Rabies: Knowledge, Attitudes, and Behaviors in Armenia

Master of Public Health Integrating Experience Project

Utilizing Professional Publication Framework

by

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LIST OF ABBREVIATIONS

FGD – Focus Group Discussion

AG – Age Group

AG1 – Age Group 1 (Younger generation including participants from 18-34 years of age)

AG2 – Age Group 2 (Older generation including participants from 35-65 years of age)

RA – Republic of Armenia

ABSTRACT

Background information: Rabies is a global public health issue accounting for approximately 55,000 human deaths annually. Many rabid animal bites and several cases of human rabies have been recorded in Armenia during the previous years. Moreover, Armenia has adequate conditions for this disease to prosper, posing high risks of the disease becoming an epidemic. No research on rabies in the Republic of Armenia appears in the literature.

Methods: In Spring 2011, a qualitative study assessed the knowledge, attitudes, and behaviors of the general population of Armenia regarding rabies. Snowball sampling was used to include 52 inhabitants, aged 18-65 from two Armenian cities: Yerevan and Gyumri in eight focus group discussions.

Results: All participants demonstrated limited knowledge about the disease causes, transmission, clinical signs, methods of protection and prevention. Formal public education campaigns are not implemented. Most rabies information is acquired through word-of-mouth, which is often inaccurate and causes more confusion than benefit. Knowledge and perceptions differed slightly between cities: Yerevan participants discussed more issues. However, these did not incorporate such knowledge that could in any way help in disease prevention and treatment. The main difference between generations was that the older generation expressed a tendency of relying more on tradition than the younger generation.

Conclusions: The population of Armenia has limited knowledge concerning rabies. This lack of public awareness about rabies sets the stage for a possible epidemic. Better surveillance, increased transparency, public education efforts, and minor policy changes such as veterinarians providing information on the disease to their clientele are actions that can assist in addressing the issues identified during this study.

INTRODUCTION

Historical information: The questions as to when and where rabies (RNA-virus from the genus Lyssavirus, family Rhabdoviridae of the order Mononegavirales (RABV)) originated and how it came to have such a worldwide distribution remain unanswered. Evidence suggests, however, that rabies may be the oldest anthropozoonotic disease known to man (1). History tells us about dog owners in Eshnunna, one of the cities of ancient Babylon, paying extreme fines for the deaths caused by their dogs biting people as far back as 2300 BC. Another one of the many historical pieces of evidence we have is in a text by Aristotle in 400 BC, where he notes "dogs suffer from the madness. This causes them to become very irritable and all animals they bite become diseased" (1). Science and technology improve, and yet this disease which has been with us every step of the way remains a global zoonotic disease of major public health, economic, and agricultural significance, with an approximated 55,000 human deaths globally each year, 95% of which occur in Asia and Africa (2,3).

Epidemiology: Rabies is regarded as an important disease due to its high fatality rate, both in humans and animals, the difficulty in diagnosis, and the necessity for treatment before symptoms appear. The incubation period can vary from a few days to years, with an average of 30-70 days. Even though the majority of cases occur in wildlife, occasionally the virus may afflicts domestic animals, in particular pets, and expose humans to the deadly virus through bites (4). Children are especially vulnerable to pet exposures: around 30 - 60% of dog bite victims are children under the age of 15 (5).

Prevention and treatment: Although death can be prevented if immediate post-exposure prophylaxis is correctly administered, treatment is considered to be impossible once the clinical signs and symptoms appear (6). Only one documented case of a human surviving the disease without post-exposure prophylactic therapy prior to the onset of clinical disease exists. Numerous attempts to replicate this "Milwaukee technique" were unsuccessful (7).

Based on continuous failures in treating humans with clinical symptoms, preventative measures are employed. Today, the most cost-effective human rabies-prevention strategy is the vaccination of dogs, which can eliminate rabies in dogs (8).

Global situation: Africa and Asia suffer the greatest rabies burden, however all other countries face incidents of this disease. Although many different species of domestic animals and wildlife can transmit rabies, dogs are the main human rabies transmission vector in developing countries. Human deaths are just one of the many impacts of this disease. The damage that it inflicts upon wildlife and the environment cannot be accurately measured (5,9).

In developed countries with established pet vaccination systems, wild animals pose the greatest risk of rabies exposure. Countries such as the USA, Canada, and China are making large investments to tackle the various strains of the virus which live among populations of foxes, wolves, raccoons, bats, etc (10). Various techniques are being used to reach these reservoirs: oral rabies vaccination bait foods, point infection control, and trapping, vaccinating and releasing. The last two options are especially time and money consuming; therefore, oral vaccinations are the main method. None of these measures ensure that all individuals of the species under concern will be vaccinated (11-13).

Situation in Armenia: ***Country profile:*** The Republic of Armenia is a mountainous land-locked country in south Caucasus. The country is divided into 11 provinces (marzes), including the capital, Yerevan. After independence in 1991, Armenia, like other former Soviet Union countries, faced major economic crisis during a difficult transition from a centrally planned to a market economy. This transition period, affected all sectors of the country, including the health care and veterinary sectors (14).

Rabies in Armenia: Rabies is endemic to Armenia. The RA Ministry of Health, reported three cases of human rabies during 2008-2009, all in the Shirak marz (15).

