowledge Questionnaire (SKQ, 15 items),[78] the Sleep Beliefs Scale (SBS 20 items),[80] and the Sleep Hygiene Index (SHI, 13 items)[81] which measure the domains of knowledge, beliefs and practices of sleep hygiene respectively.

Scoring for the three domains is done as follows:

- For the Sleep Knowledge Questionnaire (SKQ), "true", "false" and "don't know" responses are given to each statement. The scoring is assigned +2, – 2 and 0 for correct, incorrect and blank (don't know) answers respectively. The scores range from –50 to +50 with higher scores indicating better knowledge.
- In the Sleep Beliefs Scale (SBS), the respondent chooses the answers for bedtime practices as "positive effect", "neither effect" and "negative effect". Score ranges are from 0 to 20 points and one point is given to each correct answer.
- The Sleep Hygiene Index (SHI) measures frequency of bedtime behaviors among respondents, thus for each practice statement provided, the responses are "never, rarely, sometimes, frequently, always," scored using a 5-point scale; 0 (never) to 4 (always) and scores sort from 0 to 52. The higher total scores are suggestive of poor sleep hygiene practices.
- The insomnia status is measured by the Athens Insomnia Scale[83]. Its 8 items are measured with scores of 0 to 3, having upper scores indicating difficulty of sleep. Total score span is from 0 to 24. An optimum cutoff score of 6 will be selected to distinguish between insomniacs and non-insomniacs; this cutoff is chosen as a function of sensitivity and specificity.[84]
- Demographic data will be collected using questions and instructions assembled from the Household Health Survey (2006),[85] and the Tobacco Household Survey.[86]

The questionnaire will be translated to Armenian and then pretested in order to estimate the amount of time taken to complete the survey, address any unclear questions and make the necessary modifications to the local context.

The assembled questionnaire utilizes valid and reliable instruments. The SKQ has shown high inter-rater reliability with a Pearson's coefficient $r = 0.90$ and a satisfactory internal consistency $\alpha = 0.65$.[78] The SBS and SHI also have sufficient Cronbach's alpha values of $\alpha = 0.714$ and $\alpha = 0.66$, respectively.[80,81] Also, the SHI displays a test-retest reliability of $r = 0.71$.[81] Regarding the Athens Insomnia Scale (AIS), its test-retest reliability is $r = 0.88$ and has demonstrated a Cronbach's alpha $\alpha = 0.87$.[83]

13- Sampling Strategy

The study sample should be representative of the capital's population and its twelve districts. For that reason, multistage cluster sampling with probability proportional to size will be used and this method will give all the resident households of Yerevan equal probability of being selected. Each of the 12 districts of the capital will serve as the first level clusters. In each district of Yerevan, the number of second-level clusters will be determined proportionate to its population size. In order to maintain feasibility and address homogeneity concerns, a cluster size of 6 will be used. To achieve a sample size of 900, the total number of clusters in Yerevan will equal:

$$900 / 6 = \mathbf{150} \text{ clusters in total}$$

The number of clusters per district is calculated and shown in Table 2.

In each household, one eligible respondent will be selected. The electoral list will be used to randomly select starting point address for each secondary cluster in every district, given the list's fair coverage of the population of the republic. To choose the starting points, first the list of voter addresses in each district will be numbered. Then the starting point addresses will be picked by randomly generating numbers. There will be one starting point for each secondary cluster;

therefore, the number of generated numbers per district will be equal to the number of clusters presented in Table 2, by district.

After the starting point household is randomly selected, the household right next to it (on the right/up) will be visited for anonymity considerations; in case of private houses, the adjacent house on the right will be visited, and in case of buildings, the apartment on the right or upstairs. After each completed interview, the study team will move in the right direction of each street and skip 5 houses to make the next household visit. In the case of buildings, the study team will select the next apartment by skipping 5 adjacent apartments from left to right. Since buildings might possibly have less than 5 apartments on the same floor, the counting of apartments will be done by going to the next floor and counting the doors starting from left to right. In case of both houses and buildings, the 6^{th} household will be selected for attempting an interview after skipping five. If the visited household has no eligible respondent, or if there is nobody home, or if the respondent interrupts/ends the interview or refuses to participate, the household right next door on the right/up will be attempted. When selecting a respondent in the household, the interviewers will first read the interview script and then screen the household members for eligible respondents. If there is more than one, the interviewer will select the respondent that has the closest upcoming birthday.

14- Data Collection, Entry and Management

The data collectors will be trained to perform the household visits, select the respondent, introduce and conduct the interview. Starting point addresses will be given in advance and detailed instructions will be given on how to select eligible participants and greet people if and when they open their doors. All interviewers will be given a copy of an interviewer manual. Each

interviewer will be given a journal form (for each cluster), an interview script and a consent form to read it for the respondent (Appendix 3, 4, 5). After the interview is completed in each household, the interviewer will thank the respondent for participating and leave to continue the data collection. The questionnaires will have folders for storage and will be checked and counted after each interview is complete and will be safely collected and transported back to the research office after concluding each day of fieldwork. Each interviewer will complete one cluster per day (6 surveys), with three data collectors each visiting different districts every day. Therefore, three clusters (18 households) will be completed each day. This will render the duration of data collection 50 days (approximately 8.5 weeks, Sunday off from work). The folders with completed questionnaires will be stored in the office, which will be locked to assure nobody else has access to the data. During the data collection, the addresses of the cluster starting points will be recorded on the journal form and a sequential number will be assigned for each household visit (see Appendix 3). The questionnaires will not carry the addresses, but rather will have a 6-digit ID number constructed by the district number (2-digits), cluster number within each district (2-digits) and a sequential number for each household (2-digits).

The conducted surveys will be checked in parallel with the data collection process. An SPSS database will be designed and checked, and then double data entry will be done into the created SPSS database to strive for precision. The entered data will later be merged, cleaned and checked for errors and outliers by running descriptive statistics (for example: frequencies and range checks) for each variable in the database. After entry, the data entry operator will create two other copies of the data: one in an online drive and the other on a removable hardware or disk to assure data has backup. The entered data will be password protected in all of the computers, hardware and online drive to assure confidentiality and limited access.

15- Statistical Analyses

The study population will be illustrated by running descriptive statistics. For continuous variables, means, ranges and standard deviations will be calculated, while binary and categorical variables will be represented by medians, proportions, and frequencies.

Having a binary outcome – insomniac versus non-insomniac – the sociodemographic characteristics and all other independent variables will be compared across groups (insomniac versus non-insomniac) using Student t-test and Chi square for indiscrete and categorical variables, respectively.

Subsequently logistic regression models will be used to test for significant association between the outcome (insomnia status) and each subdomain of sleep hygiene while adjusting for confounders.

After reviewing the covariates provided in the literature, potentially confounding covariates were identified by drawing Directed Acyclic Graphs (DAG). The potential confounders are the following:

- Age
- Gender
- Level of education
- Alcohol use
- Smoking status
- Sleep disorders other than insomnia
- Physical/mental comorbidity
- Type of work shift

- Socioeconomic status
- Using medications affecting sleep

Once the study is implemented, the team will select the variables to be adjusted for from the given pool of confounders.

16- Strengths and Limitations of Methodology/ Internal and External Validity Issues

Study Strengths

Thanks to the study design, the proposed methodology will be able to capture a fairly representative sample. Moreover, it grants the study team an opportunity to control the selection of the respondent to be surveyed. In addition, the study team will have a relatively fair ability to ensure completion of questionnaires and control sequence of questions compared other survey methods. Cross sectional studies have no loss-to-follow-up, which eliminates attrition bias. Finally, the methodology is appropriate to measure a chronic condition and its prevalence, given that the selected sample truly represents the target population.

Study Limitations

The proposed project, like any other, will not be flawless and will have limitations and threats to internal and external validity. A cross sectional survey is only a snapshot of the situation. Answers to questions in the survey are subject to information bias. There is a potential recall problem by the participants, as the answers refer to a three month window. Also, in household surveys – which are held face to face – the respondents will potentially display social desirability when answering to the questions. Other issues include interviewer bias and residual confounding.

All of the mentioned factors can lead to KBP or/and insomnia misclassification since the latter is a bias generated by both the respondent and the interviewer.

Along with the general sources of bias, the internal validity will be imperfect since the utilized scales in the assembled instrument have not been validated in the Armenian language. As for the external validity, the study results cannot be generalized to non-employed populations or the population living and working outside the capital.