Moreover, the RA State Food Safety Service laboratory-confirmed 21 rabies cases among dogs, cats, and cattle throughout Armenia from 2006 to January 2011(16). This data, however, is inconsistent with World Health Organization (WHO) data (which is reported to the WHO by the Armenian government) where a case of human rabies was reported in 1996 and in 2009 (17,18).

Treatment for rabies in Armenia is free-of-charge and voluntary. Whenever a case of an animal bite is reported, the bitten individual is provided with general information about rabies, the side effects of vaccination, and possible outcomes in case of lack of treatment at the hospital. Two courses of treatment exist, depending on the confirmed presence of the disease in the suspect animal. After the initial immunoglobulin serum injection, an individual receives three additional injections of the vaccine, while the animal is closely monitored. In case the animal dies of the disease, is lost, or was never retrieved, the treatment course is continued with two more injections of the vaccine. In very rare cases, a sixth vaccine injection is given on the 90^{th} day post exposure (19).

Controlling stray (unvaccinated) dog populations is an important component in rabies prevention and is currently a challenge in Armenia (20). Given that a single pair of dogs can multiply to around 67,000 heads in just six years, the rabies risk cannot be underestimated (21,22). Some effort at stray dog control is made in Yerevan and other major cities. Efforts lag in other areas of the country. Armenia has struggled to slowly build and strengthen its veterinary infrastructure. A precise monitoring system and mandatory vaccination of domestic animals against rabies may be far in the future. Moreover, the issue of controlling the disease in wild populations also exists, which, as foreign experience shows, is a very difficult, time-consuming, complex, and challenging procedure (12,13,23).

Diseases such as rabies are extremely difficult to eliminate due to wildlife reservoirs. Given its infectiousness and lethality, every country that is prone to infection should have an

acceptable level of awareness among its inhabitants (24,25). Given the lack of available official reports, it is necessary to understand the situation more thoroughly. The reasons for lack of accurate data are many: lack of knowledge on the existence of the disease; incorrect clinical diagnosis; weak surveillance systems; as well as underreporting (26).

During a disease outbreak, politicians, medical specialists, veterinarians, and community members must work together(27). Prior to developing targeted community interventions, baseline knowledge, beliefs, and attitudes of the population must be assessed. This project describes the awareness level regarding the anthropozoonotic disease rabies. The present study represents the first assessment of its kind for Armenia.

Aims and research question of the study: ***Research question:*** What are the knowledge, attitudes, and behaviors of the population of Armenia regarding rabies in 2011?

This study:

- Assessed what Armenians know about rabies, how they perceive this knowledge, and if and how they protect themselves from the possibility of infection.
- Compared differences in rabies knowledge, attitudes and behaviors between the capital of the country, which has the most population, and Gyumri, the second largest city, which is situated in the Shirak marz, where cases of disease were recorded.
- Compared rabies knowledge levels by generation, contrasting those educated during the soviet union with those educated following Armenia's independence.

METHODS

Study design: The study utilized qualitative focus group discussions (FGDs), which have an exploratory nature and are thus more appropriate in assessing the current disease situation in the country. Focus groups encourage people that refuse individual interviews, or feel like they have nothing to say, to participate in the study. They provide an opportunity to explore peoples' knowledge and experiences, which is exactly what this study intended (28,29).

To increase internal validity, member checks were integrated into the discussion. Throughout the discussions, the student investigator paraphrased responses back to the participants to ensure that the statement had been correctly understood. Moreover, at the end of the interview participants were presented with a brief summary of the discussion points, the accuracy of which they confirmed (30).

Study population: The study's target population was the general population of Armenia. However, due to limited time and resources, residents of Yerevan and Gyumri, two of Armenia's most populous cities with reported rabies cases were selected as the study population. The inclusion criteria were flexible, allowing all residents of Yerevan and Gyumri between the ages of 18-65 who were fluent in the Armenian language to participate in the study.

Each focus group consisted of 6-8 individuals recruited through a quota snowball sampling technique. The focus groups were organized separately for two age (education) groups. Those individuals who were educated during the Soviet Union (at least graduated 8 years of elementary school) were included in one category, while those educated since Armenia's independence comprised another. The cutoff for inclusion in this latter category was 34 years of age while those 35-65 years are included in the first category. Two focus

groups were held with each age group in each city. Overall, eight focus groups were conducted during the study and 52 participants recruited.

Study instrument: A focus group discussion (FGD) guide was created for the study, as well as a short demographic questionnaire (See Appendices 1 and 2). The FGD guide explored several key concepts regarding knowledge, beliefs, and attitudes towards the disease rabies. The guide was created specifically for this study. It included several general questions about rabies, its transmission, and clinical symptoms; several questions regarding actions and procedures taken to avoid infection and disease; and several questions referring to behaviors.

Both the guide and short questionnaire were developed in English, after which they were translated into the Armenian language. Six volunteers from Yerevan served as pre-testers for the instrument and provided detailed feedback. Several minor changes were made in response to their observations.

Study timeline*:* Preparatory work for the study began at the beginning of November 2010. Data collection, transcribing, coding and analysis began in March 2011 and ended in June 2011. From drafting a project proposal, to final product, the study lasted approximately 7 months.