IV. Budget and Logistical Considerations

17- Personnel

The entire study will require one project coordinator to manage the study activities, train the interviewers, and govern the safety of the data and monitor the processes of research. The coordinator will also be responsible for data merging, cleaning and checking. The project will require three data collectors to conduct the household surveys after obtaining consent from the respondents, two data entry operators for double data entry, and a statistician for assisting the coordinator with data analysis. The final report of the study will be written and revised by the coordinator.

18- Budget

The required budget for the proposed study comprises personnel and operational costs, including administrative, communication and transportation expenses. The project coordinator and statistician will receive a monthly salary, while the data collectors and data entry operators will be paid per completed interview and entry of one questionnaire data respectively. The

administrative costs include office rent, utilities, office supplies, and printing costs. The budget calculations are based on the typical rates and salaries of non-governmental and international institutions operating in the Armenian market. A detailed description of the budget is presented in Table 3, which is estimated to be **4,130,000** Armenian Drams (AMDs).

19- Work plan and Timeline

The activities and timeline of the proposed study are depicted in detail in Table 4. The entire study duration will be four months and will cover interviewer training, data collection, data entry operator training, double data entry, data checking, database merging, data analysis and composing the final report.

V. Human/Animal Subjects

The study process will maintain confidentiality and anonymity at all times. Oral consent will be obtained from the participants. The survey respondents will be assured of data confidentiality and anonymity in the consent form, and will be informed about the limited access to the data (only by the study team) and that no identifiable information will be recorded. They will also be informed how their homes were selected and that their addresses will not be recorded, and the data provided by them will only be reported as aggregate results. The journal forms will be destroyed after the study completion. The institutional review board (IRB) of the American University of Armenia has approved the proposed study.

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Tables

Table 1. Study Variables

Variable	Type
Independent variables	
Knowledge score	Continuous
Belief score	Continuous
Practice score	Continuous
Dependent(Outcome variable)	
Insomnia status	Binary
Covariates	
Age	Continuous
Gender	Binary
Nationality	Categorical
Educational level	Ordinal
Smoking status	Binary
Number of cigarettes	Continuous
Alcohol consumption	Ordinal

Type of shift	Categorical
Income	Ordinal
Standard of living	Ordinal
Perceived health	Ordinal
Weekly working hours	Continuous
Physical activity at work	Ordinal
Medications affecting sleep	Binary
Duration of taking medication affecting sleep	Continuous
Comorbid chronic conditions	Binary
Sleep disorder other than insomnia	Binary
Falling asleep on the wheel	Binary

Table 2: Representation of number of households selected in each district with respect to their population proportion.

District	Proportion Size N, (%)	Number of Clusters in each district
Ajanpnyak	108,282 (10.0%)	15
Avan	53,231(5.0%)	8
Arabkir	117,704 (11.0%)	17
Davitashen	42,380 (4.0%)	6
Erebuni	123,092 (11.6%)	17
Kentron	125,453 (11.8%)	18
Malatia-Sebastia	132,900 (12.5%)	19
Nor-Nork	126,065 (12.0%)	18
Nork Marash	12,049 (2.0%)	2
Nubarashen	9,561 (1.0%)	1
Shengavit	135,535 (13.0%)	19
Qanaqer	73,886 (7.0%)	10
Totals	1,060,138 (100.0%)	150

Table 3: Study budget in Armenian Drams

Budget Item	Appointment type	Number of required units	Amount per unit	Total
Personnel salaries				
Project coordinator	Monthly	4	350,000AMD	1,400,000 AMD
Data collectors (x3)	Per completed interview	900	1,000AMD	900,000 AMD
Data entry operators (x2)	Per one interview data entry	900 * 2 = 1,800	350 AMD	630,000 AMD
Statistician	Monthly	1	350,000AMD	350,000 AMD
Administrative costs				
Office rent	Monthly	4	100,000AMD	400,000 AMD
Office supplies	Monthly	4	20,000AMD	80,000 AMD
Utilities (Electricity, water, gas)	Monthly	4	20,000AMD	80,000 AMD
Printing	Per page	10,000	10 AMD	100,000 AMD
Other expenses				
Transportation costs (taxi)	Per cluster visit	150	1,000 AMD	150,000 AMD
Communication costs (landline, mobile phone, internet)	Monthly	4	10,000AMD	40,000 AMD
Total	-	-	-	**4,130,000 AMD = 8,515 USD**

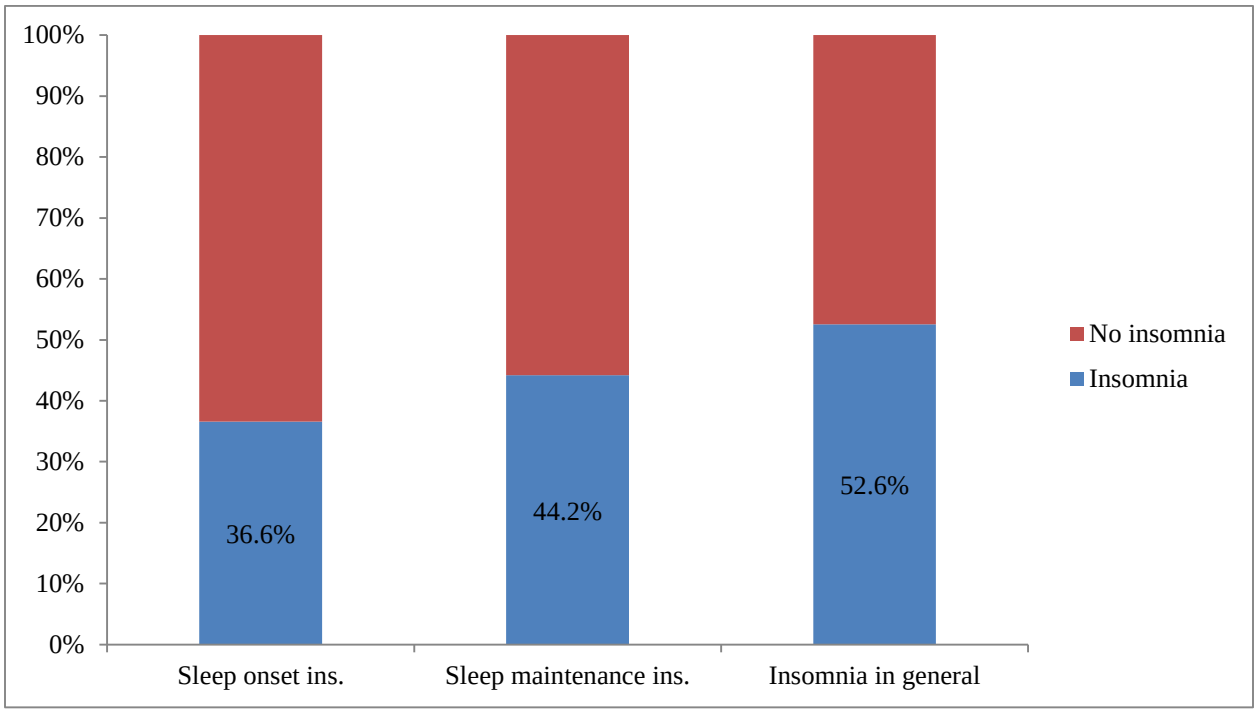
Table 4: Study Timeline

Study Activity	Month #1				Month #2				Month #3				Month #4			
	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
Approval from the institutional review board of AUA	X															
Assembly of study team	X															
Training of interviewers		X														
Preparation and printing of questionnaires		X														
Data collection			X	X	X	X	X	X	X	X	X					
Training of data entry operators								X								
Data entry								X	X	X						
Data checking, cleaning, merging										X	X	X				
Data analysis													X	X		
Finalization of the study report															X	X

W = Week

Appendices

Appendix 1: Insomnia distribution in Armenia (Copyright – Armenian Sleep Disorders Association).



Appendix 2: Study Instrument

Interview date (dd/mm/yyyy): _____

Interview start time (hh:mm): _____

Interviewer name: _____

Participant ID: _____

Instructions for interviewers are in italic before each section.