Ethical considerations: The study was approved by the American University of Armenia Institutional Review Board (IRB) on Human Research. The focus group guide was free of such questions that could possibly trace back to participants of the study. Discussions proceeded only after oral consent from every participant. All data are stored in the student investigator's computer and no other person has access to them. Transcripts do not contain any identifiable information. All audio recordings and notes were destroyed after the transcription and verification of the FGD sessions.

Data collection: After receiving consent from all participants, discussions were audio-taped. In addition, the facilitator took field notes throughout the discussion. Discussions continued until data saturation was achieved for each city separately as well as triangulation was achieved among groups. At the end of the interview each participant was provided with a simple printed A4 informational leaflet (see Appendix 3) with general information on rabies, prevention and immediate actions to be taken after exposure (31,32).

Data entry: Throughout the data collection process, data from the demographic information questionnaires were entered into a Microsoft excel file.

After each FGD, the notes and audio recording were transcribed into a Microsoft word document in the original language. All data were translated into English.

Coding participants: Throughout the transcripts, codes the use of codes provided a general idea about the participant to whom the quote belongs, making it possible to identify participants from different age groups and cities. These individual identifying codes change in each box, so the same participant may have a different code in a subsequent box. The code includes: the participant's age group - AG1 refers to the younger generation (18-34 years old), while AG2 refers to the older generation (35-65 years old); the number of the section where the box is provided; the last digit is the consecutive number of the participant's quote in each box; as well as the participant's city. An example for a 37-year-old participant from Gyumri whose quote is the first in the box in section 4.G, would be: AG2.4.G.1, Gyumri.

Analytic methods: The transcribed data were coded by themes and ideas. In order to make the information more accessible, a table was created in an excel file, where the coded information were categorized according to the main domains addressed in the interview guide, as well as several emergent themes. To ensure consistency in categorization, frequent comparisons were made between new codes and already categorized ones (33). Only

triangulated ideas provided by different participants within the same and between different FGDs were reported in the results (34,35).

RESULTS AND DISCUSSIONS

Demographic information

Before commencing the FGD, each participant was provided a short demographic information questionnaire, which was completed individually. The questionnaire lacked any identifying information and was intended only to retrieve such participant personal information as sex, age, education, and compliance with pet vaccination as well as provide an insight into the number of stray dogs that the participants typically encounter during a given day. Table 1 below summarizes the study participants' characteristics.

Table 1: Demographic characteristics of the study participants

Study sites	Number of FGDs	Number of participants	SEX		EDUCATION		
			Male	Female	Secondary	Technical	Higher
YEREVAN	4	26	7	19	1	-	25
GYUMRI	4	26	8	18	4	5	17
TOTAL	**8**	**52**	**15**	**37**	**5**	**5**	**42**

During the FGDs, 17 of 52 participants reported owning pets, of which approximately 1/5 had dogs, three had cats, and one participant had hamsters. All those who owned dogs only, reported that their animals had received vaccinations, although they were not entirely sure if rabies vaccination was included. Two participants who had both a cat and a dog reported that neither animal was vaccinated, as did those who had cats. The average number of strays reported sighted per day varied from two to 15 animals. The average number of strays seen per day for Yerevan was approximately five, while Gyumri participants reported a higher number of strays seen per day: an average of approximately seven.

1. Knowledge:

1. A. What is rabies?

One of the first objectives of the study was to gain insight into the participants' understanding of the disease during FGDs. A series of questions in the interview guide were designed to illicit relevant responses. Throughout the discussions, the main problem noticed among all participants in all age groups was the inability to distinguish between general animal behaviors and other diseases including rabies. A second confusion was the seeming inability to comprehend exactly what "infection" means, therefore, even those participants who correctly reported rabies as an infectious disease transmitted through bites, would later on join the rest in asserting other, incorrect thoughts related to animal psychology. Representative examples of responses are provided below in Box 1.

Box 1: What is rabies?

I know that if the dog has rabies, if it bites a human, they have to be vaccinated.
AG2.1.A.1
Yerevan

The elders always used to say that the dog becomes rabid and bites and that is dangerous.
Ag1.1.A.2
Gyumri

It is a disease. I do not know.
AG1.1.A.3
Yerevan

There was a dog near where we lived. One of those small toy breeds. It probably had that disease… I remember it was always aggressive. I don't know why. Maybe it was due to its size… It had turned into a habit… every time I walked into my dad's friend's house, it would attack from behind and bite me.
AG1.1.A.4
Gyumri

1. B. Causes of rabies in animals

The concept of a genetic predisposition to rabies was a generally accepted notion amongst all groups. Participants in all groups expressed their concern over bad treatment from humans having psychological effects and leading to more aggression (and subsequently rabies) amongst dogs. Another frequently reported cause of rabies was the food that animals eat. Several participants agreed that either dirty or tainted food also could lead to rabies in dogs. Representative results are presented below, in Box 2.

The variety of causes of rabies mentioned by the participants may be partly due to the confusion that the name "rabies" creates. The name of the disease in the Armenian language is 'kadaghootioon', which translates as 'madness' or 'ferocity' - manifestations of 'extreme anger'. This confusion alone complicates the distinction between extreme anger and a disease that causes aggressive behavior.

Throughout the FGDs, this misconception intensified the confusion amongst the participants, as they struggled to discuss what this disease is and where it comes from. Therefore, as a result a single focus group would end up correctly describing rabies as an infectious disease, which at the same time has a genetic predisposition and is also due to psychological factors (both incorrect).