I. Sleep Hygiene

A) Knowledge

Read to participant: "We are interested in what you know and do not know about sleep. For each statement below, please indicate whether you know it is true or false by making the appropriate selection. Please do not worry if you do not know how to answer (indicate this by selecting the "don't know" option)."[78]

Statement	1.True	2.False	3.Don't Know
A1. Drinking three standard glasses of alcohol has no effect on sleep	1	2	3
A2. Watching television in bed disrupts sleep	1	2	3
A3. Smoking more than 1 pack of cigarettes a day has no effect on sleep	1	2	3
A4. Going to bed hungry benefits sleep	1	2	3
A5. Going to bed thirsty has an effect on sleep	1	2	3
A6. If you cannot fall asleep in 20 min, you should get out of bed and try again later	1	2	3
A7. Waking up at the same time each day has no effect on sleep	1	2	3

Statement	1.True	2.False	3.Don't Know
A8. Going to bed at the same time each night disrupts sleep	1	2	3
A9. You should spend 2 h longer in bed than you need for sleep to give yourself the best opportunity	1	2	3
A10. Consuming food, beverages or medications containing caffeine has no effect on sleep	1	2	3
A11. Exercising strenuously within 2 h of bedtime disrupts sleep	1	2	3
A12. Setting aside time to relax before bedtime benefits sleep	1	2	3
A13. If you wake during the night and cannot fall back to sleep within 20 min, you should stay in bed and try harder	1	2	3
A14. Sleeping approximately the same length of time each night has no effect on sleep	1	2	3
A15. To achieve the amount of sleep needed (e.g. 8 h), you should lie in bed for longer (e.g. 10 h)	1	2	3

B) Beliefs

Read to participant: "This is a survey of the effects of selected behaviors upon sleep. We are interested in knowing your opinion about whether any of these behaviors may influence the quality and/or quantity of sleep. For the following list of behaviors, please indicate whether you believe they produce a positive effect, a negative effect, or neither effect on sleep. Please do not make reference to how they influence your sleep in particular, but to the effects you think these behaviors have on people in general. Please answer ALL the statements (interviewer should check the appropriate box) even if you are not completely sure of the answer."[80]

Behaviors	1.Positive Effect	2.Neither Effect	3.Negative effect
B1. Drinking alcohol in the evening	1	2	3
B2. Drinking coffee or other substances with caffeine after dinner	1	2	3

Behaviors	1.Positive Effect	2.Neither Effect	3.Negative effect
B3. Doing intense physical exercise before going to bed	1	2	3
B4. Taking a long nap during the day	1	2	3
B5. Going to bed and waking up always at the same hour	1	2	3
B6. Thinking about one's engagements for the next day before falling asleep	1	2	3
B7. Using sleep medication regularly	1	2	3
B8. Smoking before falling asleep	1	2	3
B9. Diverting one's attention and relaxing before bedtime	1	2	3
B10. Going to bed 2 h later than the habitual hour	1	2	3
B11. Going to bed with an empty stomach	1	2	3
B12. Using the bed for eating, calling on the phone, studying and other non-sleeping activities	1	2	3
B13. Trying to fall asleep without having a sleep sensation	1	2	3
B14. Studying or working intensely until late night	1	2	3
B15. Getting up when it is difficult to fall asleep	1	2	3
B16. Going to bed 2 h earlier than the habitual hour	1	2	3
B17. Going to bed immediately after eating	1	2	3
B18. Being worried about the impossibility of getting enough sleep	1	2	3
B19. Sleeping in a quiet and dark room	1	2	3
B20. Recovering lost sleep by sleeping for a long time	1	2	3

C) Practices

Read to participant: Now I will ask you several questions regarding your smoking status and alcohol consumption. Please respond to these questions sincerely. As I told before your answers are anonymous and confidential, they will be available only to the research team of the American University of Armenia, so please be as sincere as you can.

1. Do you smoke tobacco?
    a. Yes → a.1. Specify number of cigarettes per day _____
    b. No (*skip "tobacco" in C6*)
    c. Not disclosed

2. On average, how often do you drink (having at least 1 glass of wine; can/bottle of beer; shot of liquor, whiskey or vodka, or mixed drink)?
    a. Never (skip "alcohol" in C6)
    b. Less than one drink a week
    c. One to three drinks a week
    d. Four to six drinks a week
    e. Seven to thirteen drinks a week
    f. Fourteen drinks or more a week

Read for participant: For the following statements, please select the answer that best describes how frequently you engage in the following activities:

SHI Items	1.Never	2.Rarely	3.Sometimes	4.Frequently	5.Always
C1. I take daytime naps lasting two or more hours	1	2	3	4	5
C2. I go to bed at different times from day to day	1	2	3	4	5
C3. I get out of bed at different times from day to day	1	2	3	4	5
C4. I exercise to the point of sweating within one hour of going to bed	1	2	3	4	5

SHI Items	1.Never	2.Rarely	3.Sometimes	4.Frequently	5.Always
C5. I stay in bed longer than I should two or three times a week	1	2	3	4	5
C6. I use alcohol, tobacco, or caffeine within four hours of going to bed or after going to bed	1	2	3	4	5
C7. I do something that may wake me up before bedtime (for example: play video games, use the internet, or clean).	1	2	3	4	5
C8. I go to bed feeling stressed, angry, upset, or nervous	1	2	3	4	5
C9. I use my bed for things other than sleeping or sex (for example: watch television, read, eat, or study).	1	2	3	4	5
C10. I sleep on an uncomfortable bed (for example: poor mattress or pillow, too much or not enough blankets).	1	2	3	4	5
C11. I sleep in an uncomfortable bedroom (for example: too bright, too stuffy, too hot, too cold, or too noisy).	1	2	3	4	5
C12. I do important work before bedtime (for example: pay bills, schedule, or study).	1	2	3	4	5
C13. I think, plan, or worry when I am in bed	1	2	3	4	5

II. Insomnia

D) Athens Insomnia Scale

Read for participant: This scale is intended to record your own assessment of any sleep difficulty you might have experienced. For the items below, please indicate your estimate of any difficulty, provided that it occurred at least three times per week during the last three months (interviewer should check the box by circling the appropriate number).

Items	0	1	2	3
D1. Sleep induction (time it takes you to fall asleep after turning off the lights)	0. No problem	1. Slightly delayed	2. Markedly delayed	3.Very delayed or did not sleep at all
D2. Awakenings during the night	0. No problem	1. Minor problem	2.Considerable problem	3. Serious problem or did not sleep at all
D3. Final awakening (Earlier than desired)	0. Not earlier	1. A little earlier	2. Markedly earlier	3. Much earlier or did not sleep at all
D4. Total sleep duration	0. Sufficient	1. Slightly insufficient	2. Markedly insufficient	3. Very insufficient or did not sleep at all
D5. Overall quality of sleep (no matter how long you slept)	0. Satisfactory	1. Slightly unsatisfactory	2. Markedly unsatisfactory	3. Very unsatisfactory or did not sleep at all
D6. Sense of well-being during the day	0. Normal	1. Slightly decreased	2. Markedly decreased	3. Very decreased
D7. Functioning (physical and mental) during the day	0. Normal	1. Slightly decreased	2. Markedly decreased	3. Very
D8. Sleepiness during the day	0. None	1. Mild	2. Considerable	3. Intense

III. Demographic questions

3. Your gender:

    1. Male
    2. Female

4. Your age at the last birthday (in years): _____

5. Your nationality:

    1. Armenian
    2. Russian
    3. Yesidi
    4. Other (specify): _____

6. The highest level of education you have completed:

    1. School less than 10 years
    2. School (10 years)
    3. Professional technical education (10 to 13 years)
    4. University/Institute (14 to 16 years)
    5. Postgraduate

7. Last month, the approximate amount of income spent by all of your household members was:
    1. Less than 25,000 AMD
    2. From 25,000 – 50,000 AMD
    3. From 51,000 – 100,000 AMD
    4. From 101,000 – 250,000 AMD
    5. Above 250,000 AMD
    6. Don't know

8. How would you rate your family's standard of living? (***Read answers***)

    1. Substantially below average
    2. Little below average
    3. Average
    4. Little above average
    5. Substantially above average
    6. Not sure/Difficult to answer

9. How would you describe your health in the last 30 days?

    1. Excellent
    2. Very good
    3. Good
    4. Fair
    5. Poor
    6. Very poor

10. Please specify what best describes the nature of your work:

    1. Sedentary (office/desk job, bank teller…)
    2. Lightly active (teacher, salesman…)
    3. Moderately active (waiter, mailman…)
    4. Vigorous activity (farmer, construction worker, factory worker)

11. How many hours on average do you work per week? _____

12. What best describes your current work situation? (Check all that apply)

    1. Full time
    2. Part time
    3. Day shift
    4. Night shift
    5. Other (specify): _____

13. Please indicate and chronic health problem(s) that you presently have. (***Mention all that apply***)

    1. Diabetes
    2. High blood pressure
    3. Heart disease
    4. Lung disease (including Asthma)
    5. Stomach/intestine disease
    6. Cancer
    7. Eye/vision problems
    8. Kidney problems
    9. Problems with joints/bones
    10. Other problems (***describe***): _____
    11. No chronic health problems

14. Have you ever been diagnosed with a sleep disorder other than insomnia before?

    1. Yes (specify)_____
    2. No
    3. Don't know/Not disclosed

15. In the past three months, have you ever used or been prescribed medication that interrupts with your sleep (benzodiazepines, antidepressants, melatonin supplements…etc)?