Box 2: Causes of rabies in animals

Genetics:
Rabies in animals is due to genetic predisposition… their mental state becomes unbalanced I think. Naturally, when these rabid animals fight with others and bite them, the disease can be transmitted.

AG2.1.B.1
Yerevan

I think that they [dogs] *are born that way. If you don't vaccinate your dog, it will become like that* [rabid]*… I mean it will grow up like that.*

AG1.1.B.2
Yerevan

Psychology:
If a person does not treat a dog with aggression, it is impossible… the animal will not become aggressive itself. It will not become rabid.

AG2.1.B.3
Yerevan

Food:
[Animals become rabid] *from food poisonings, which cause other reactions in the body. In dogs their immune system heals the body, but the after-affects of this cause an animal to become rabid.*

AG1.1.B.4
Gyumri

Dogs can become infected by eating dirty food or something like that… I don't know, maybe it's from within.

AG1.1.B.5
Yerevan

1. C. Rabies symptoms

Participants from both cities listed several differences between the symptoms that infected animals and humans exhibit (results presented below in Box 3). Even though the symptoms about which people knew were very limited as compared to the wide range that is exhibited during the various stages of the disease, both AG1 and AG2 participants from Yerevan mentioned foamy saliva, or hyper-salivation as the main symptom in animals, while the AG1 and AG2 participants from Gyumri concentrated on anger, aggression and death. Participants from both cities and age groups mentioned similar symptoms in infected humans.

Box 3: Rabies symptoms

In humans:	***In animals:***
People get fever. AG1.1.C.1 Yerevan	*Dogs have red eyes and foamy saliva.* AG1.1.C.4 Yerevan
The person's eyes pop out. AG2.1.C.2 Gyumri	*Dogs become aggressive, mad.* AG1.1.C.5 Gyumri
Both the dog and human die. That's what I've heard. AG1.1.C.3 Gyumri	*If the dog is sick, it dies.* AG2.1.C.6 Gyumri

1. D. Transmission of rabies from dog to man

Although almost all participants in all groups considered biting as a definite method of transmission of the disease from rabid animals (almost solely referring to dogs); they had different ideas about what exactly the bite does. Albeit most agreed on saliva, blood, and teeth being the possible explanation, several participants had additional ideas. Ingestion of the animal's hair is also a rather feared method of transmission, since participants expressed their worry about hair being almost impossible to eliminate. A third method, which was accepted in most groups was transmission through contact with the animal, expressed as touching, scratching, sharing meals, etc. These ideas are provided in Box 4 below.

Box 4: Transmission of rabies from dog to man

Bites:
Transmission is through the saliva of the animal…or the blood, which are transmitted into a human's blood.

AG1.1.D.1
Yerevan

Transmission is through the animal's teeth [when bites].

AG2.1.D.2
Yerevan

When some fluids mix up together.

AG1.1.D.3
Yerevan

Animal hair:
[Rabies] *infection isn't just transmitted to you through bites. Let's say, playing* [with the dog]*… it can be transmitted through hair.*

AG2.1.D.4
Gyumri

The animal's hair also transmits the disease. Let's say were cleaning some greens or something which has animal hair in it. It's quite possible that it will not come out and you will not even see it, no matter how many times you wash it [therefore it will be ingested].

AG2.1.D.5
Yerevan

Contact:
The disease can be transmitted from kissing a dog… sleeping next to a dog, keeping it in the house, using the same plates… because there are people who share their food with their dog from the same plate.

AG1.1.D.6
Gyumri

You have to be in contact with a dog [to become infected]*… when it scratches you for example.*

AG2.1.D.7
Gyumri

1. E. Prevention of rabies

Participants expressed mixed feeling regarding prevention of the disease among animals. Several examples are provided below, in Box 5. In all groups, most participants correctly agreed that the disease can be prevented by vaccinating animals. However, taking sick animals to a specialist for treatment was also widely reported, which is incorrect, since as mentioned above, after the onset of clinical symptoms, the disease is untreatable.

Participants also expressed other generally accepted ideas, which they believed would assist in managing the disease, however the confusion caused by the misconception about the disease and its causes continued here. Participants correctly suggested that owners should be taught to properly care for their animals and vaccinate them on time, but they also discussed teaching people humane treatment of animals as another important preventive measure.

Box 5: Prevention of rabies

Vaccination*:*
The only thing that we can do is vaccinate our pets; you can't do anything to yourself… I mean you can't vaccinate yourself or something so that you won't become infected.

AG1.1.E.1
Yerevan

There are vaccines that prevent disease.

AG1.1.E.2
Yerevan

Medical assistance:
If a person has a pet, they must constantly take them to the veterinarian for checkups. If they see that it [the animal] *isn't healthy, they start medication to stop the disease.*

AG1.1.E.3
Gyumri

Humane treatment of animals:
They [the government] *should create programs so that people will start loving animals and treating them well".*

AG2.1.E.4
Yerevan

1. F. 1. Treatment of rabies

The knowledge among different age groups somewhat varied concerning first aid in case of a bite. Examples are provided below, in Box 6. Participants in general agreed that if an unknown animal bites and opens a large wound, the person should seek immediate medical help. In all groups, the main first aid methods stated were use of iodine, hydrogen peroxide, and washing the wound. It is of interest that two AG1 participants from separate groups, both from Yerevan, also mentioned putting a tight band around the area above the bite and removing some blood as is done when removing snake venom.

Although almost all participants in all groups knew that bite victims were injected sera by doctors, the exact reason for the injection caused some confusion. A few participants believed that this prevented infection with Clostridium tetani through the open wound.

Box 6: Treatment for rabies

Immediate action:
They say that if treatment isn't administered on time, [the infected person] *develops a fever, hallucinates and dies.*

AG1.1.F.1.1
Yerevan

You should go to the doctor immediately.

AG.1.1.F.1.2
Yerevan

If a wild stray bites a person they probably have to go to the doctor immediately, but if pet then they can just treat with home remedies such as medical alcohol.

AG1.1.F.1.3
Yerevan

Disinfecting the wound:
First, you should buy 3% hydrogen peroxide and pour it on the wound, then put iodine, bandage it and go to the doctor.

AG2.1.F.1.4
Yerevan

The wound should be disinfected.

AG1.1.F.1.5
Yerevan

Injections:
A person will die if they do not go to the doctor and receive a serum injection… I think it's called anti-tetanus serum.

AG2.1.F.1.6
Gyumri

The serum is anti-tetanus, against tetanus.

AG2.1.F.1.7
Gyumri

1. F. 2. Traditional treatment methods – "THE RED (kidney) BEAN" phenomenon

AG2 participants depended more on traditional methods as compared to those from AG1. Various AG2 participants from different cities mentioned the implementation of a very specific 'first aid and treatment' method, which is presented below, in Box 7.

AG2 participants, in both Yerevan and in Gyumri, mentioned the "Red Bean" phenomenon , and had been used either by their elders or by themselves. The main idea behind this phenomenon is the use of a red bean to treat bite wounds. Regardless of the general disagreement among participants concerning whether the bean should be inserted into the wound (whole or split in half) or just split and placed on the wound, it was nevertheless stressed as a superior method to treat bite wounds. A participant asserted that not only does it stop the hemorrhage and help the wound heal in a few days, but it also disinfects the wound.

Box 7: Traditional treatment methods – "THE RED (kidney) BEAN" phenomenon

Application of the "red bean":
We had an old woman in our neighborhood who told me about this traditional method when my son was bitten by a dog. She told me to split the red bean in half and place it on the wound. We washed the wounds and then placed the half-beans all over the wounds, with the white parts touching the wound.

AG2.1.F.2.1
Gyumri

…A dog bit our neighbor's daughter who was my age; we were 10-11 years old at that time. My grandmother ran to the house, took a single large red bean and inserted it into the wound.

AG2.1.F.2.2
Yerevan

A dog had bitten my mother years ago. They had brought the red beans, split them in half, cleaned them and inserted them into the wounds.

AG2.1.F.2.3
Yerevan

Characteristics of the "red bean":
The bean is sterile. I think that's the point.

AG2.1.F.2.1
Gyumri

They don't just use the bean for wound healing, but also for infections.

AG2.1.F.2.2
Yerevan

The bean helps heal the wound very fast, and even stitching isn't necessary. [My mother's] *wound had been very large, but it completely healed in 2-3 days.*

AG2.1.F.2.3
Yerevan

Red bean doesn't just heal the wound; it completely removes the bad bacillus.

AG2.1.F.2.2
Yerevan

1. G. Sources of information on rabies

The main source of information reported by all groups was word of mouth. Most participants, especially the young generation, expressed their worry concerning the validity of the information handed down to them from older generations. A general concern about possible cause of further harm rather than help during a dangerous situation due to inaccuracy of some of the information was reported. Moreover, mothers in the groups acknowledged that in order to teach their children about rabies, they needed to know more.

One discrepancy was observed among the participants regarding the sources of information. Residents of Gyumri mentioned television as a source of some information while Yerevan residents did not. However, this additional knowledge was more in the manner of news coverage of cases of the disease in Gyumri, rather than information on the disease itself. Several examples are provided below, in Box 8.

Box 8: Sources of information on rabies

Word of mouth:
I also know about this [rabies] *like the rest do… more as a legend… and I don't know what results in rabies, but… there is such a thing.*

AG1.1.G.1
Gyumri

Just when I was a child, everyone [surrounding people] *used to warn me to be careful so a dog won't bite me, because it might have that disease* [rabies].

AG1.1.G.2
Gyumri

Media:
A few days ago I saw the "Kisabats Loosamood" TV program. It is a program about preventing stray animals… they also spoke about rabies.

AG2.1.G.3
Gyumri

Lack of information:
Information is very incomplete concerning any disease here in Armenia. Either it's really bad or something irrelevant that's reached from previous centuries … it's these sorts of stories that they wrap around each others necks.

AG1.1.G.4
Yerevan

Let our awareness increase, so that we will be able to explain to our children.

AG2.1.G.5
Gyumri

When you haven't received correct information and have just heard things here and there that old people have told, when the time for action comes you may make more mistakes than you would if you didn't know anything at all.

AG1.1.G.6
Yerevan

For example when people don't drink from the same glass as a person with cancer, saying 'I'll get infected', it's due to lack of information; they can just drink it.

AG1.1.G.7
Yerevan

2. Attitudes

2. A. Stray dogs and rabies prevention

Several participants in both age groups from Yerevan expressed their worry concerning the possibility of preventing the disease altogether. The discussion here

concerned stray animal populations. These participants agreed that vaccination would prevent pets from becoming infected; however, they argued that it is literally impossible to vaccinate all the strays. Therefore, it is next to impossible to address this issue appropriately. None of the Gyumri groups discussed this issue. Several example responses are provided in Box 9 below.

Box 9: Stray dogs and rabies prevention

They [the government] *should collect all the stray dogs, vaccinate them, and then release them.*

AG1.2.A.1
Yerevan

The only way to prevent rabies is to kill all the strays.

AG1.2.A.2
Yerevan

Prevention is only possible if you kill all the dogs in the world.

AG2.2.A.3
Yerevan

It is impossible to prevent [rabies] *amongst stray dogs.*

AG2.2.A.4
Yerevan

Prevention is impossible, because dogs aren't the only source. [A person] *can get infected from other animals also… cats, rats.*

AG2.2.A.5
Yerevan

2. B. Raising awareness among the population

Among all groups, opinions and suggestions concerning the best methods to raise awareness among the general population were many. Most of these such as the use of television, internet, organizing seminars and education in schools and universities triangulated for all groups. Several examples are provided below in Box 10.

In all groups, all participants agreed on the benefits of using the television, as being more accessible to all age groups, more interesting, and providing possibility for live programs. Both generations suggested providing information as short, interesting advertisements or video-spots. The AG1 participants in Yerevan specifically brought Viva-

cell advertisements as the most interesting and educational kind and suggested the same be used for awareness raising in case of rabies. Doctors and veterinarians were uniformly identified as the most respected and trusted information source to communicate rabies-related messages.

Many participants from both cities, young and old alike also suggested using internet-based approaches. Participants in both AG1s from Yerevan specifically suggested 'Facebook' and 'Odnaklasniki' as the best possible websites with high traffic. An alternative solution mentioned by members from both cities was placing small informational articles next to news reports.

Several participants from different AGs and from both cities mentioned word-of-mouth as a very effective method if organized in the correct manner. Suggestions were made to use community members who act as leaders for this purpose.

All groups considered early education of children and youth in schools and universities as an important step in raising awareness. Organizing lectures and discussions for the older generation also was considered important and effective.

Box 10: Raising awareness among the population

Television:
Television is interesting and you can also include a larger group of people if you use this method.

AG2.2.B.1
Yerevan

They [government] *can prepare a program. For example, a series of adverts, which will be broadcasted 10 times a month and slowly explain how what happens. The important thing is that it should be interesting.*

AG1.2.B.2
Gyumri

Internet:
Internet is correct. Nowadays even the youngest children know how to use the internet.

AG2.2.B.3
Gyumri

Place advertisements in the social networks such as 'facebook' or 'odnaklasniki', because those sites are accessed a lot. For example, the uneducated mass accesses 'odnaklasniki' a lot; they can go there, have a look at it [the advert] *and get used to it* [learn about the disease].

AG1.2.B.4
Yerevan

Word of mouth:

One person who knows the disease very well will explain it to another five, but in such a manner that those five understand very well… in their turn those five people will explain to another five. That is a very good method.

AG1.2.B.5
Yerevan

Of course word of mouth is better, because when something happens among the public, it is disseminated with much speed… of course they paint it in much darker colors, but at least they increase awareness to some extent.

AG1.2.B.6
Gyumri

Seminars, courses, discussions:

Organize a few lectures or something like that in universities. Let me tell you that if the topic really interests or concerns the youth, they will convey the issue to their elders as well.

AG1.2.B.7
Yerevan

Organize seminars and disseminate booklets among the population. They will become more aware and make correct decisions.

AG1.2.B.8
Gyumri

3. Behavior

3. A. Dog bite experiences

Most participants in both age groups agreed that a physician should only be sought if the bite is "dangerous". The meaning of "dangerous" in all groups was either a stray animal, or a deep, bleeding wound.

Bites by pets were considered as "not dangerous", if the animals were vaccinated or people "knew" and "trusted" the animal was well kept and cared for. Bites resulting in mere scratches also were considered harmless. A limited number of participants from each group insisted that the physician should be contacted regardless of the "level of danger". Corresponding results are provided in Box 11.

Box 11: Dog bite experiences

Well it has happened to me that a dog bit me, but the owner told me that the animal was vaccinated, so I just washed the wound with water and left it… didn't even pay any attention to it.

AG1.3.A.1
Yerevan

A few months ago a dog bit my neighbor's child and they didn't pay attention to it and didn't take any treatment measures. After some time passed, the child developed a fever. By the time they got him to the hospital, it was too late to do anything. He died sometime in around 40 days.

AG2.3.A.2
Gyumri

I know about a case of rabies in Alaverdi. A dog had this disease and bit a man and the man became infected. He started becoming mad and aggressive. Then doctors treated him and now everything is all right.

AG1.3.A.3
Gyumri

3. B. Self protection from stray dogs

Participants from both Yerevan and Gyumri demonstrated great concern about the stray dog populations in their cities. A general solution to this problem suggested by most participants was avoiding the animals by changing direction or crossing the street whenever a stray was encountered (findings presented below in Box 12).

Some differences existed between participants from Yerevan and Gyumri concerning the reported numbers of strays' encountered per-day – residents of Gyumri reported higher numbers on average – and their level of fright. Residents of Gyumri in both AG1 and AG2 reported being afraid to leave the house at night hours. Moreover, apart from the above-mentioned behavior of crossing the street whenever a stray was seen, residents of Gyumri also discussed "squatting" as an alternative option for avoiding attacks from strays. This method was not reported by residents of Yerevan and was given various explanations by those from Gyumri. However, even though the reasons why people believe this technique works varied, they all agreed that the outcome was positive.

Box 12: Self-protection from stray dogs

Well whenever I see a dog I pretend I'm a cat… I just scramble away.

AG1.3.B.2.1
Gyumri

When you see a stray you must squat. The dog sees you at the same height as itself and becomes flabbergasted that 'what happened? He seems to be the same height as I am, but it's not a dog or anything, ok I should just leave it alone'.

AG1.3.B.2.2
Gyumri

You must squat near a barking stray so it won't attack. When a dog barks it's thinking 'this is my territory', but when you kneel, it's over: dog thinks 'it's ok, he's humble'.

AG1.3.B.2.3
Gyumri

Yes, when you kneel [the dog] *feels that you are the same as him, but when you stand, it feels that you are a different being.*

AG1.3.B.2.4
Gyumri

If you see a stray, you must squat. They say that it feels that you're about to pick something up and hit it, so it stops.

AG2.3.B.2.5
Gyumri

I have told my child that when she sees a stray she should squat and pick a stone; The dog goes away automatically.

AG2.3.B.2.6
Gyumri

Causes of fear:
I love dogs, but I am scared of them, because I don't know what I should do if I am bitten.

AG2. 3.B.2.7
Yerevan

It is not the animal itself that I am scared of, but of being bitten and becoming infected.

AG1.3.B.2.8
Yerevan

STUDY STRENGTHS AND LIMITATIONS

This baseline, exploratory study is the first of its kind conducted in Armenia a. Moreover, in order to increase internal validity, the investigators used member checks throughout and provided brief summaries to the participants at the end of each FGD. Discussions were continued until data saturation was reached and triangulation was achieved. Results reported here included only those findings, which triangulated both within and/or between groups.

However, due to time limitations, the study only included the general population and did not concentrate on other stakeholders, such as physicians, veterinarians, specialists from the State Hygienic Epidemiological Center, and hunters.

SUMMARY OF FINDINGS

Overall, this qualitative rabies study identified many similarities and limited differences between participants from the two cities and different age groups.

Addressing the *first aim* of this study on the level of knowledge, attitudes, and behaviors of general population in Armenia about rabies, the FGDs revealed a huge gap in knowledge concerning rabies with participants from both cities exhibiting very limited/insufficient knowledge and some reporting that they know absolutely nothing. An inability to distinguish rabies from general animal behaviors, and fully comprehend what 'infection' was noticed among all participants throughout the FGDs. Participants had various fractions of information as well as opinions derived from these about protecting themselves from rabies: vaccinating their pets; turning to the assistance of a physician and receiving injections in case of "dangerous" bites; as well as using traditional methods such as red beans for self-treatment. On the other hand, several participants argued that the disease cannot be prevented since it is impossible to solve the vaccination problem of the stray dog population.

The realization that rabies is indeed a serious disease, combined with a lack of sufficient, accurate information on methods of protection provides a sense of fear amongst the population. Almost all reported fear of being bitten by a dog, however, most agreed that the fear is not from dogs themselves - since they love animals - but is due to not knowing how to avoid being bitten and what to do when bitten.

The *second aim* of the study was to compare differences in rabies knowledge, attitudes and behaviors between the capital of the country, and Gyumri. Participants from both cities almost exclusively refered to dogs as the animal that transmits rabies. Only a small number of participants mentioned that infection is possible from at least one additional species of animal, however during the discussion of prevention and self-protection, no other species was

either considerd or mentioned other than dogs. One difference was reported in the sources of information: participants from Gyumri listed television in addition to all the other sources listed by both groups. However, it was noted that the television programs were either concerned with the stray dog population of the city (mentioning rabies as well) or news coverage of cases of the disease, and lacked any educational content.

In addition, several participants from Yerevan expressed their concern that the disease canot be prevented, since it is impossible to vaccinate the entire stray-dog population. None of the Gyumri participants either raised, nor discussed this same issue.

Further dissimilarity was noticed while participants discussed how they protect themselves from being bitten by strays. A special 'Technique' unique to participants of both age groups from Gyumri was the "squatting" method. Even though various explanations were given as to why exactly this method works, it was nevertheless mentioned as very effective and widely employed. None of the Yerevan groups reported this method.

The *third* and last aim of the study was to compare rabies knowledge levels between generation. Revelations were very few, since both generations exhibited a general lack of knowledge. The main difference was noted when participants were discussing various methods of treatments when bitten, which revealed reliance on traditional medicine among the older generation. However, since none of the AG2 participants reported availability of additional information during the Soviet era, this difference was mostly attributed to life experience.

RECOMMENDATIONS

Overall, the study concluded that the general population of Armenia does not have sufficient information related to rabies, to effectively protect themselves from infection and disease.

The authors recommend starting various awareness raising programs to begin educating the public. As suggested by the participants themselves, short educational TV-spots are a very affective method with a wide coverage and possibility to include members from all age groups. Informative live programs presenting doctors and veterinarians can also be very beneficial, since it provides opportunity for the public to ask the experts questions concerning rabies. Another important step that should be addressed is involving the veterinarians into the awareness-raising program. Veterinarians must inform their clients about rabies, the necessity of vaccination and how to recognize and report abnormal behavior both among their animals and others.

To target a long-term solution for education of younger generation, the introduction of a multi-dimensional special course into school curriculums should be included in existing "Healthy Lifestyle" courses for 9-12 grade students. This effort will provide an opportunity to not only address this issue, but also incorporate various other subjects, such as general health, attitude towards nature, social behaviors, first aid, etc.

In order to effectively address the lack of public awareness not only on rabies but also on other antropozoonotic infections in Armenia the surveillance system must be strengthened and data transparency increased.

Since only members of the general population from two cities of Armenia were included in this study, the findings cannot be generalized for the entire population of Armenia and other stakeholders of the field. In order to answer this question, qualitative and/or quantitative

follow up studies, which will include health specialists (medical doctors and veterinarians) as well as hunters (first in contact with wild animals) and more representatives of general population from other regions of Armenia are recommended. This approach will offer a broader picture and identify possible solutions to the lack of awareness.

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APPENDIX 1 – Demographic information

1. Age ----------

2. Sex *(Please mark the appropriate box with an "X")* -------- Male ☐ Female ☐

3. Education *(Please mark the appropriate box with an "X")* ----------

School ☐ Specialized secondary ☐ University (14 years) ☐ Higher (14 + years) ☐

4. If you have received specialized secondary education or attended university, what is your specialization? ☐

5. Do you currently have any household pet/s? If yes, then are your pets vaccinated against rabies? (*Please fill in accordingly in the table below)*

Animal species	How many?	Regularly Vaccinated	
		Yes	No
Dog			
Cat			
Other (specify):			
Other (specify):			
Other (specify):			

6. Approximately how many different stray dogs do you see in a given day? -------- ☐

THANK YOU!!!

APPENDIX 2 – Focus group discussion guide

Interview	City	Date	No of part.

Place	Start and end time

1. What can you tell me about the disease Rabies (“Бещенство’’)? Do you recall ever hearing of any cases of rabies in your community?
   - When was this? How did it happen? What did they do?
2. What are the sources of infection and how can people get the infection?
3. Could this disease be prevented in animals, and if yes how?
4. What should a person do if an animal bites him/her? (If you have any personal experiences would you like to share with us?)
   - What happens to a person after he/she has been infected?
   - How should the wound be treated?
5. How did you learn about Rabies?
6. How do you use that knowledge (vaccinated pets, counseled friends or relatives, helped someone, etc.)?
7. In your opinion, what are the most effective ways for receiving information (counseling, audio-visual, printed, etc.)?
8. From what sources (TV, booklets, lectures, etc.)?
9. From whom (veterinarian, health provider, famous person, etc.)?

10. How affective do you think raising awareness among the general population for disease prevention is?

11. Is there anything else that you would like to add to the information you provided above?

THANK YOU FOR YOUR PARTICIPATION IN OUR STUDY!

APPENDIX 3 – Informational leaflet

RABIES

Rabies is a viral disease of humans and mammals. If immediate treatment is not provided, the outcome is death. The disease affects humans and all other mammals, including dogs, cats, foxes, rodents and bats. The virus enters the saliva of the infected animal and from here it is transmitted to healthy animals and humans through bites or through wounds on the mucous membranes and skin.

RABIES IS A 100% PREVENTABLE DISEASE!

Clinical signs of the disease:

On average, in humans the incubation period of the disease can last 30-70 days. Usually diseased animals display unease, aggressiveness, foamy hyper-salivation, difficulty swallowing and seizures. Dogs may swallow unusual items, such as wood. Animals are usually depressed, avoid light and tend to hide in dark places. Paralysis and coma usually persist during the last period of the disease and the animal dies. The disease has a similar progression among humans and if after being bitten, immediate treatment is not provided, once clinical symptoms proceed, the outcome is death.

To protect your animals and yourself from Rabies:

- Do not panic! Regardless of the location of the wound, if an animal has bitten you, wash it with soap and plenty of water for at least 10 minutes.
- Contact a doctor without hesitation.
- Whenever possible, isolate the animal that bit you, so that specialists will be able to study it for Rabies identification. Try to remember the species of the animal that bit you, if it is a wild animal, as well as the color and size, because this information is very important.

- Since children are often in contact with animals, they are at higher risk. Teach them to avoid touching unfamiliar animals, even if they look calm.
- Discuss with the veterinary specialist and definitely vaccinate domestic pets against rabies.
- Stay away from unfamiliar animals.
- Do not touch, keep or feed wild animals.
- Keep all garbage cans closed, to avoid attracting wild and stray animals.
- Wear gloves before touching your pet if it has been bitten. Beware, wounded animals can bite. It is essential to vaccinate the animal.
- Immediately inform the veterinarian if you notice abnormal behavior in your animal, or if it has been bitten. Your pet must be vaccinated within 72 hours, if there is suspicion that it has been bitten by a rabid animal.
- Cull rabid animals and destroy the carcasses through incineration.