    1. Yes (specify): _____
    2. No (skip Q15)
    3. Don't know/Not disclosed

16. How long have you been using this medication? _____

17. Have you ever fallen asleep while driving or operating vehicles?

    1. Yes
    2. No
    3. Don't know/Not disclosed

18. Would you like to add anything else? Comments?

_____

_____

Thank you for participating!

Appendix 3: Journal Form

American University of Armenia

Gerald and Patricia Turpanjian School of Public Health

Interviewer Journal Form

Interviewer name: _____

Date of data collection (dd/mm/yyyy): ____/___/_____

District number: _____

Cluster number: _____

Starting point address: _____

Visit/attempt sequential number	Visit/attempt time (hh:mm)	Number of eligible participants	Result
01			
02			
03			
04			
05			
06			
07			
08			
09			
10			
11			
12			
13			
14			

Visit/attempt sequential number	Visit/attempt time (hh:mm)	Number of eligible participants	Result
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			

Result code

1- Complete Interview
2- Refusal
3- Nobody home
4- No eligible member
5- Incomplete interview
6- Other (specify) _____

N.B: The ID addresses on the questionnaires will be constructed in the following way: the district number, the cluster number, and the visit/attempt number (all as written on this form).

Appendix 4: Interview script (*At doorstep*)

Hello, my name is Anush and I am a student at the American University of Armenia. My investigators and I are conducting a survey about the relationship of sleep hygiene with insomnia among employed adults in Yerevan. We have made this visit to your home randomly as you reside in Yerevan, would you be interested to know more?

Appendix 5: Consent Form in English

American University of Armenia

Gerald and Patricia Turpanjian School of Public Health

Institutional Review Board #1

Consent Form

Hello, my name is Anush Taslakyan, I am a Master of Public Health student at the Gerald and Patricia Turpanjian School of Public Health at the American University of Armenia and I am conducting a survey as a part of my Master of Public Health thesis. The aim of my research is to assess the association between sleep hygiene knowledge, beliefs and practices (KBP) and status of insomnia among the employed population of Yerevan.

Your house/apartment was selected randomly for a visit; you are one of the 899 participants we select for this survey using the same method. I would like to interview you because you are a part of the general employed population and the information you might provide will be very valuable to our research.

I would also like to let you know that your participation is completely voluntary and you have the right to refuse taking the survey. Moreover, you have the right to skip any question you do not wish to answer and even stop the interview at any time. Not participating in the survey will not have any negative effects on you and/or any of your household members.

The information you provide is totally confidential. Only the study team will be able to view the questionnaire. The data you provide will only be used for the purposes of this study and no further. This data will not be reported anywhere, but will rather be presented in an aggregate manner as general results of the study. There are no risks involved in taking this survey; it will only take 30minutes to complete, so I apologize for any discomfort caused. Your participation will not give you any direct benefits, but will contribute to the body of scientific knowledge. If you are interested, you can provide us your contacts and we would gladly share our study results with you once the study is over.

The questions I will ask are about what you know about sleep hygiene and related beliefs you might have, about bedtime practices, how you sleep, and finally, some demographic questions.

If you have further questions about the research, you can contact primary investigator of this study Dr. Vahe Khachadourian (+374)60612570. If you feel like you have been hurt or treated poorly as a result of this visit or in the process of this survey, please feel free to contact Ms. Varduhi Hayrumyan, the Human Participants Protections Administrator of the American University of Armenia (+374)60612561.

Thank you.

Appendix 6: Consent form in Armenian

Հայաստանի ամերիկյան համալսարան

Ժիրայր և Փաթրիշա Թրփանճեան Հանրային առողջապահության ֆակուլտետ

Գիտահետազոտական էթիկայի թիվ 1 հանձնաժողով

Իրազեկ Համաձայնության Ձև (Բանավոր)

Բարև ձեզ, ես Անուշ Թասլաքյանն եմ, Հայաստանի Ամերիկյան Համալսարանի Ժիրայր և Փաթրիշա Թրփանճեան Հանրային առողջապահության ֆակուլտետի մագիստրատուրայի ուսանող եմ: Ես կատարում եմ հարցում, որը իմ մագիստրատուրայի թեզի մի մասն է հանդիսանում: Հարցման նպատակն է որոշել կապը՝ անքնության և քնի հիգիենայի վերաբերյալ գիտելիքների, համոզմունքների և կիրառման միջև Երևան քաղաքի չափահաս, աշխատող անձանց շրջանում:

Ձեր տունը/բնակարանը ընտրվել է պատահականորեն: Դուք 900 մասնակիցներից մեկն եք, ում մենք այցելում ենք՝ անցկացնելու այս հարցումը և ընտրում նույն՝ պատահականության, մեթոդով: Ես կուզենայի ձեզանից հարցազրույց վերցնել, որովհետև դուք կազմում եք Երևան քաղաքի չափահաս, աշխատող ժողովրդի մասնիկ, և այն ինֆորմացիան, որը դուք կարող եք տրամադրել, բավական արժեքավոր կլինի մեր ուսումնասիրության համար:

Ուզում եմ ձեզ տեղյակ պահել, որ ձեր մասնակցությունը լիովին կամավոր է, և դուք իրավունք ունեք հրաժարվելու հարցազրույց տալուց: Դուք նաև իրավունք ունեք բաց թողնել ցանկացած հարց, որին դուք չեք ցանկանում պատասխանել, և նույնիսկ՝ ցանկացած պահի ընդհատել հարցումը: Եթե հրաժարվեք մասնակցել հարցմանը, դա ոչ մի բացասական հետևանք չի ունենա ձեզ և/կամ ձեր ընտանիքի որևէ անդամի վրա:

Այն ինֆորմացիան, որը դուք կտրամադրեք, ամբողջովին գաղտնի կմնա: Հարցաթերթը կվերանայվի միմիայն հետազոտական թիմի անդամների կողմից: Ձեր տրամադրած ինֆորմացիան կօգտագործվի միայն ուսումնասիրության նպատակով և ոչ ավելին: Տեղեկատվությունը ոչ մի տեղ չի հրապարակվելու, ներկայացվելու են

միայն ուսումնասիրության ընդհանրացված արդյունքները: Այս հետազոտությանը մասնակցելը իր մեջ չի կրում որևե ռիսկ, այն կտևի ընդհամենը 30 րոպե: Կանխավ ներողություն եմ խնդրում պատճառած ցանկացած անհարմարության համար: Այս հարցմանը Ձեր մասնակցությունը չի նախատեսում ուղղակի օգուտ ձեզ համար, այլ կնպաստի գիտական հետազոտության գործունեության ասպարեզին: Եթե հետաքրքրում է ձեզ, կարող եք ձեր կոնտակտները տրամադրել և մենք սիրով ձեզ հետ կկիսվենք ուսումնասիրության արդյունքներով, երբ ավարտենք այն:

Այն հարցերը, որոնք կուղղեմ ձեզ, վերաբերվում են քնի հիգիենայի մասին ունեցած ձեր գիտելիքներին և դրա հետ կապված համոզմունքներին, ինչպես նաև՝ քնելու ժամին ձեր սովորություններին և այն բանին, թե ինչպես եք քնում, և վերջապես՝ մի քանի ժողովրդագրական հարցեր:

Եթե ունենաք ուսումնասիրության հետ կապված այլ հարցեր, կարող եք զանգահարել ուսումնասիրության ղեկավար՝ Դոկտ. Վահե Խաչադուրյանին, (+374)60612570 համարով: Եթե զգում եք, որ այս այցելության արդյունքում կամ այս հետազոտության ընթացքում ձեզ վնասել են կամ վատ են վերաբերվել, խնդրում ենք կապվել Հայաստանի ամերիկյան համալսարանի էթիկայի հանձնաժողովի համակարգող Վարդուհի Հայրումյանի հետ +374 60 612561 հեռախոսահամարով: Շնորհակալություն: