MEDILABSECURE EARLY WARNING SITUATION ANALYSIS STUDY (ONE HEALTH MESAPLUS STUDY)

STUDY ABSTRACT

OBJECTIVES OF OH THE MESAPLUS STUDY

The One Health MESAPLUS Study is a situational analysis involving human, animal, entomology and any other relevant sectors involved in vector borne disease surveillance in Armenia.

AIM OF THE STUDY

To enhance early detection and early warning of complex health threats at the human-animal-environmental interface, by a situation analysis study and by promoting the adoption of a One Health (OH) based Conceptual framework (OHCF) for the integration of OH approaches in prevention and preparedness strategies.

General Objective

Contribute to the integration of human, animal and entomological surveillance of arboviruses and the inclusion of relevant environmental data to enhance early detection of potential threats at the human-animal-environmental interface and early warning capacity in the Region.

Specific objectives

1. Describe how the collection, analysis and dissemination/exchange of information is organized within and between human, animal and entomological surveillance of arboviruses, (including relevant environmental data) in Armenia;

2. Describe how, when and where essential information for prediction, early warning and risk assessment of arbovirus infections are collected, stored and shared by the relevant sectors;

3. Discuss main challenges and success stories in establishing a functional inter-sectoral utilisation of the information collected across sectors in these

three countries for prediction, detection, early warning and risk assessment purposes;

4. Facilitate the utilisation of the available information for the development of the integrated early warning/risk assessment (also with GIS training support);

5. Assess the adequacy of a One Health based Conceptual Framework (OHCF) to strengthen the integration of OH approaches in prevention and preparedness

OH MESAPLUS SITUATION ANALYSIS INVESTIGATORS

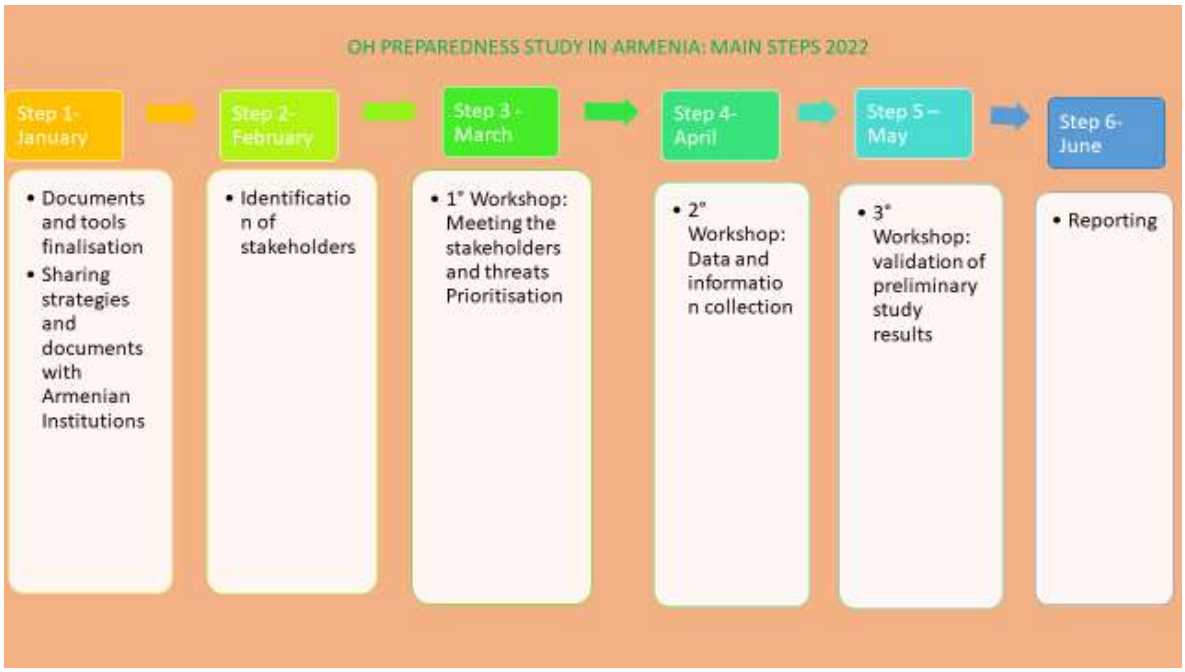
The national situation analysis will be guided and performed by a team of investigators (hereby OH Situation Analysis investigators) comprising representatives from Istituto Superiore di Sanità (ISS), Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G.Caporale" (IZSAM), Armenian National Center for Disease Control and Prevention (NCDC) and Armenian Veterinary Inspectorate of the State Service for Food Safety (VIFS) involved in MLS Project.

Staff from previous MLS Country Studies (Georgia, Serbia and Tunisia) will be invited to support this Study on the basis of their acquired experience (ToT approach).

PHASES OF THE ONE HEALTH MESAPLUS STUDY

The OH MeSAPLUS study started in 2021. Due to the Covid-19 emergency the year 2021 was dedicated the preparation of the draft documentations, but it was not possible to start the study activities.

Tentative study planning for year 2022:



MEDILABSECURE[2] SITUATIONAL ANALYSIS (MESAPLUS): integration of One Health approaches to enhance detection of potential threats at the human-animal-environmental interface and early warning for arbovirus infections

TERMS OF REFERENCE MESAPLUS

Updated version 2 December 2021

Proposing	Italian Health Institute (ISS) as leader of MediLabSecure Working Group on Public Health (WP4)– in collaboration with Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale" (IZSAM)
Subject	Participation to a situational analysis on integrated surveillance of arboviruses (MESAPLUS Study). Findings will be shared, as part of the situation analysis study, with the countries part of the MediLabSecure (MLS) network and a report published on the project website.
Purpose	**General Objective** The goal of the MESAPLUS study is to: Contribute to the integration of human, animal and entomological surveillance of arboviruses and the inclusion of relevant environmental data to enhance early detection of potential threats at the human-animal-environmental interface and early warning capacity in the Region. Specific objectives 1. Describe how the collection, analysis and dissemination/exchange of information is organized within and between human, animal and entomological surveillance of arboviruses, (including relevant environmental data) in three countries of the MediLabSecure network; 2. Describe how, when and where essential information for prediction, early warning and risk assessment of arbovirus infections are collected, stored and shared by the relevant sectors; 3. Discuss main challenges and success stories in establishing a functional inter-sectoral utilisation of the information collected across sectors in these three countries for prediction, detection, early warning and risk assessment purposes; 4. Facilitate the utilisation of the available information for the development of the integrated early warning/risk assessment (also with GIS training support by WP5- Early warning tools / Modelling). 5. Assess the adequacy of a One Health based Conceptual Framework (OHCF) to strengthen the integration of OH approaches in prevention and preparedness
Eligibility	During the MLS KOM in Paris (July 2019), the WP4 proposed detailed criteria for the identification of three countries to be involved in the MESAPLUS Study. Countries' requirements for participation in the study are: - Digitalized Surveillance in place for at least one of the MLS priority arbovirus infections; - Surveillance data/indicators available for at least two of the sectors relevant for the considered arbovirus infection (according to MLS Survey results); - Representativeness of one of the areas involved in MLS2, reflecting the diversity of the Regions; - Existence of internal national capacity to meet the study's terms of reference requirements; - Availability to get involved in the GIS training to reinforce early warning/risk assessment procedures (WP5). Added Value:

	- The MLS Country Focal Points consider the sharing of lessons learned and experiences matured nationally to be useful for MLS network
	STUDY IN ARMENIA
Proposed pathogens	**Priority Arboviral infectious**[1]
Duration	December 2020-December 2021 (including one week study visit tentatively in Autumn 2021)[2]
Activities	The assessment of existing data collection and possible integration for early warning is structured in four phases: 1. **Selection:** Confirmation of the participation to the study by the identified country; 2. **Country Portfolio:** Development of study tools and collation, in advance of the site visit, of available data/documents to build a country portfolio including specific scenarios; 3. **Site Visit/Virtual meetings** (October 2021)**:** Conduction of a set of virtual meetings aimed at: ✓ Sharing consensus on the revised objectives, methodology and schedule of the study; ✓ Assess the possibility of extending to other potential threats the assessment of the adequacy of a One Health based Conceptual Framework (OHCF) to strengthen the integration of OH approaches in prevention and preparedness (OS 5) ✓ Identification of stakeholders/institutions to be involved in the study; ✓ Sharing and revision of the developed tools to implement the study (e.g. check list, framework etc.) ✓ Information/data collection/interviews with the identified stakeholders 4. **Reporting:** Preparation of a draft country report, validation with the stakeholders involved and final sharing and discussion of the main findings in a strategic document on multisectorial integration in the Mediterranean, Black Sea and Sahel Regions. The MediLabSecure WP4 Focal points (human and animal health) of Armenia will be asked to: 1. Collaborate as investigators in all the study phases including the development of the study methodology and tools, 2. Provide input on/share relevant sources and documents for the compilation of background information on the country;

[1] Priority arboviral diseases will be selected on the basis of documentation available (i.e Armenian CDC Report 2021, Tephinet small grant on ''Piloting of Epidemiological Surveillance System for Arboviral diseases in Armenia''; ISS rapid desk top review), experts advice and project's requirements)

[2] Considering the present emergency, due to the Covid-19 Pandemic, the study in Armenia will be started with virtual meetings which will be concluded with a site visit if feasible.

	3. Identify key informants/mapping stakeholders[3] in the surveillance process at national, intermediate and local level to involve in the study as appropriate both within the national health systems and in other sectors by involving other MediLabSecure focal points (from the laboratories of human and animal virology, entomology) and representatives of other key sectors (e.g. environment). 4. Facilitate the involvement of the identified stakeholders in the virtual meetings organised to implement the study (***see specific meetings plan with objectives and tentative schedule in annex 1)*** 5. Organize with the investigator team a site visit (if feasible by June 2022) in the country designed to: a. Verify the utilization of the available information for the development of an integrated early warning/risk assessment procedures enhanced by GIS training (by WP5- Early warning tools / Modelling). b. Validate findings and provide comments on the draft report that will summarize the findings of the situation analysis and the OHCF assessment and related relevant recommendations.

[3] Relevant stakeholders should include referents/institutions/lab in charge of the surveillance of the identified arboviral diseases and other priority threats, as well as facilities (i.e clinics, veterinary farms, slaughterhouses etc.) or any other representative relevant for the aim of the study

The One Health MediLabSecure Early Warning Situation Analysis Study in Armenia

(OHMESAPLUS Study)

Portfolio

Armenia

ADVANCED Draft 11-8-2022

CONTENTS

STUDY IMPLEMENTATION

Study steps

a. ***Presentation of the country situation*** by the Armenian colleagues.

b. ***Meeting with all stakeholders involved in Crimean Congo Haemorragic Fever surveillance*** (at least one per each sector: human virology, animal virology, animal health, medical entomology, public health, climate and environment, etc.) to:

- explore the effectiveness of the surveillance process and communication mechanisms in place between the sectors;
- explore the data collection system with focus on those indicators particularly relevant for an integrated surveillance and early warning for CCHFV;
- enhance the strength of surveillance and early warning by integration of geographical data through the Geographic Information System (GIS) with ad hoc training session for Armenian staff.

CONFIRMED STAKEHOLDERS PARTICIPATING IN THE STUDY

Institution	Department	Referent
National Center for Disease Control and Prevention (NCDCP)/MoH	Deputy Director General	Lilit Avetisyan WHO IHR-2005 National Focal Point
National Center for Disease Control and Prevention (NCDCP)/MoH	Department of Epidemioloy of Zoonotic and Parasitic Diseases	Dr Lusine Paronyan
"Reference laboratory Center" branch of National Center for Disease Control and Prevention (NCDCP)/MoH	Virology Laboratory	Dr Shushan Sargsyan
"Reference laboratory Center" branch of National Center for Disease Control and Prevention (NCDCP)/MoH	Virology Laboratory	Dr Edgar Petrosyan
"Reference laboratory Center" branch of National Center for Disease Control and Prevention (NCDCP)/MoH	Laboratory of Episootology, Ectoparasitology and Entomology	Dr Arsen Manucharyan
"Reference laboratory Center" branch of National Center for Disease Control and Prevention (NCDC)/MoH	Laboratory of Especially dangerous Infections and Live Culture Museum	Dr Armine Khazazyan

Institution	Department	Referent
National Center for Disease Control and Prevention (NCDC)/MoH	“Shirak” branch	Dr Ruben Danielyan
Food Safety Inspection Body of the Government of the Republic of Armenia (FSIB), MoE	Head of FSIB	Dr Georgi Avetisyan WOAH delegate
Food Safety Inspection Body of the Government of the Republic of Armenia (FSIB), MoE	International Affairs Department	Dr Tigran Yesayan
Risk Assessment Research Center (RAC), MoE	Head of RAC	Dr Tigran Marcosyan
Reference Laboratory of Especially Dangerous Pathogens of Veterinary and Phyto-Sanitary Laboratory Center, FSIB	Head of Reference Laboratory of Especially Dangerous Pathogens	Dr Perch Tumanyan
Veterinary and Phyto-Sanitary Laboratory Center, FSIB	Head of Veterinary and Phyto-Sanitary Laboratory Center	Dr Arman Gevorgyan
Ministry of Economy	Food Safety Division	Melanya Karapetyan
Ministry of Economy	Food Safety Division	Marianna Khachatryan
Ministry of Economy	Food Safety Division	Ashot Danielyan
Ministry of Environment	Specially Protected Areas of Nature and Biodiversity Policy Department	Tatevik Zuerker
Center for Ecological-Noosphere Studies- National Academy of Sciences		David Pipoyan
BTR Program, CH2M/Jacobs Armenia Branch Office	Training specialist	Lilit Khachatryan

Institution	Department	Referent
BTR Program, CH2M/Jacobs Armenia Branch Office	One Health specialist	Dzovinar Melkom Melkomian
WHO Armenia Country Office	Incident Management Support Officer	Ekaterine Jabidze

BACKGROUND INFORMATION

1. General information

1.1 Geography

Armenia, officially the Republic of Armenia, is a landlocked country in the southern Caucasus region, which shares borders with Azerbaijan, Georgia, Iran, and Turkey (Fig. 1). Yerevan is the capital city.

Figure 1. Representative map of the borders of Armenia.

The geography is primarily mountainous with little forestland, centred on the Ararat valley (Fig. 2). It is the result of an uplift of the earth's crust 25 million years ago, that created the Armenian plateau and the Lesser Caucasus range that extends from northern Armenia to the southeast, between Lake Sevan and Azerbaijan, to the border with Iran [1].

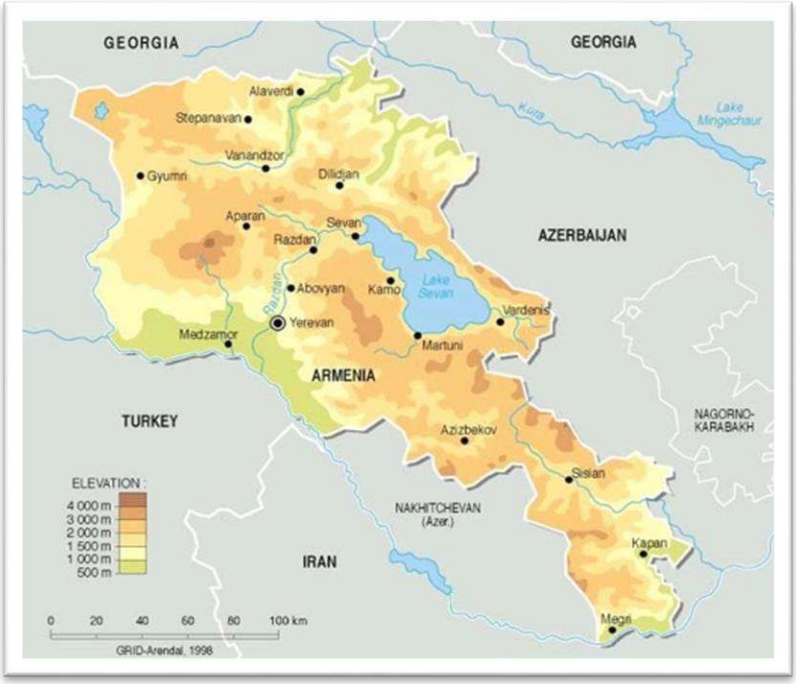


Figure 2. Representative map of the territory of Armenia.

Armenia has a population of about 3 million, more than one third of whom live in the capital, Yerevan. Life expectancy at birth in 2011 was estimated at 71 years (67 for men and 75 for women). The main burden of disease is non-communicable diseases, particularly cardiovascular diseases [1].

1.2 History

1.2.1 Policy

From a historical-cultural point of view, Armenia could be considered European, and, in fact, the country is a member of the Council of Europe. The country declared its independence from the Soviet Union on September 21, 1991[2].

1.2.2 Relations with neighbouring countries

In recent decades, the country has been engaged in a long conflict with Azerbaijan, and very recently in the conflict for the disputed region of Nagorno-Karabakh and surrounding territories which seems to have reached an end with the signed Agreement on 10 November 2020. The economies of both states have suffered from the war, mainly due to mutual trade blocks.

Armenia has very difficult relations with Turkey, for the question of the Armenian genocide (1905-1915) denied by the latter and has good relations with Russia and Iran. Political relations between Georgia and Armenia, after the dissolution of URSS, have always been good, although the presence of various economic interests can destabilize the relations between the various countries in the region [2].

1.2.3 Livestock sector

Cattle farming is the leading branch of the livestock sector in Armenia, accounting for 58% of the meat produced in the country. In the lowlands, cattle farming is practiced throughout the year and the animals are farmed into stables, whereas in the sub-mountainous and mountainous areas they are reared on pastures. The largest population of cattle is concentrated in the regions of Gegharkunik and Shirak, followed by Aragatsotn, Syunik, and Lori (Fig. 3) [3].Cattle data was reported at 4.500 Head in 2019. This records a decrease from the previous number of 5.000 Head in 2018 [4]. For what concerns the commercial organization of small ruminants (sheep and goats), data reported 2.000 Head in 2019. Also in this case, the data records a decrease from the previous number of 2.400 Head for 2018. These data remain actives status in CEIC Data [a] and are reported by Statistical Committee of the Republic of Armenia. Data on animal population of Armenia are categorized under Global Database's Armenia [4].

Figure 3. Regions where the largest populations of cattle are concentrated.

a: Founded in 1992 by a team of expert economists and analysts, CEIC Data provides an expansive and accurate data insight into more than 213 economies. https://www.ceicdata.com/en/armenia/number-of-livestock-and-poultry

1.2.4 Health care system

The health care system is divided into three administrative layers: national, regional, and municipal or community. Except for the State Hygiene and Anti-Epidemic Inspectorate (SHAEI) and several tertiary care hospitals, operations and ownership of health services have been devolved to regional and local government (Fig. 4) [5]. The health system today comprises a network of independent, self-financing (or mixed financing) health services that provide both statutory and private services. Previously, hospitals had nominal accountability to the local administration and were ultimately answerable to the Ministry of Health; they now have financial autonomy and are increasingly responsible for their own budgets and management, reporting only utilization data to the State Health Agency (SHA). Regional government, however, continues to monitor the care provided while the Ministry of Health formally retains regulatory functions. Almost all pharmacies, most dental services and medical equipment support have been privatized, as have most hospitals in Yerevan. The Ministry of Health is nominally the key regulator of the health system, but its regulatory capacity remains quite weak at the facility level. It is the role of the Ministry and its subordinated institutions to define and apply national health standards and norms, to ensure quality control and to develop as well as oversee state-funded programmes [2]. Regional and local governments do not have to report to the central government; however, they should comply with national orders and policies set by the Ministry of Health, those related to the control of infectious diseases, through negotiated procedures and processes. Therefore, local government activities in the health care sector remain visible to the Ministry of Health, although lines of accountability are opaque and there are few direct monitoring and evaluation activities. There is still a degree of accountability of regional health care institutions to regional government in that they have to report on funded activity; however, hospitals and polyclinics are increasingly autonomous. In recent years (up to 2018), improvements in population health outcomes have been slower than in neighbouring countries. Armenia was doing poorly when it came to financial coverage. Its public health funding was among the lowest in the region [2]. On November 22, 2019, Armenia's Ministry of Health proposed a program for implementing a mandatory, universal health insurance system in the country, costing a 6% income tax on every working citizen. The program would not cover all medical procedures: it would include treatment of cardiovascular diseases including surgeries, as well as treatments for cancer including surgery, radiation, and chemotherapy [5].

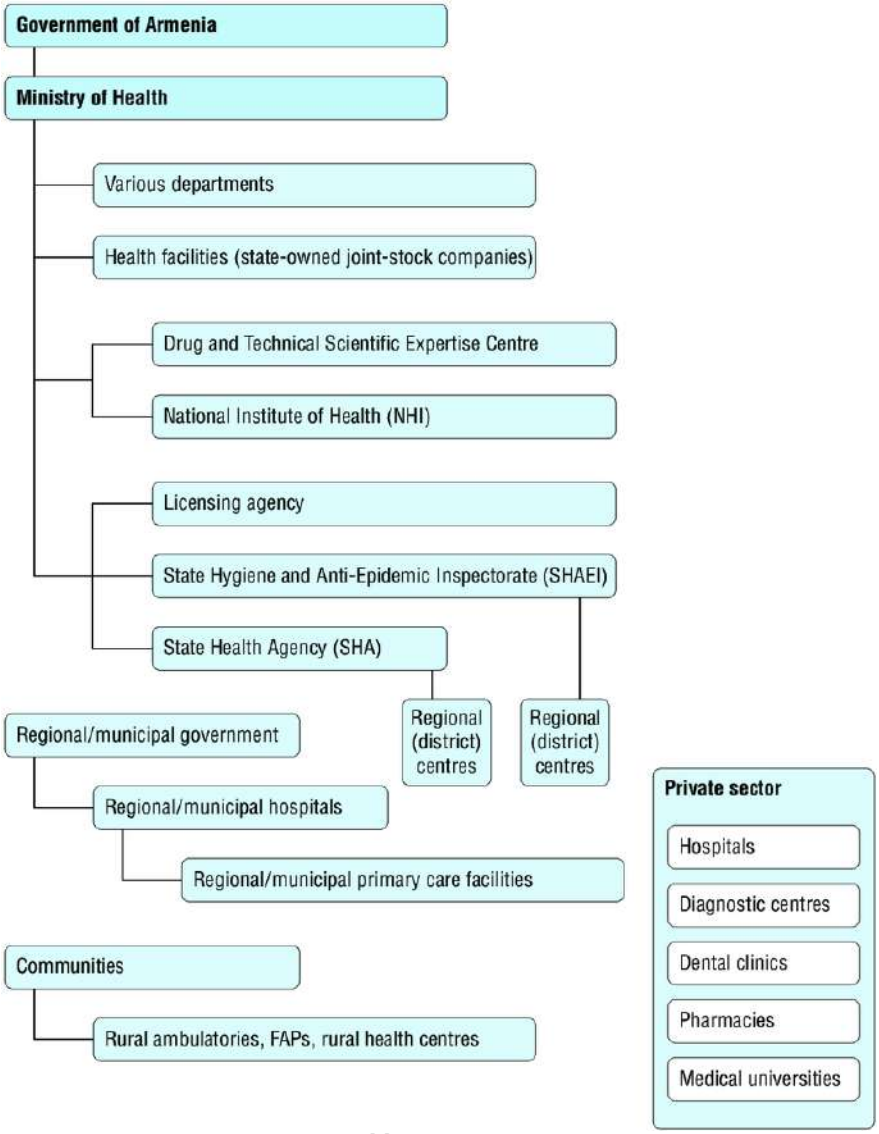


Figure 4. Overview of the health system [2].

2. Institutions involved

2.1 "National Center for disease control and prevention"

NCDC (Fig. 5) is a non-profit organization, which has been established in 2014 and operates under the supervision of the RA Ministry of Health.

The objectives of the organization are as follows:

1. Implementation of complex measures (sanitary-hygienic, antiepidemic) for the prevention of communicable and non-communicable diseases,
2. Implementation of measures envisaged by the National Immunization Program,
3. Implementation of disinfection and rodents' extermination (deratization) activities in the communicable and parasitic diseases foci, where there are conditions for communicable and parasitic diseases development and spread,
4. Participation in implementation of preventive, medical and constraining activities conducted by sanitary-quarantine units at the state border checkpoints,
5. Organization and implementation of activities that help to minimize the impact of acoustic factors on a human body,

6. Ensure preparedness and response to epidemics, outbreaks, poisonings, and other conditions posing threat to public health (including, ensuring reserve supplies, formation and preparedness of a quick response team, assuring transportation and other material resources, preparing to workout),
7. Observation, analysis, and study of communicable and non-communicable diseases spread, epidemiology and risk factors, as well as identification of the risk groups,
8. Implementation of programs aimed to detect and prevent nosocomial communicable diseases,
9. Observation, analysis, and study of the measures taken to ensure work hygiene and good health of employees,
10. Regulation of the overall laboratory network, according to the requirements of the International Health Regulations (IHR), and implementation of the functions of the reference laboratory,
11. Conduct of sanitary-hygiene examination, laboratory analysis of environmental agents and submission of conclusions,
12. Implementation of programs and taking measures in the scope of one's authority, to ensure biosafety and biosecurity in public health,
13. Conduct of social-hygiene inspection (monitoring) of the environmental factors having an impact on the health of the population, analysis, and assessment of the results,
14. Implementation of programs directed to propagation of knowledge in medical and hygienic and anti-epidemic safety and healthy lifestyle, as well as to education of specific groups of the population,
15. Provision of prevention services to travellers, such as calibration and checking,
16. Development of legal acts, methodological guidelines, and draft projects in public health on prevention of nosocomial infections and assurance of population sanitary-epidemic safety,
17. Development of methods for infection control, implementation of activities on updating the criteria set for precise diagnosis of nosocomial infections,
18. Implementation of scientific and scientific-medical research.

NCDC consists of Head office, "Reference Laboratory Centre" and regional branches (Aragatsotn, Ararat, Armavir, Gegharkunik, Kotayk, Lori, Shirak, Syunik, Tavush, Vayots Dzor).

Figure 5. Head office and "Reference Laboratory Center" branch of NCDC.

2.2 Food Safety Inspectorate

The Food Safety Inspectorate implements assessment of food products' conformity with the applicable standards, regulates the administration of veterinary and sanitary services, as well as ensures control and imposes sanctions acting on behalf of the Republic of Armenia [6].

2.3 Ministry of Economy

The Ministry of Economy of the Republic of Armenia with the current structure was formed as a result of the unification of the Ministry of Economic Development and Investments of the Republic of Armenia and the Ministry of Agriculture of the Republic of Armenia according to the Law of the Republic of Armenia "On Amending and Adding to the Law "On the Structure and Activities of the Government "adopted by the RA National Assembly on May 8 2008 (signed by the President of the Republic of Armenia on May 16, 2019, No-31-N). The Ministry of Economy of the Republic of Armenia includes 13 main professional structural divisions, 10 supporting structural divisions, 4 offices and 1 subordinate body [7].

3. Arboviral diseases in Armenia

3.1 Crimean-Congo Haemorrhagic Fever

The first detection of the Crimean-Congo Haemorrhagic Fever Virus (CCHFV) in ticks (the vector) and the only laboratory-confirmed severe case of human CCHF disease in Armenia is dated back to 1974 in Syunik region (Tab. 1) [8, 9, 10].

There are no published reports about CCHFV activity in the country in the last five decades for what concerns the circulation of the virus in the livestock. Some concerns on CCHF in Armenia's livestock occurred after the detection of AGDP antibodies to the virus in cattle sera from five areas of the country in 1970s (Tab. 2) [10, 11]. Armenia is considered in a study at level 2 in 2019 where CCHF cases were reported intermittently in absence of robust surveillance (Fig. 6) [8].

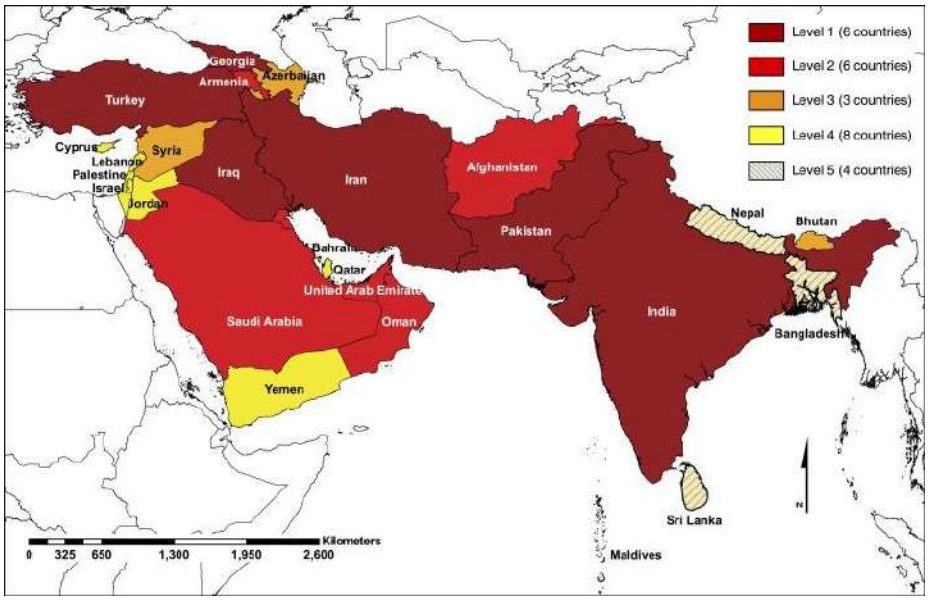


Figure 6. Burden of CCHF in Southern and Western Asia using a One Health approach. Data support CCHFV circulation in lower Level (1 and 2) countries, whereas further study and surveillance of CCHFV circulation is recommended in countries of higher Levels (3, 4, and 5). Classification at the country level was performed for policy implications. Country boundaries do not necessarily reflect the geographic area at risk. Map was created using ArcGIS Release 10.61. Source: Database of Global Administrative Areas (GADM). This figure appears in color at www.ajtmh.org [8].

Country	Total confirmed cases	Total deaths	Cases per year (range)	Years cases reported	References
Turkey	10,333	469	150–1,318	2002–2017	7 , 31
Iran	1,256	177	18–150	1999–2017	28 – 30
Pakistan	429	94	3–83	1976–2017	32 , 38 , 39 , 54 – 61
Iraq	377	39	0–55	1979–1980, 1990–2010, 2013, 2015	62 , 63
Afghanistan	334	88	1–237	1998–2017	21 , 33 , 64 – 67
Georgia	56	7	0–25	2009, 2012–2017	42 , 68 , 69
India	47	19	6–18	2011–2015	43 , 70 – 75
Oman	34	14	0–33	1995–2014	76 – 79
United Arab Emirates	24	14	0–11	1979, 1994–1995, 2010	6 , 80 – 82
Saudi Arabia	8	0	0–7	1989–1990	83
Kuwait	2	0	0–2	1980, 1982	46
Armenia	1	0	0–1	1974	45

Table 1. Human cases CCHF in Armenia [8].

Country	CCHF cases reported	Human serology	Animal serology	*Hyalomma* ticks	Virus detected in *Hyalomma* ticks
Armenia	1974 45 , 95	1972 96	1972 96	Yes 97	1972–1974 97 , 98
Azerbaijan	No	2007 99	1967–1970 100	Yes 97	1972–1974 97 , 101
Bahrain	No	NA	NA	NA	NA

Table 2. Cases of CCHF in Armenia (human, animals, and ticks) [8, 11, 12, 13, 14].

In 2022 CCHF virus was detected from ticks in Syunik region (13 samples) and small retrospective seroprevalence study among people with the history of fevers of unknown origine and tick-bites in Tavush region revealed 5.4% of seropositive cases for CCHF (5 from 93 samples).

3.1.1 Human and animal surveillance

As mentioned, there are no published data about CCHFV presence in the country in the past 50 years [10]. Armenia is considered an at-risk country, but since the vector of the disease is thermopile, the conditions for circulation of the virus are not yet at the emergency threshold [9]. The experience of neighbouring countries (Iran, Turkey) reveals that when the climate becomes more arid, the disease emerges also among humans [15]. The boundaries of natural ecosystems may move up the mountain profile by about 200 m in the coming 100 years, which can cause serious changes both in the ecosystem structure and in the habitats of different representatives of biodiversity (Fig. 7) [12]. An increase in desert and semi-desert areas is expected to lead to CCHF epidemics.

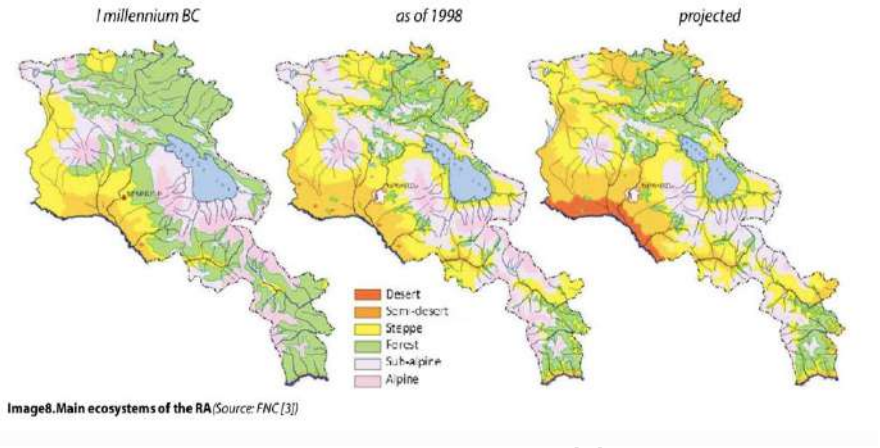


Figure 7. Prediction of the Armenia's ecosystem in 100 years [10].

3.1.2 Situation of CCHF in neighbouring countries

Surveillance for CCHF began in Georgia in 2009 when the first case was detected. Since then, annual case counts have increased progressively in the country, which might reflect a constant improvement of the surveillance sensitivity [16].

The presence of CCHFV in Iran was first identified in studies of livestock sera and ticks in the 1970s but the first human infection was not diagnosed until 1999. Since that time, the number of cases has markedly increased. Since the first human infection, CCHF has been a major public health concern in Iran with many cases all over the country [17].

In Turkey, CCHF outbreaks started in northern regions in 2020. Since then, human cases continue to increase and the disease spreads in many other provinces of Turkey [18].

3.2 Other Arboviral diseases

In 2006, a large entomological survey (64,567 mosquitoes and 45,180 ticks of the genus *Ixodes*) identified 125 distinct strains of 10 arboviruses, including West Nile fever virus, tick-borne encephalitis virus, Tamdy virus, Tahyna virus, Geta virus, Batai virus, Sindbis virus, Crimean-Congo hemorrhagic fever virus, Bhanja virus, and Dhori virus.

Tick-borne encephalitis (TBE) virus was historically diagnosed in Armenia but has not been studied in recent years. Investigations carried out in 1985-1992, showed TBE virus circulation among bloodsucking arthropods' species found in almost all landscape zones of the country. Natural foci of TBE were identified in various climatic and geographical zones.

Available literature indicates Sandfly fever was reported in Armenia until the late 1970s. Phlebotimine shadflies (also transmit Leishmaniases) are found in different altitudes of the country. Pappataci fever was found mostly in visitors (24 times more than in residents) in Ararat valley and Southern part of Armenia. Currently, no cases of Sandfly fever are registered in Armenia due to lack of diagnostic capacities and low awareness of medical personnel.

West Nile fever is now spread all over the world, including the Mediterranean area. It is mostly transmitted by the mosquito *Culex pipiens*, a species widely spread in Armenia.

3.3 Vector control

In 2016, a study [10] showed that ticks collected from central regions of Armenia were more infected with CCHFV than those from southern and northern regions were. This could be explained by the composition of sampled ticks from this region, where *Rhipicephalus sanguineus* were the most abundant species that were also showing the highest infection rate among all other tick species (less *Hyalomma*) and/or a higher concentration of livestock and the scarce quality of breeding management. Among all the areas studied, the highest ticks' infection was identified in Kotayk Province with a prevalence of 54.05%. The second highest prevalence was identified in Dilijan Town (Tavish Province). Prevalence of infected ticks decreased in the north, in Ijevan (25%) and Artsvaberd (21.5%) regions, as well as in the east Chambarak (15%) (Fig. 8, Tab. 3) [10]. In the study, the Rhipicephalus resulted the most prevalent genus in the Kotayk region. *Ixodes ricinus* and *Rhipicephalus annulatus* were the most prevalent species in Gegharkunik Province. In Artsvaberd and Ijevan the most abundant tick species were *Rhipicephalus bursa* and, in Chambarak, *Rhipicephalus annulatus*. The most abundant tick species in this study is *R. sanguineus* (Tab. 4) [10].

Figure 8. Regions where ticks are most infected. The highest ticks' infection was identified in Kotyak Province with prevalence of 54.05%. The second highest prevalence was identified in Dilijan Town (Tavish Province). Prevalence of infected ticks is low in the north, Ijevan (25%) and Artsvaberd (21.5%) as well as in the east Chambarak (15%).

Tick species	No ticks	Infection rate	No Pools	Positive pools	Doubtful pools
Rhipicephalus annulatus	65	107.73	17	6	1
Dermacentor marginatus	68	0.00	16	0	2
Hyalomma marginatum	70	17.85	17	1	3
Ixodes ricinus	51	0.00	13	0	1
Rhipicephalus bursa	86	71.87	22	5	3
Rhipicephalus sanguineus	208	175.30	52	26	4
Total	**548**		**137**	**38**	**14**

Table 3. Results of CCHFV antigen detection in tick pools according to geographic location, infection rate per 1000 ticks and 95% confidence interval [10].

Town/village (Province)	Infection rate	No Pools	Positive Pools	Doubtful Pools
Zorak (Ararat)	0.00	16	0	2
Chambarak (Gegharqunik)	42.80	39	6	2
Tsaghkadzor (Kotayk)	195.79	37	20	3
Khndzoresk (Syunik)	10.87	25	1	2
Dilijan (Tavush)	156.65	220	100	18
Ijevan (Tavush)	65.76	8	2	0
Artsvaberd (Tavush)	73.58	14	3	3
Total		**359**	**132**	**30**

Table 4. Serological results of Crimean-Congo haemorrhagic fever antigen detection in pools according to tick species, infection rate per 1000 ticks and 95% confidence interval [10].

A field mission of the European network for medical and veterinary entomology (VectorNet) of Armenia identified, in 2016, 29 different species of mosquitoes, including 6 anophelines, 10 aedes, 3 culiseta, 8 culex, 1 uranotaenia and 1 coquilletidia, and including *Aedes albopictus* for the first time in the northern part of Armenia (bordering to Georgia)[1] (Fig. 9).

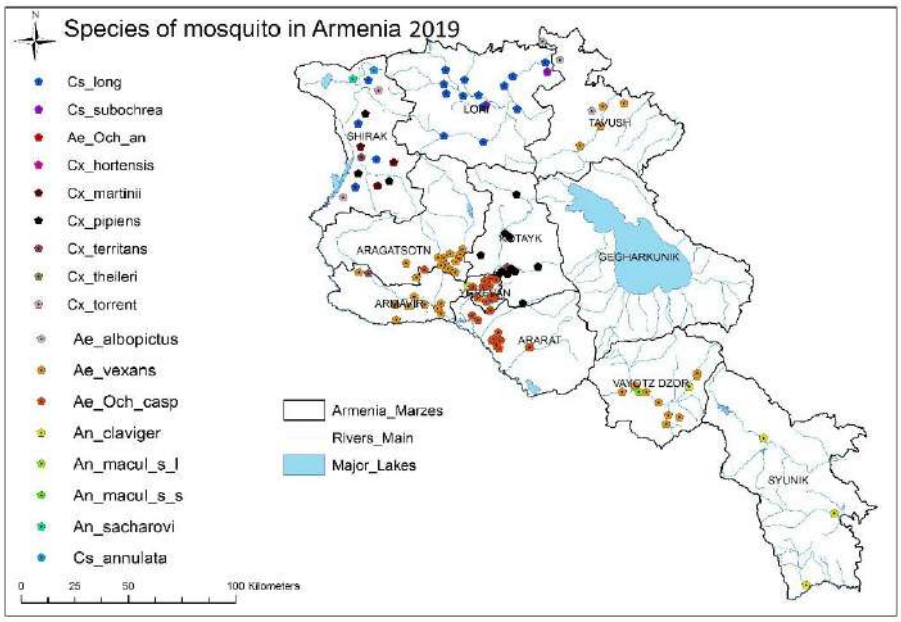


Figure 9. Mosquito species in Armenia, 2019.

Aedes albopictus (Stegomyia albopicta), also known as Asian tiger mosquito, was recorded in a single locality, at the border point with Georgia, on the main road Tbilisi-Yerevan. Routine entomological surveillance (conducted by field entomologists working in NCDC branches) in 2017-2020 on presence/absence of *Aedes*

[1] Akiner MM, Demirci B, Babuadze G, Robert V, Schaffner F. 2016. Spread of the invasive mosquitoes Aedes aegypti and Aedes albopictus in the Black Sea region increases risk of chikungunya, dengue, and Zika outbreak in Europe. PLoS Neglected Tropical Diseases, 10(4), e0004664.

invasive species revealed expansion of the area of *Aedes albopictus*. This important potential vector of many arboviruses (yellow fever, dengue, Chikungunya, Zika, as well as Dirofilaria immitis), was recorded during the four consecutive years 2016-2020. Only adults of *Aedes albopictus* were recorded in 2017 in the same locality as in 2016, border point Bagratashen, 450m above sea level. In 2018 entomological investigation recorded its establishment (adults and larvae) and spread in northern Armenia up to 15 km in Ayrum town (500 MAMSL). In 2019 adults and larvae of *Aedes albopictus* were recorded 60km inland from border point in Ijevan town, again on the main road Tbilisi-Yerevan (750 MAMSL) (Fig. 10).

Figure 10. Expansion of the area of *Aedes albopictus*.

Field observations demonstrated *Aedes albopictus*'s recent introduction and establishment in the north of the country, with implications for public health. Studies that are more comprehensive are required to understand the real distribution of *Aedes albopictus* in Armenia, to estimate and predict the future distributions of it in response to target surveillance and control efforts that aim to mitigate the spread of arboviral diseases among population.

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Description of the surveillance system in Armenia

1. HUMAN SURVEILLANCE

- **Which institution is in charge for human surveillance?**

The National Center for diseases control and prevention (NCDC) is in charge for Arboviral diseases human surveillance.

- **When Arboviral diseases first detected in Armenia?**

Crimean-Congo Hemorrhagic Fever virus (CCHFV) was first detected in Armenia in human (1974), cattle sera (1972) and ticks (1972).

- **Are Arboviral diseases notifiable in Armenia? (Please mention relevant legal references and currently used case definitions).**

Arboviral diseases are notifiable disease in Armenia. There are 5 legal acts – MoH orders 35-N ministerial Order on December 17, 2010, "Real Time electronic epidemic surveillance of infectious diseases"; 1985-A ministerial Order on August 20, 2014, “Prevention and control of Crimean-Congo hemorrhagic fever ”, 313-A ministerial Order on February 5, 2016 “Prevention and control of Zika fever ”, 2561-A ministerial Order on August 12, 2016 “Epidemiological surveillance of Hemorrhagic syndrome” ; 860-A ministerial Order on March 17, 2017 “Prevention measures and control of Yellow fever ”.

Standard case definitions:

Crimean-Congo hemorrhagic fever (CCHF) standard case definition

A suspected case is defined as an individual with sudden onset of high fever >38.5°C, and one of the following symptoms: severe headache, muscle aches, nausea, vomiting, and/or diarrhea

AND

in the anamnesis mentions the fact that the tick has bitten 14 days before the onset of the disease.

OR

an individual with sick animal’s blood contact or other biological secretions (slaughterhouse workers, farmers, veterinarians) 14 days before the onset of symptoms.

OR

medical workers who report having been in contact with a suspected, probable, laboratory-confirmed case of CCHF within 14 days prior to the onset of symptoms

AND

have been in CCHF endemic countries (e.g. Georgia).

A probable case defined as CCHF suspected case and thrombocytopenia

AND

Two of the following symptoms: hematoma, hemorrhage, gastrointestinal bleeding, bleeding gums, any hemorrhagic event that has no other origin or is associated with another disease.

A confirmed case is defined as a probable case with positive diagnosis of CCHF in blood sample: presence of IgG or IgM antibodies to the CCHF virus in serum by ELISA (Ig M appears in the blood on the 5-7th day of the disease and reaches the maximum titer in 2-3 weeks, Ig G appears on the 7-10th day of the disease) and/or detection of viral nucleic acid in specimen by PCR and/or isolation of the virus (on the first 5-7 days of the disease).

- **How and where the laboratory confirmation of human cases of Arboviral diseases is conducted?**

All suspected cases are analyzed in Reference Laboratory Center, using RT-PCR test: in 2018 have been examined 47 blood samples, in 2019-29 blood samples, in 2020-3 blood samples, in 2021-2 blood samples.

- **Who has responsibility for human Arboviral diseases surveillance and who for response in case of outbreaks?**

Zoonotic and Parasitic Diseases Epidemiology department of NCDC (Head office) is the main responsible authority. There are also specialists from regional and urban branches, which investigate the case.

- **Could you please describe the Arboviral diseases surveillance system?**

The Arboviral diseases passive surveillance system has been operational in Armenia since 2010. It works as case-based surveillance system. A suspected case from medical facilities is reported to Head office of NCDC, from where it is reported to the regional branches.

In 2010 the order of the MoH, real time epidemiological surveillance system, immediate notification cases (before that there was only urgent notification), and notification of cases to the MoH were adopted. This was activated also by the need of enhancing the WHO IHR capacity and of activating the electronic integrated surveillance system.

- **How many staff is involved in collecting and transmitting Arboviral diseases surveillance data?**

In collecting and transmitting of Arboviral diseases surveillance data are involved 3 persons. A suspected case must be confirmed by laboratory specialist. An epidemiological-entomological examination of the confirmed case is carried out by visiting foci.

- **What are the data sources?**

Detection of Arboviral diseases cases is carried out by medical staff, service providers, family doctors etc. The diagnosis of Arboviral diseases case is based on the standard case definition, with epidemiological, clinical and laboratory indications.

- **How the data are collected (forms, number of variables, individual and/or aggregated, paper and/or electronic)?**

Data are collected from medical centers via telephone and then electronic specific form is sent. Electronic Integrated Diseases Surveillance System (EIDSS) is on the way of its implementation and shortly will be fully operated. After that only electronic notification of all the cases of infectious diseases will be conducted in real time. According to the ministerial order N 2873-A on 05.10.2017 "Measures to be taken in the foci of infectious diseases transmitted by ticks" Annex 7 of the methodological guide, we have a special form of foci epidemiological investigation.

- **Please report which indicators are you collecting in the table below:**

Indicator	Collected		If YES, Since (year)	Type		Coverage	
	Yes	No		Annual	Season.	National	Regional/areas
Population density	✓		1926	✓		✓	
Population age distribution	✓		1926	✓		✓	
Arboviral Disease frequency or occurrence: new notified cases/outbreaks per year	✓		2010				
Arboviral Disease frequency or occurrence: number of confirmed laboratory cases per year	✓		2010				
Arboviral Disease frequency or occurrence: persons with specific antibodies (seroprevalence)		✓					

- **How is data analysis conducted?**

Monthly/Annual reports and situation analysis is conducted for all infectious diseases.

- **How are data transmitted out? To whom, in what format?**

Electronic (Mulberry electronic document management system). Half-year/Annual reports to the MoH and Government on the epidemiological situation and all activities conducted during that period is conducted.

- **Was the Arboviral diseases surveillance system evaluated?**
    - **If so, is it possible to share a copy of this evaluation with the investigator team?**

No.

- **Is data shared with other sectors (animal health, entomology)? For what purpose (early warning, surveillance …).**

Medical Entomologists work at NCDC, regularly conduct field work, and share findings. In case of registration of Arboviral diseases cases data will be shared with veterinary service (FSIB) for early detection and prevention of diseases cases.

- **Is feedback received from other sectors? In what format: Informal communication, regular official reports, Other (specify):**

Informal communication.

- **Can official documents pertaining human Arboviral diseases surveillance procedures be made available to the team during the site visit?**

Yes.

2. ANIMAL VIROLOGY SURVEILLANCE

Which institution is in charge for animal virology?

The reference Institution is the Reference Laboratory Center of EDPs of Food Safety Inspection Body and equipment are generally available, including small quantity of kits for CCHF. They mainly perform activities to adhere to OIE/WOAH policies

- Is a veterinary surveillance system in place for Arboviral diseases?

No.

- Could you please describe the veterinary Arboviral diseases surveillance system? (Target species, active/passive surveillance etc.)
- How many staff are involved in collecting and transmitting Arboviral diseases surveillance data?
- What are the data sources?
- How the data are collected (forms, number of variables, individual and/or aggregated, paper and/or electronic …)?

Please report which indicators are you collecting in the table below:

Indicator	Collected		If YES, Since (year)	Type		Coverage	
	Yes	No		Annual	Season.	National	Regional/areas
Animal disease occurrence							
Animal disease seroprevalence							

- How is data analysis conducted?
- How are data transmitted out? To whom, in what format?
- Was the veterinary Arboviral diseases surveillance system evaluated?

No.

  - If so, is it possible to share a copy of this evaluation with the investigator team?
- Is data shared with other sectors (human health/ entomology)? For what purpose (early warning, surveillance …)
- Is feedback received from other sectors? In what format: Informal communication, regular official reports, Other (specify):
- Can official documents pertaining veterinary CCHFV surveillance procedures be made available to the team during the site visit?

3. ANIMAL HEALTH SURVEILLANCE

Which institution is in charge for veterinary public health?

The Food Safety Inspection Body

- Is a veterinary surveillance system in place for Arboviral diseases?

No.

- Could you please describe the veterinary Arboviral diseases surveillance system? (target species, active/passive surveillance etc.)
- How many staff are involved in collecting and transmitting CCHFV surveillance data?
- What are the data sources?

- How the data are collected (forms, number of variables, individual and/or aggregated, paper and/or electronic …)?

Please report which indicators are you collecting in the table below:

Indicator	Collected		If YES, Since (year)	Type		Coverage	
	Yes	No		Annual	Season.	National	Regional/areas
Animal population density	x			x		x	
Animal movements and trade: pastoralism and transhumance	x					x	
Animal movements and trade: import and export							
Animal movements and trade: wildlife migrations							

They collect data about movements and population that are notified to OIE with six months aggregated reports:

- Movements, collected by State of Food Inspection Body (also trade, import/export including wildlife) but they do not public these data.
- Population, collected by Statistic Agency, they are available online on the Statistic Agency website.

NCDC collaborates with Institute of Zoology: the institute does investigation in wildlife migration (geckos, foxes, some cats) so NCDC contacted them and asked them to collaborate and share information and not duplicate what they are doing. Institute of Zoology meet them, share experiences, and explain what they are doing but they do not report routinely.

- How is data analysis conducted?
- How are data transmitted out? To whom, in what format?

In animal health sector, they have reports and excel files, but these files are not available online or on a platform. They provide data if someone ask for them.

- Was the veterinary CCHFV surveillance system evaluated?
    - YES or NO
    - If so, is it possible to share a copy of this evaluation with the investigator team?
- Is data shared with other sectors (human health/ entomology)? For what purpose (early warning, surveillance …)
- Is feedback received from other sectors? In what format: Informal communication, regular official reports, Other (specify)

- Can official documents pertaining veterinary CCHFV surveillance procedures be made available to the team during the site visit?

4. MEDICAL ENTOMOLOGY SURVEILLANCE

Which institution is in charge for medical entomology?

NCDC is in charge for medical entomology

- Could you please describe the entomological Arboviral diseases surveillance system? (Target species, active/passive surveillance etc.)

Routine entomological and ectoparasitological surveillance is carried out all over the country in accordance with the decision of the Government of the Republic of Armenia N1134-N dated 17.10.2013 on approval of the Statute of the National Center for Diseases Control and Prevention (NCDC).

NCDC is responsible for implementation of the vector-control activities in the country, including:

- formulation of national policy regarding objectives of VBD control,
- development of national guidelines,
- monitoring of VBD trends,
- coordination, assistance, and monitoring of technical component of the VBD control program in the regions,
- conduct of basic/special trainings for staff and guide research activities,
- promotion and coordination of inter-regional control program,
- procurement and distribution of VBD control commodities such as insecticides, drugs for prophylaxis, laboratory, and field items/equipment,
- The peripheral units that are involved in vector borne diseases prevention and control are NCDC Regional branches. Each of these institutions is headed by a Director (Chief Epidemiologist) who is supported by epidemiologists, laboratory, technical, management and financial staff.

During 2011-2015 the Protocol Decision of the Government of the Republic of Armenia N-23 of the June 17, 2011, on approving the 2011-2015 state program on prevention of malaria reintroduction and establishment in the Republic of Armenia confirmed the list of measures on strengthening entomological surveillance, effective response, monitoring and evaluation, research etc.

During 2014-2018, based on the Government Protocol Decision number 22 of the 29 May 2014, the Infectious Diseases Vector Control Program for 2014-2018 was adopted, with the following strategic directions:

- Entomological surveillance,
- Implementation of vector-control activities,
- Prevention of endemic infectious diseases,
- Vector-control measures in borders,
- Scientific and applied research on vectors,
- Human resource development,
- Awareness rising on vector-control measures among population.

Vector control policy in Armenia is/was regulated in accordance with international approaches and national legal acts.

- How many staff is involved in collecting, identifying vectors' pools?

The roles and responsibilities of staff working in the field are clearly defined, including their skills and functions, which are described in their job descriptions. But still, there is an urgent need of human resources development plan.

Programme level	National	Regional / provincial / state / departmental
Mosquito larval surveys	+	+
Adult vector (mosquitoes and sand flies)surveys (e.g., use of light traps, baited traps, human landing catches)	+	+
Ticks collection (from rodents, cattle, by flagging)	+	+
Data management	+	+
Statistical analysis	+	+
Survey design	+	+
Mapping / GIS	+	-/+(only in Shirak)
Monitoring and evaluation	+	+

Table: Roles and responsibilities of staff working on vectors and VBDs

- Do you have maps of distribution of potential Arboviral diseases' vectors in your country?

Yes, on annual basis. Data are coming from the branches of entomology doing samplings. Info available in the database: *Hyalomma, Ixodes, Rhipicephalus*.

- Do you monitor PCR Arboviral diseases' positivity in vector pools?

When possible (depends on availability of kits, was done in 2018 mosquito pools for WNV). Also ticks' seroprevalence.

4.1 TICKS' SURVEILLANCE

Please report which indicators are you collecting in the table below:

Indicator	Collected		If YES, Since (year)	Type		Coverage	
	Yes	No		Annual	Season.	National	Regional/areas
Vector presence	✓			✓		✓	✓
Vector abundance/density		✓					
Vector seasonality	✓						
Vector infection rate	✓					✓	

- How are the data collected?

Fieldwork is conducted during the season, regional entomologists/ectoparasitologists sample vectors and identify species and send samples for reference to the Reference Laboratory. Regional entomologists/ectoparasitologists provide monthly reports on findings.

- How are data transmitted out? To whom, in what format?

Half-year/Annual reports to the MoH and Government on the epidemiological situation and all activities conducted during that period is conducted.

- Is data shared with other sectors (human health/ animal health)? For what purpose (early warning, surveillance …)

Not yet. Will be shared if needed. They share information to their branches that share awareness among doctors and population about these diseases, but they do not send any information to the animal health sector.

- Is feedback received from other sectors? In what format: Informal communication, regular official reports, Other (specify) N/A

- Can official documents pertaining entomological Arboviral diseases surveillance procedures be made available to the team during the site visit?

Yes.

5. CLIMATE AND ENVIRONMENT

Which institution is in charge for climate and environment data collection?

- Are data and information from climate and environmental database integrated in surveillance of Arboviral diseases?

"HYDRO METEOROLOGY AND MONITORING CENTER" SNCO is in charge for climate and environment data collection.

- Are data from publicly available dataset on climate and environment integrated in surveillance of Arboviral diseases?

Yes.

If so, which data?

Meteorological service routinely provides the weather information on daily temperature, humidity, precipitations, and winds, based on which entomologists are counting malaria seasonal elements in case of imported cases to have clear understanding of the risks of local transmission.

Please report which indicators are you collecting and integrating in surveillance in the table below:

Indicator	Collected		If YES, Since (year)	Type		Coverage	
	Yes	No		Annual	Season.	National	Regional/areas
Temperature	✓			✓	✓	✓	✓
Humidity	✓			✓	✓	✓	✓
Precipitation	✓			✓	✓	✓	✓
Land use (urban, rural, uninhabited)	✓			✓	✓	✓	✓

6. POLICY/INSTITUTIONAL LEVEL INTERSECTORAL AGREEMENTS

Are there formal collaboration mechanisms between the animal virology and veterinary public health and the human sector (ministerial decree, legislation, or other formal documents) that impact Arboviral disease surveillance?

Yes, Joint orders among other zoonotic diseases.

Are there formal collaboration mechanisms between the medical entomology sector and the human sector (ministerial decree, legislation, or other formal documents) that impact Arboviral diseases surveillance?

Yes, defined by Joint orders among other zoonotic diseases.

Are there Memorandum of understandings or other formal agreements between the institutions involved in Arboviral disease surveillance from the human, animal, and entomological sectors?

No

Are there informal agreements of collaboration between the mentioned institutions?

Yes

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7. INTERSECTORAL COLLABORATION AT DATA COLLECTION/ANALYSIS LEVEL

Is there interoperability between data collection mechanisms of human surveillance, animal surveillance and medical entomology monitoring for Arboviral Diseases?

No.

Is there interoperability between data analysis mechanisms of human surveillance, animal surveillance and medical entomology monitoring for Arboviral Diseases?

No.

Is regular exchange of information occurring across sectors involved in Arboviral Diseases surveillance regardless of full interoperability of the data collection and analysis systems?

No.

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8. INTERSECTORAL COLLABORATION AT DATA DISSEMINATION LEVEL

Are Arboviral Diseases joint surveillance reports issued that include data on human surveillance, animal surveillance and medical entomology monitoring?

No.

Is there a two-way communication in place between public health and other sectors involved in Arboviral Diseases surveillance?

No.

9. CONCRETE EXAMPLES

When were Arboviral Diseases outbreaks described in Armenia?

There were no Arboviral Diseases outbreaks described in Armenia.

Could these real-life experiences be used to describe the intersectoral collaboration mechanisms in place during the site visit?

If so, we would kindly ask you to describe the outbreaks and provide any publication you deem relevant in allowing the investigators to prepare in advance of the visit on the topic.

OH Study in Armenia
1° workshop – 22/03/2022

Lusine Paronyan-NCDC/Georgi Avetisyan-FSIB
ISS team: Maria Grazia Dente, Silvia Declich, Alessia Milano e Claudia Robbiati
IZSAM team: Paolo Calistri, Ombretta Pediconi e Laura Amato

Objectives of Prioritisation (Study aim)

To identify priority pathogens in Armenia to be studied in the context of the MediLabSecure Project in order to:

> assess One Health (OH) approaches integrated in the preparedness, surveillance and control of the identified pathogen in Armenia;

> assess key lessons learned and positive factors which have enhanced the integration of OH approaches;

> assess constraints which are hampering integration of OH approaches;

> assess adequacy of the OH Conceptual Framework to facilitate OH operationalisation in Armenia.

Prioritisation exercise steps

1. Seeking consensus about relevant zoonotic diseases for Armenia identified according to National Reports (JEE Armenia 2016, VCNA Armenia 2021, NBW Armenia final report, One Health Armenia OH 2021) and to MLS aims;
2. Seeking consensus about indicators for the prioritisation of selected pathogens;
3. First polling: arboviruses ranking based on replies to the prioritisation indicators;
4. Discussion about the selected pathogens;
5. Second polling: additional potential pathogens ranking based on replies to the prioritisation indicators;
6. Final discussion and preliminary consensus.

Potential pathogens as per prioritisation objectives

	MLS aim	Possible additional pathogens		
	Virus	**Virus**	**Protozoa**	**Bacteria**
Vector-borne	CCHFV (ticks)°	TBE (*Ixodes, Dermacentor, Haemaphysalis*)°	Leishmaniosis (*Phlebotomus*)°	/
	WNV (*Culex*)°			
	RVF (*Aedes, Cluex*)			
Non vector-borne	/	Rabies (animals' bite, skratches)*	/	Anthrax (food, inhalation, skretches)§

JEE Armenia 2016 & -> *
VCNA report Armenia 2021 -> °
National Bridging Workshop > §

Consensus on indicators for prioritisation (1)

INDICATORS
1. Select the pathogen/s which has/have been detected or caused outbreaks/epidemics in the past 10 years
2. Select the pathogen/s which has/have been detected in a new location or population (human or animal) in the country or neighboring countries in the past 10 years
3. Select the pathogen/s whose animal host (domestic or wild) is/are in close proximity to humans in Armenia
4. Select the pathogen/s whose related vector/s' presence and abundancy are increasing in Armenia due to anthropogenic, climatic and environmental factors
5. Select the pathogen/s that can affect food safety or/and food security
6. Select the pathogen/s which can have a big impact on economic and social aspects in case of outbreak in Armenia

Consensus on indicators for prioritisation (2)

INDICATORS
7. Select the pathogen/s which can benefit the most of the integration of the OH approach in preparedness/surveillance/response in Armenia
8. Select the pathogen/s for whom a OH preparedness/surveillance plan is available in Armenia
9. Select the pathogen/s which can benefit the most from the integration of environmental and climatic data in its surveillance
10. Select pathogen/s which has activated a recent response action to contain a potential outbreak of the disease
11. Select the pathogen/s with an integrated (human, veterinarian, environmental) data collection and analysis system in Armenia

First polling on arboviruses indicators for prioritisation

1. Select the pathogen/s which have been detected or caused oubreaks/epidemics in the past 10 years in Armenia
CCHFV
WNV
RVFV

2. Select the pathogen/s which have been detected in a new location or population (human or animal) in the country or neighboring countries in the past 10 years
CCHFV
WNV
RVFV

First polling on arboviruses indicators for prioritisation (1)

3. Select the pathogen/s whose animal host (domestic or wild) is in close proximity to humans in Armenia
CCHFV
WNV
RVFV

4. Select the pathogen/s whose related vector/s' presence and abundancy are increasing in Armenia due to anthropogenic, climatic and environmental factors
CCHFV
WNV
RVFV

First polling on arboviruses indicators for prioritisation (1)

5. Select the pathogen/s that can affect food safety or/and food security
CCHFV
WNV
RVFV

6. Select the pathogen/s which can have a big impact on economic and social aspects in case of outbreak in Armenia
CCHFV
WNV
RVFV

First polling on arboviruses indicators for prioritisation (1)

7. Select the pathogen/s which can benefit the most of integration of OH approach in preparedness/surveillance/response in Armenia
CCHFV
WNV
RVFV

8. Select the pathogen/s for whom a OH preparedness/surveillance plan is available in Armenia
CCHFV
WNV
RVFV

First polling on arboviruses indicators for prioritisation (1)

9. Select the pathogen/s which can benefit the most from the integration of environmental and climatic data in its surveillance
CCHFV
WNV
RVFV

10. Select pathogen/s which have activated a recent response action to contain a potential outbreak of this disease
CCHFV
WNV
RVFV

First polling on arboviruses indicators for prioritisation (1)

11. Select the pathogen/s with an integrated (human, veterinarian, environmental) data collection and analysis system in Armenia
CCHFV
WNV
RVFV

Second polling on additional potential pathogens

1. Select the pathogen/s which have been detected or caused oubreaks/epidemics in the past 10 years in Armenia
TBE
Rabies
Leishmaniosis
Anthrax

2. Select the pathogen/s which have been detected in a new location or population (human or animal) in the country or neighboring countries in the past 10 years
TBE
Rabies
Leishmaniosis
Anthrax

Second polling on additional potential pathogens

3. Select the pathogen/s whose animal host (domestic or wild) is in close proximity to humans in Armenia
TBE
Rabies
Leishmaniosis
Anthrax

4. Select the pathogen/s whose related vector/s' presence and abundancy are increasing in Armenia due to anthropogenic, climatic and environmental factors
TBE
Rabies
Leishmaniosis
Anthrax

Second polling on additional potential pathogens

5. Select the pathogen/s that can affect food safety or/and food security
TBE
Rabies
Leishmaniosis
Anthrax

6. Select the pathogen/s which can have a big impact on economic and social aspects in case of outbreak in Armenia
TBE
Rabies
Leishmaniosis
Anthrax

Second polling on additional potential pathogens

7. Select the pathogen/s which can benefit the most of integration of OH approach in preparedness/surveillance/response in Armenia
TBE
Rabies
Leishmaniosis
Anthrax

8. Select the pathogen/s for whom a OH preparedness/surveillance plan is available in Armenia
TBE
Rabies
Leishmaniosis
Anthrax

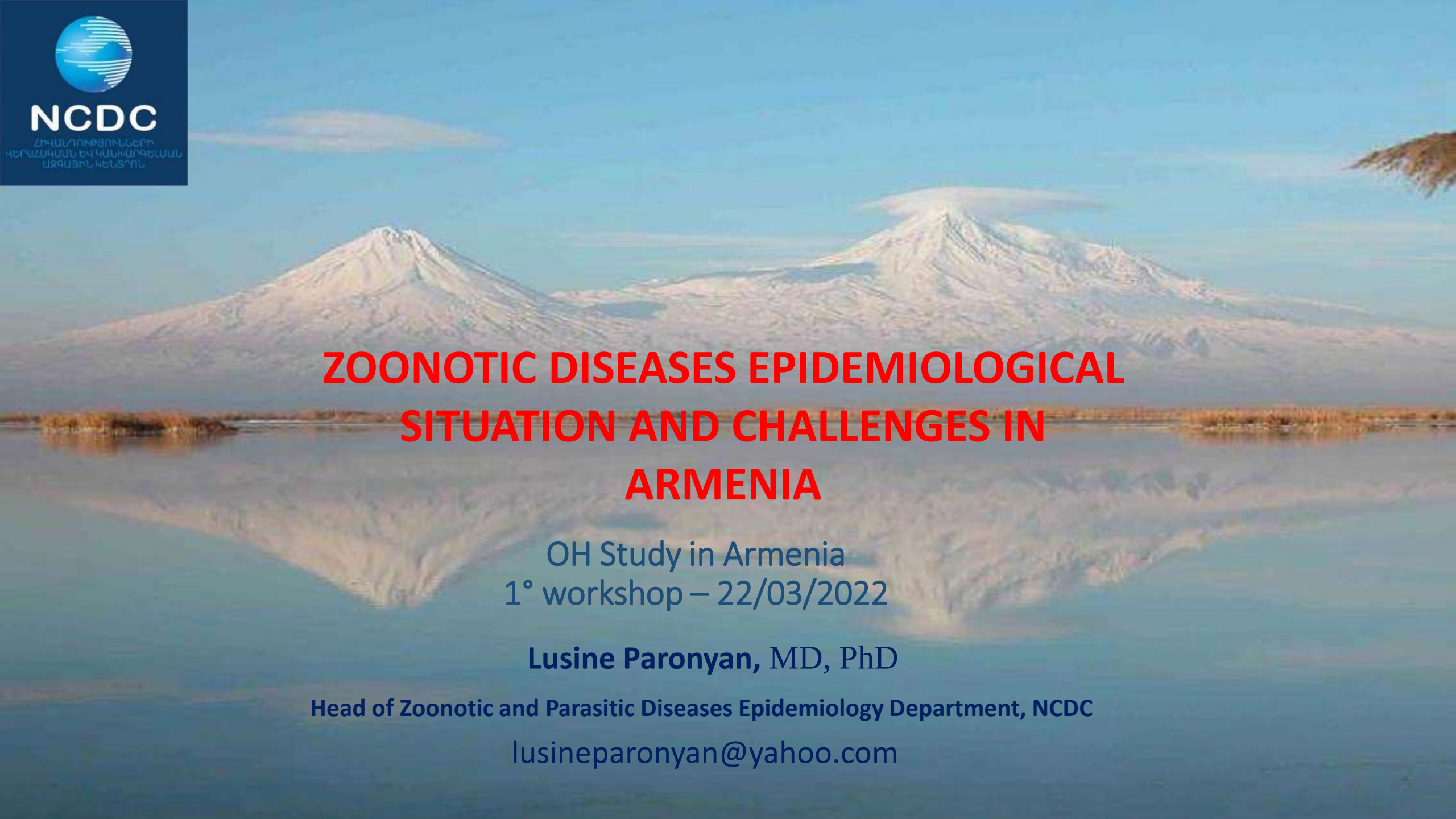
Second polling on additional potential pathogens

9. Select the pathogen/s which can benefit the most from the integration of environmental and climatic data in its surveillance
TBE
Rabies
Leishmaniosis
Anthrax

10. Select pathogen/s which have activated a recent response action to contain a potential outbreak of this disease
TBE
Rabies
Leishmaniosis
Anthrax

Second polling on additional potential pathogens

11. Select the pathogen/s with an integrated (human, veterinarian, environmental) data collection and analysis system in Armenia
TBE
Rabies
Leishmaniosis
Anthrax



ZOONOTIC DISEASES EPIDEMIOLOGICAL SITUATION AND CHALLENGES IN ARMENIA

OH Study in Armenia
1° workshop – 22/03/2022

Lusine Paronyan, MD, PhD

Head of Zoonotic and Parasitic Diseases Epidemiology Department, NCDC

lusineparonyan@yahoo.com

ZOONOSES IN ARMENIA

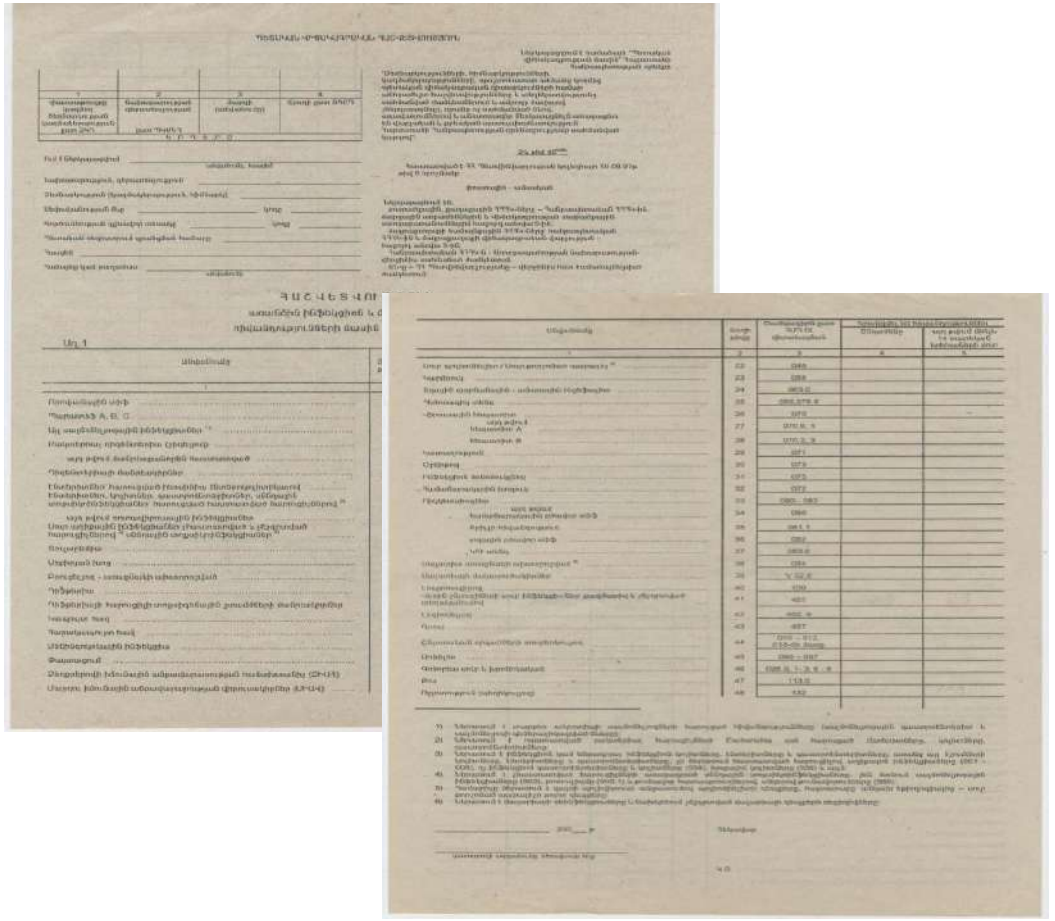
- Tularemia
- Anthrax
- Brucellosis
- Leptospirosis
- Rabies
- Q-fever
- Lyme disease
- Leishmaniases
- Echinococcosis
- Teniidoses
- Listeriosis
- Arboviral infections
- Plague

National Center for Disease Control and Prevention, MoH

Registration & report

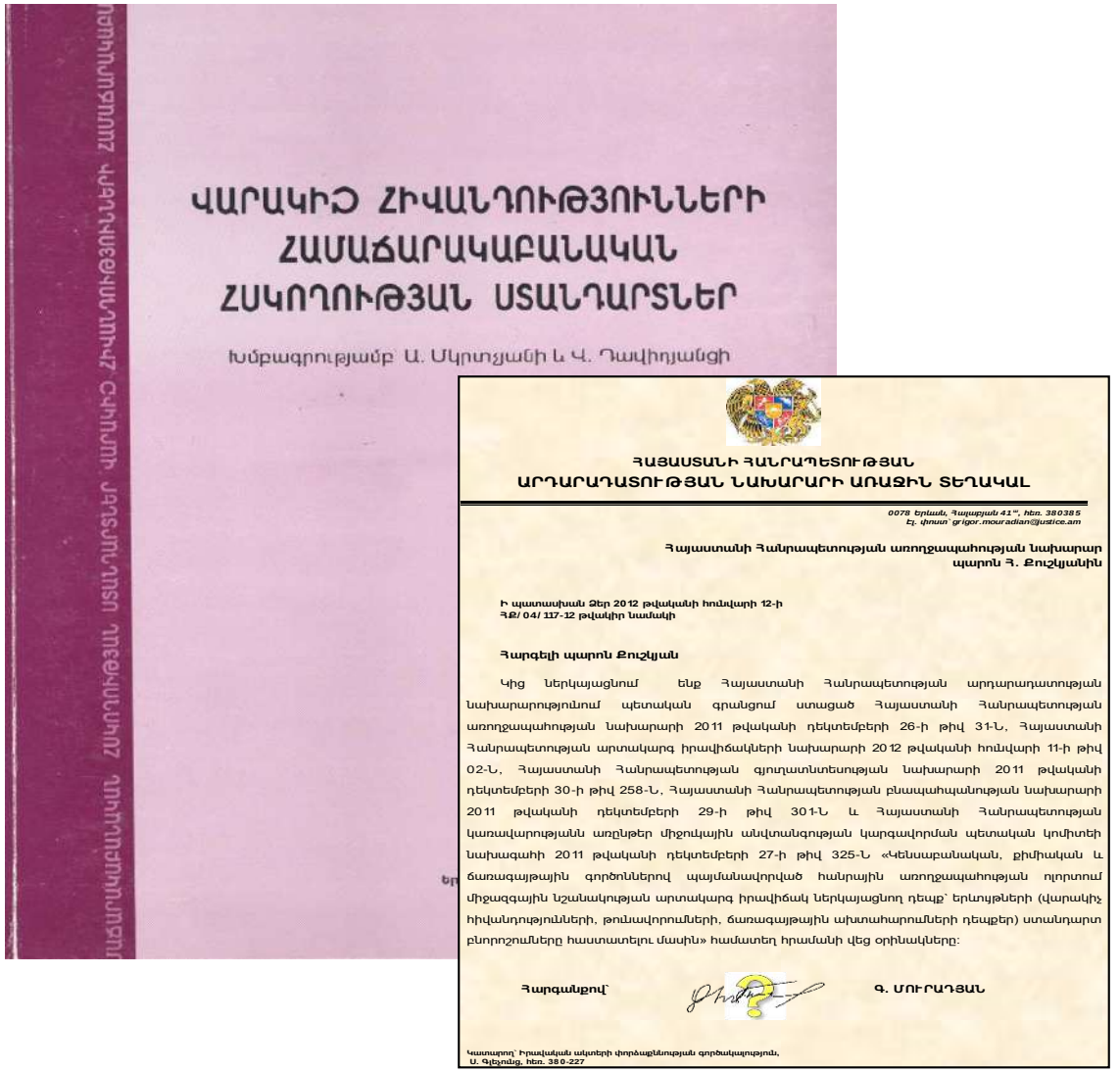
RA MOH order 17.12.10 "Real-time electronic epidemiological control of infectious diseases" approved by order N 35-N SC 3.1.1-018-10 sanitary-epidemiological norms

138 infectious diseases are subject to state statistical registration & reporting

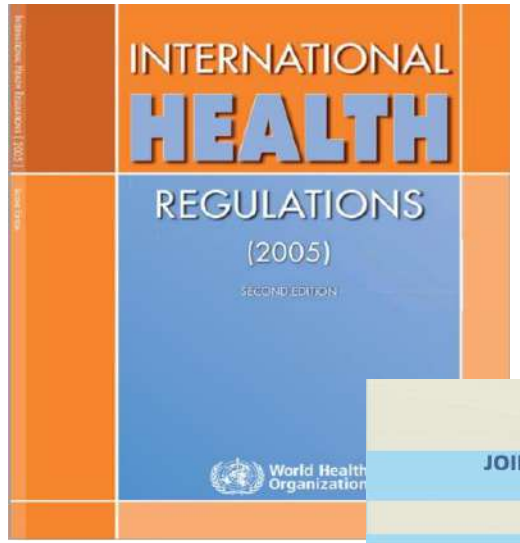


STANDARD CASE DEFINITIONS

- **Introduced since 2001**
- Regularly reviewed.
- 2005
- 2010
- 2013 (in accordance with EU directives)



IMPLEMENTATION OF THE INTERNATIONAL HEALTH REGULATIONS (2005)



➢ **Decisions of the RA Government**

✓Decision No. 480-N of January 19, 2006

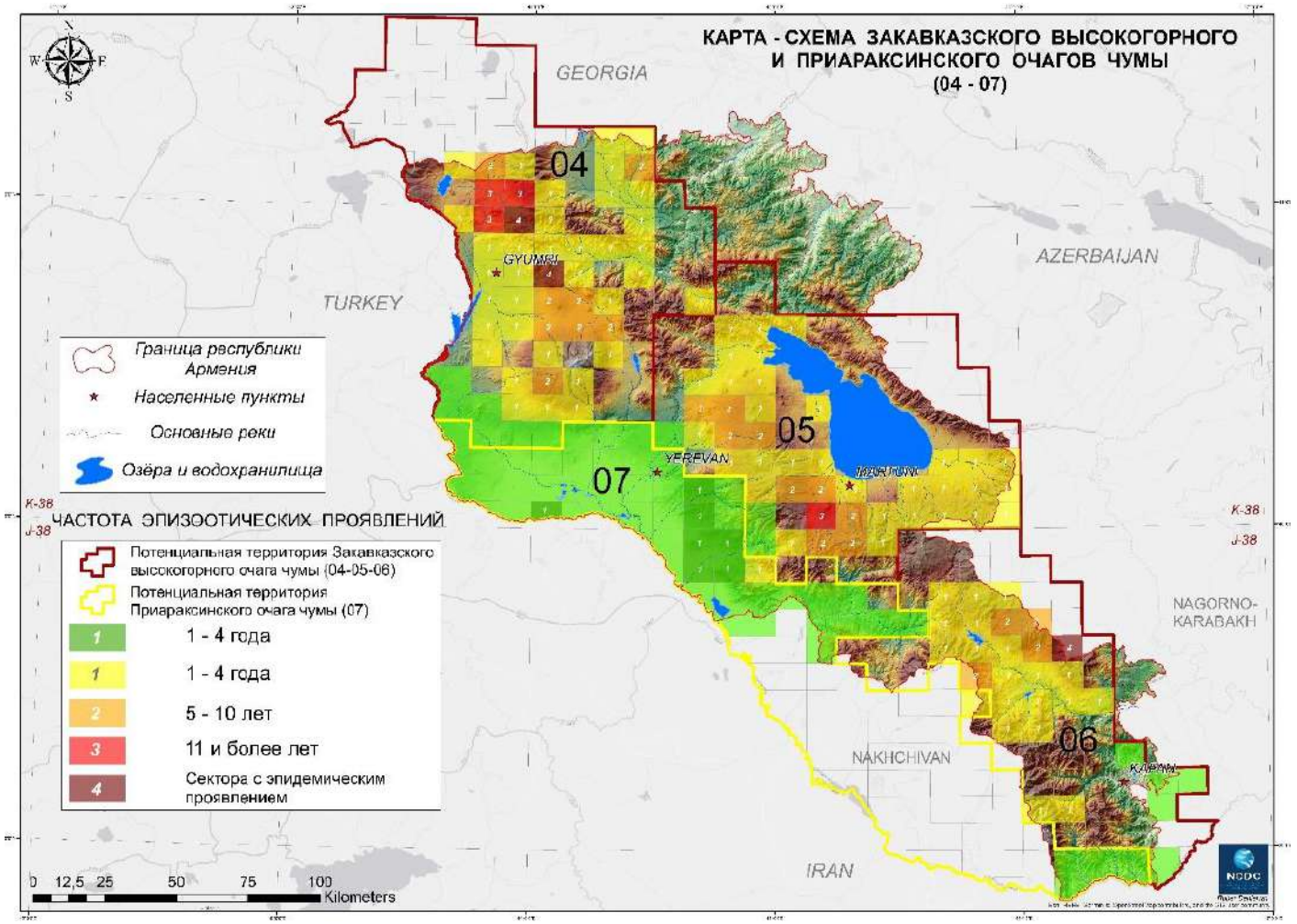
➢ **Joint orders**

✓ Introduction of both epidemiological surveillance systems of infectious diseases in PH & Veterinary service

➢ **Standard operating procedures**

On Outbreaks of zoonotic diseases, Cattle burials, RRT establishment, etc.

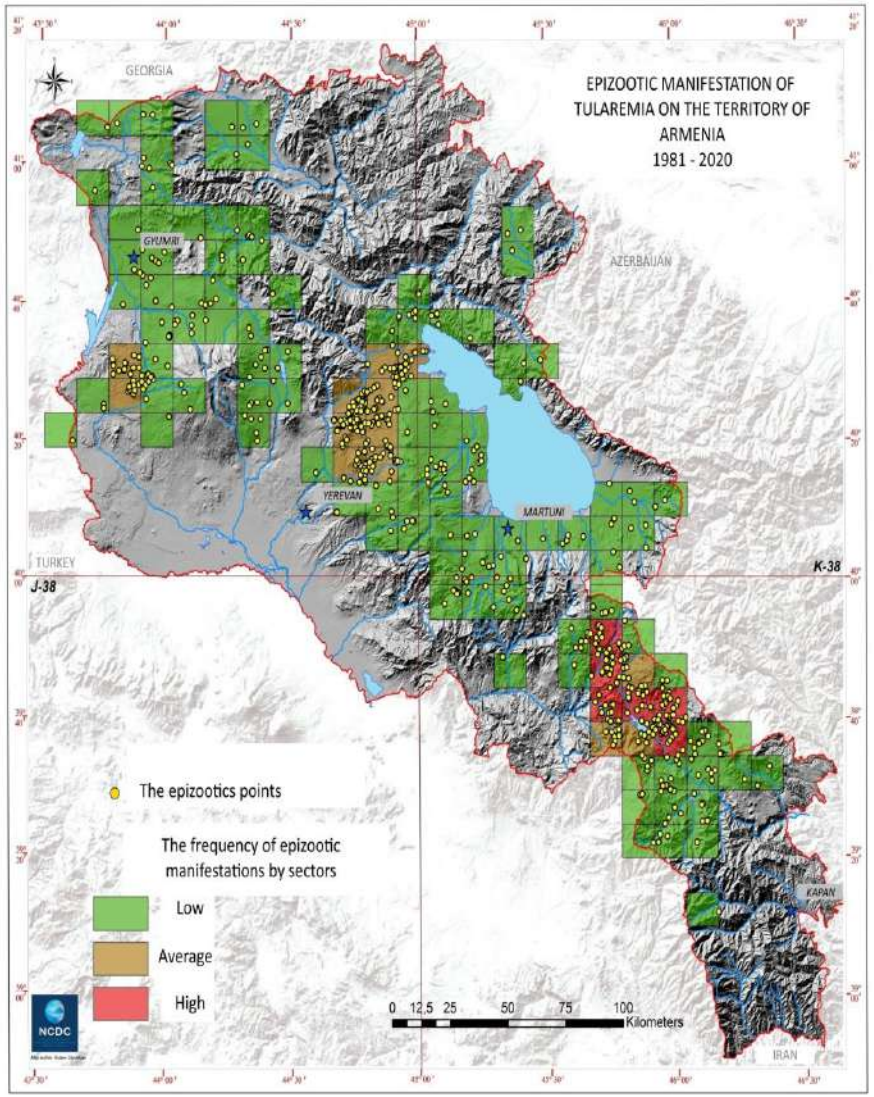
NATURAL FOCI OF PLAGUE IN THE TERRITORY OF ARMENIA

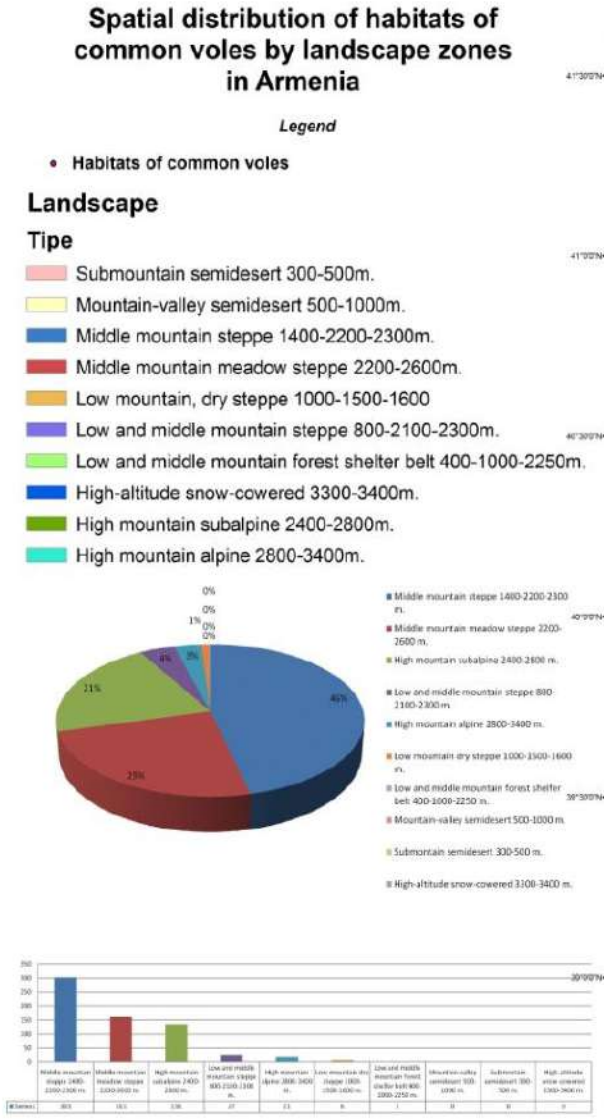


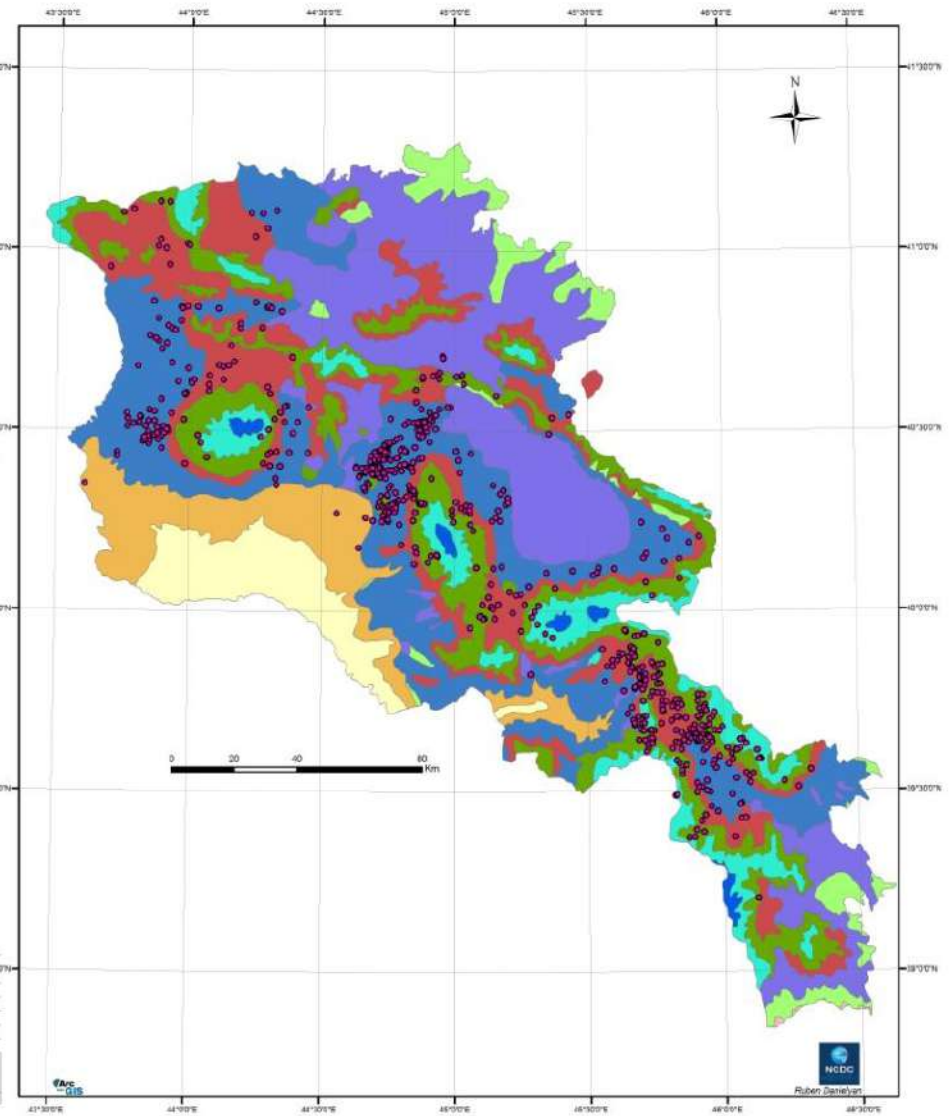
- Transcaucasian high-mountain and Araksian low-mountain natural foci
- 75% of the territory of Armenia
- Last epizootics - in 2008-2009
- Cases among the population:

- in 1958 - in Lori marz
- in 1961 - in Shirak marz
- in 1971 - in Syunik marz

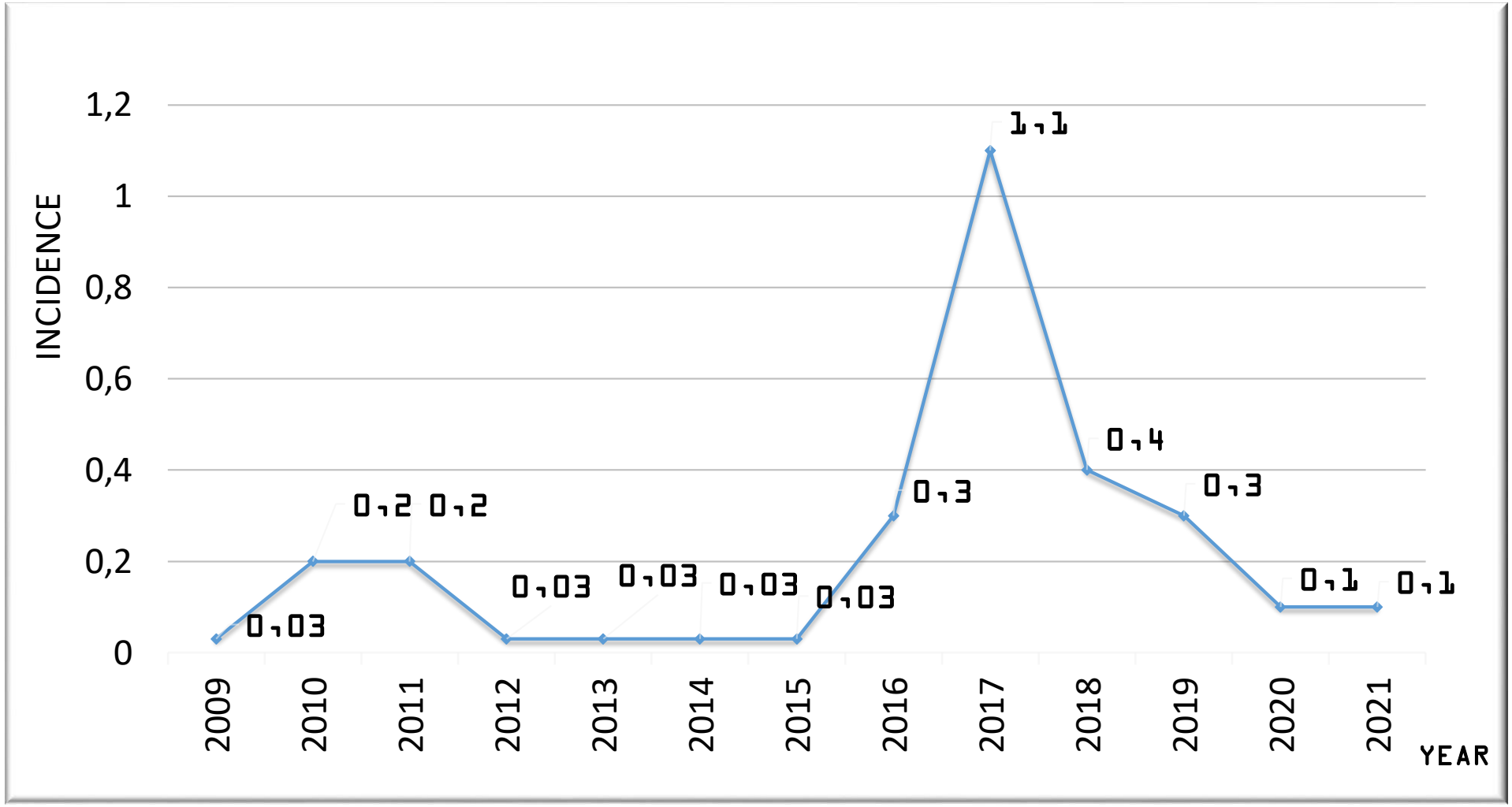
TULAREMIA


EPIZOOTIC MANIFESTATION OF TULAREMIA ON THE TERRITORY OF ARMENIA
1981 - 2020
GEORGIA
AZERBAIJAN
TURKEY
IRAN
GHUMRI
YEREVAN
MARTUNI
KAPAN
J-38
K-38
The epizootics points
The frequency of epizootic manifestations by sectors
Low
Average
High
0 12,5 25 50 75 100 Kilometers
NCDC

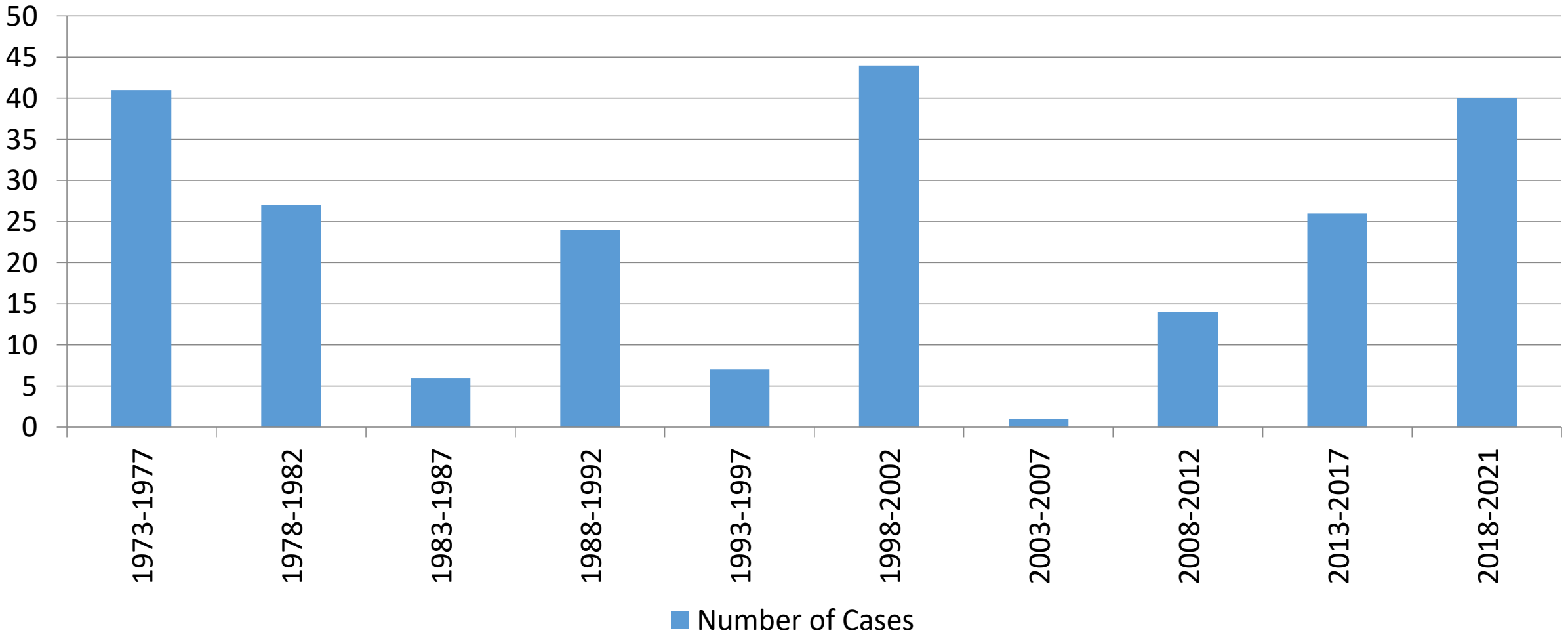

Spatial distribution of habitats of common voles by landscape zones in Armenia
Legend
Habitats of common voles
Landscape
Tipe
Submountain semidesert 300-500m.
Mountain-valley semidesert 500-1000m.
Middle mountain steppe 1400-2200-2300m.
Middle mountain meadow steppe 2200-2600m.
Low mountain, dry steppe 1000-1500-1600
Low and middle mountain steppe 800-2100-2300m.
Low and middle mountain forest shelter belt 400-1000-2250m.
High-altitude snow-cowered 3300-3400m.
High mountain subalpine 2400-2800m.
High mountain alpine 2800-3400m.


N
0 20 40 80 Km
NCDC
Ruben Danielyan

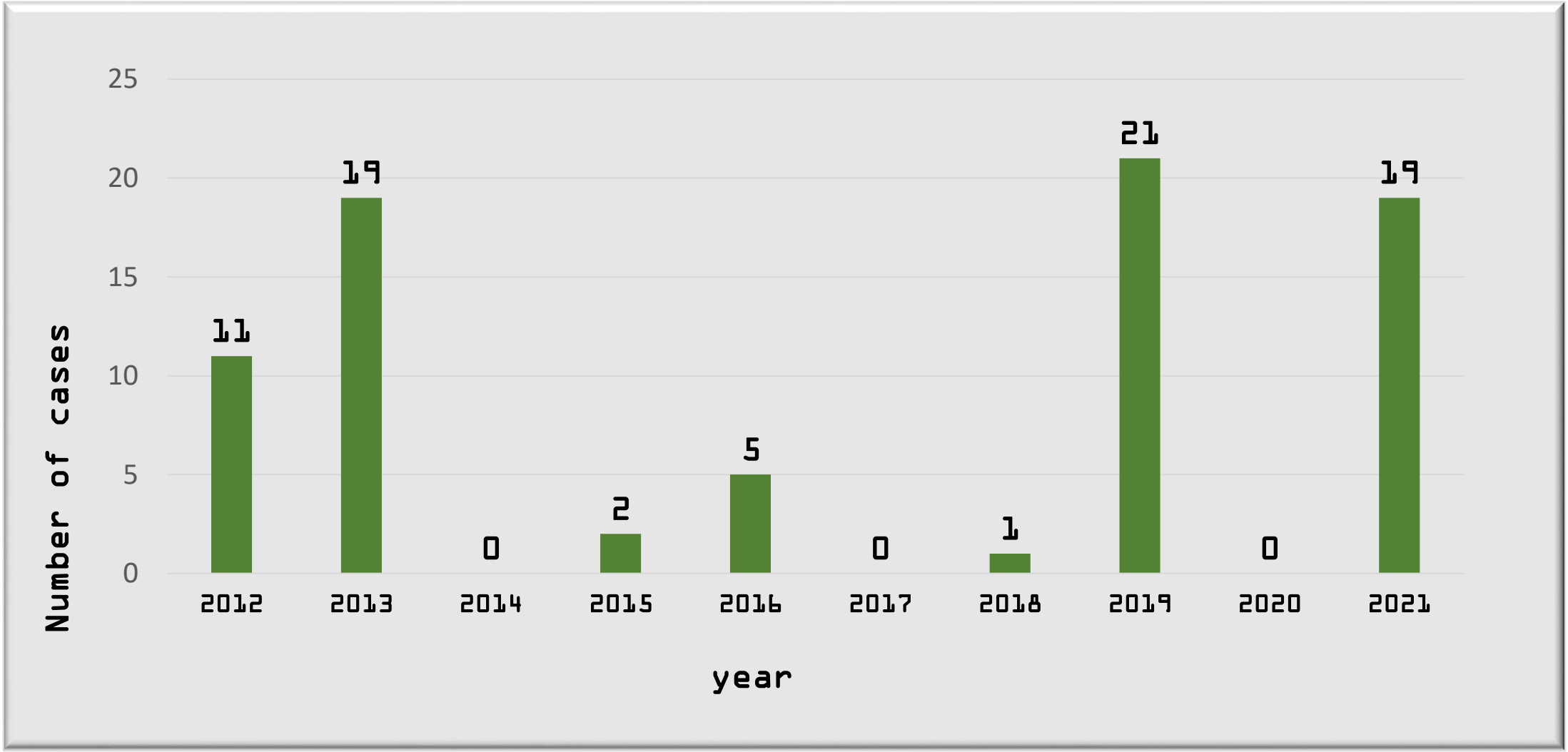
THE DYNAMICS OF THE TULAREMIA INCIDENCE (PER 100.000) 2009-2021



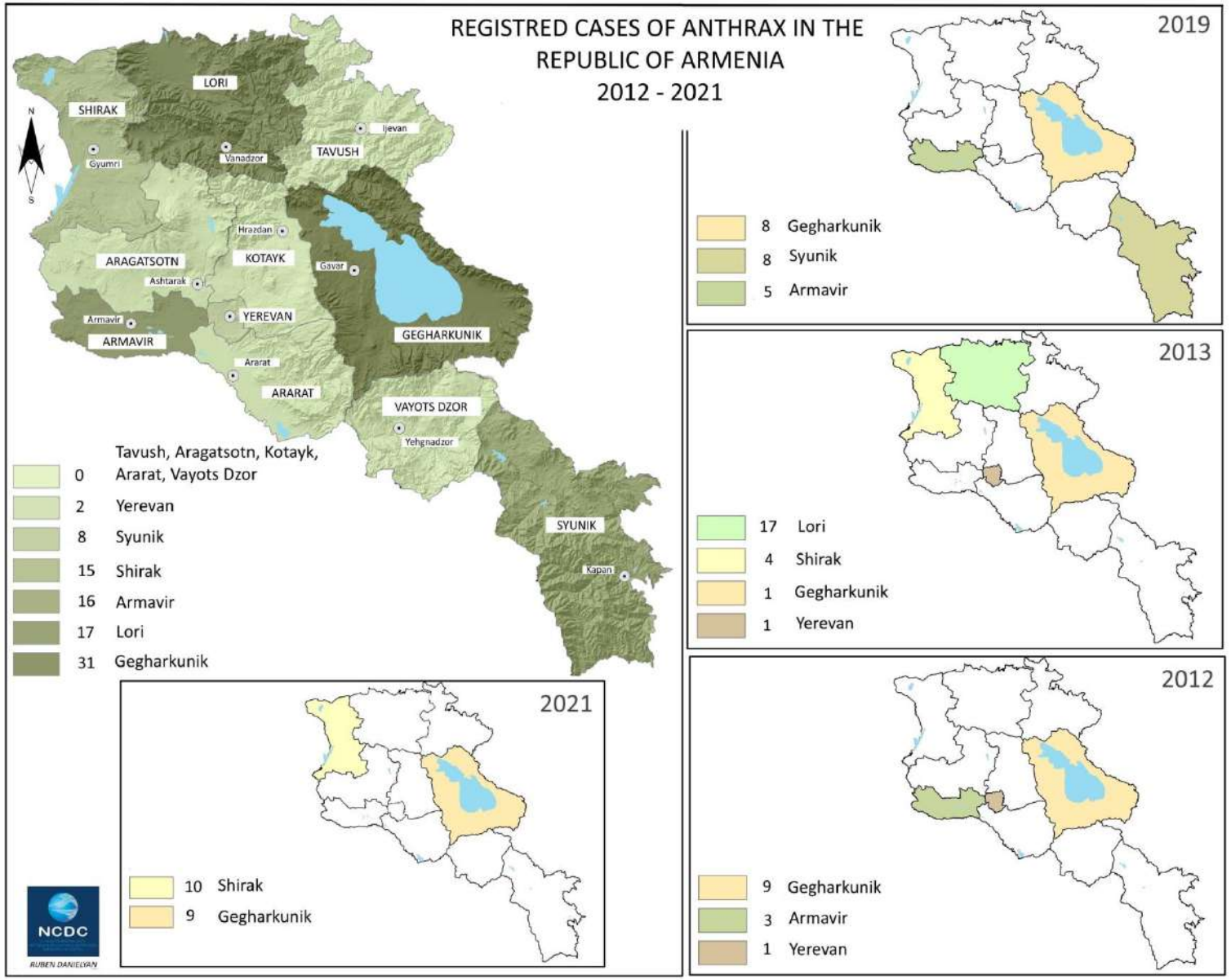
ANTHRAX CASES OF IN ARMENIA, 1973-2021



ANTHRAX CASES IN ARMENIA, 2012-2021



ANTHRAX CASES BY REGIONS, 2012-2021



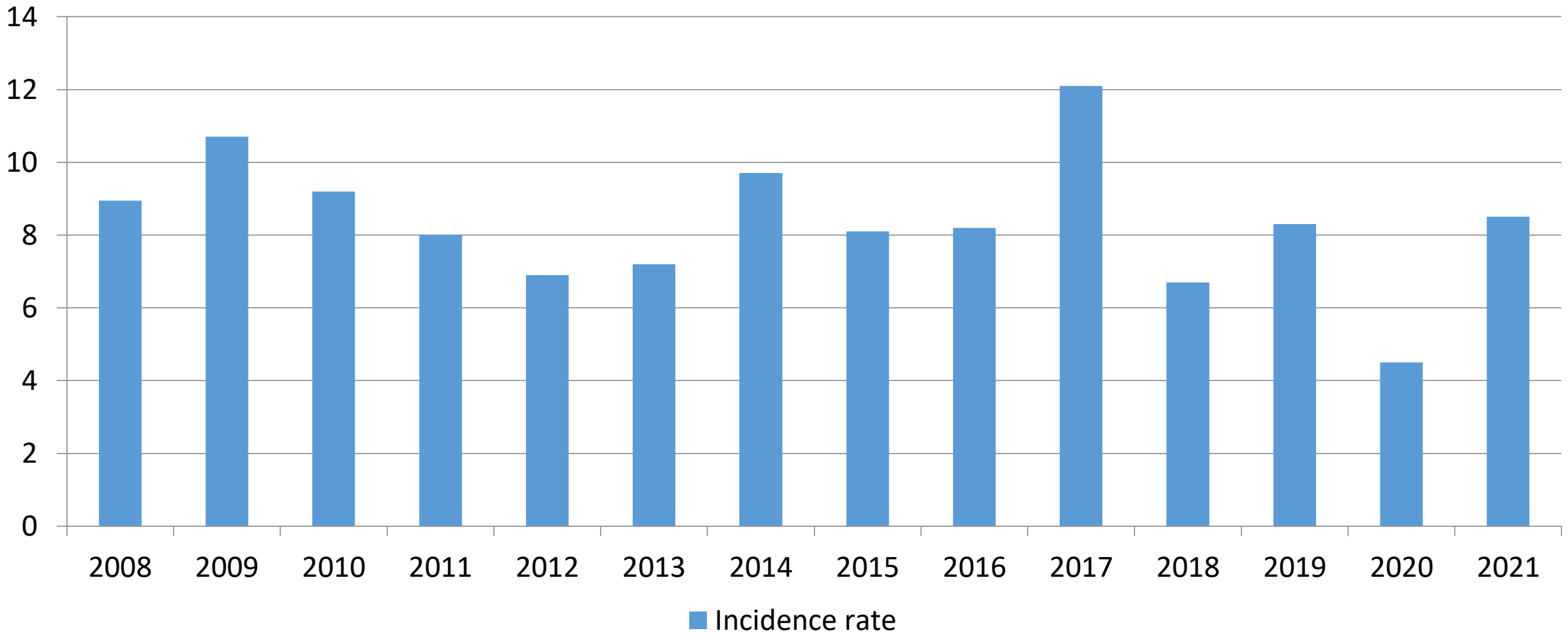
ANTHRAX OUTBREAKS IN GEGHARKUNIK & SHIRAK REGIONS, 2021

- Outbreaks in animals and people
- In total, 19 cases were registered among the population:

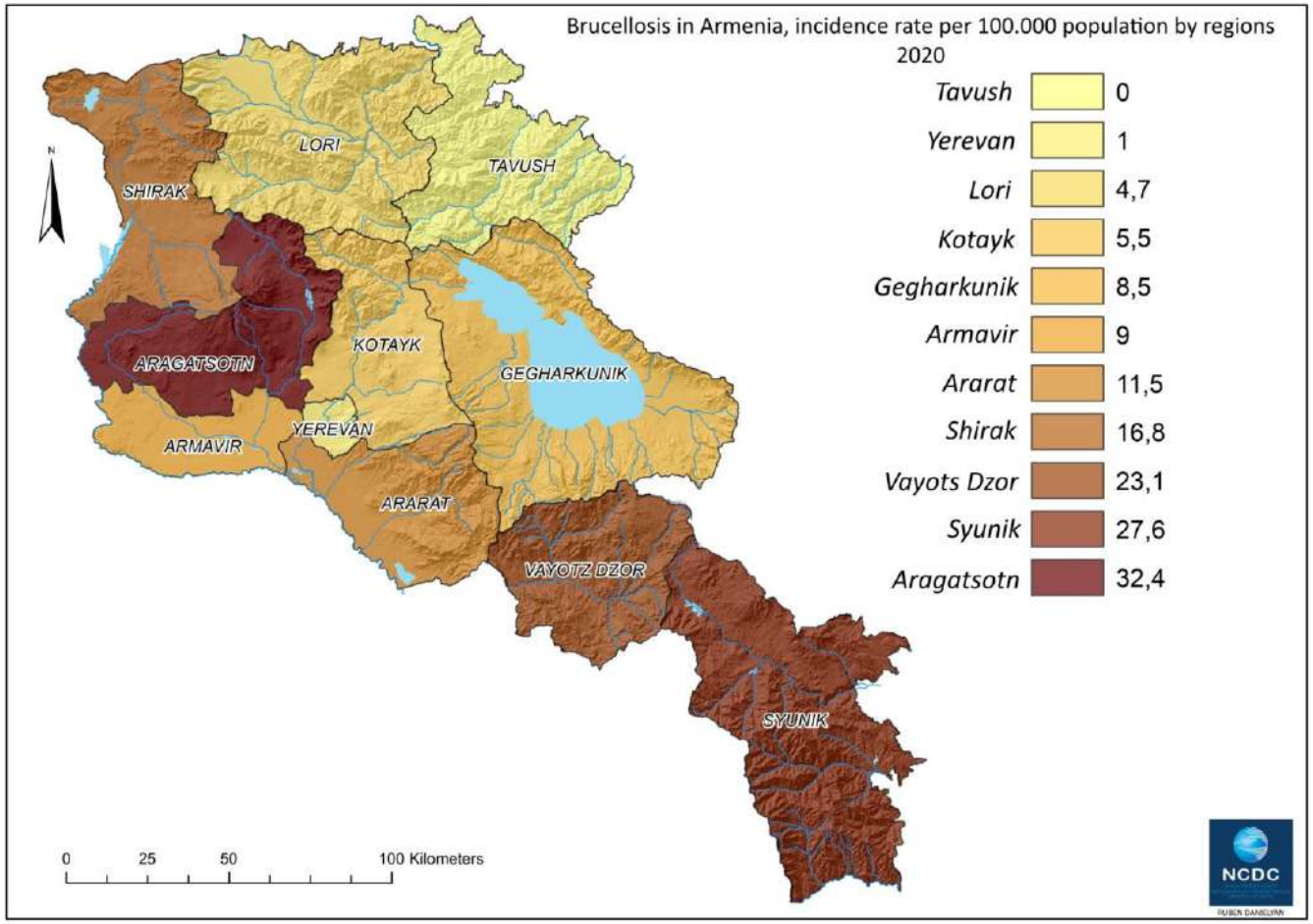
-9 in Gegharkunik marz

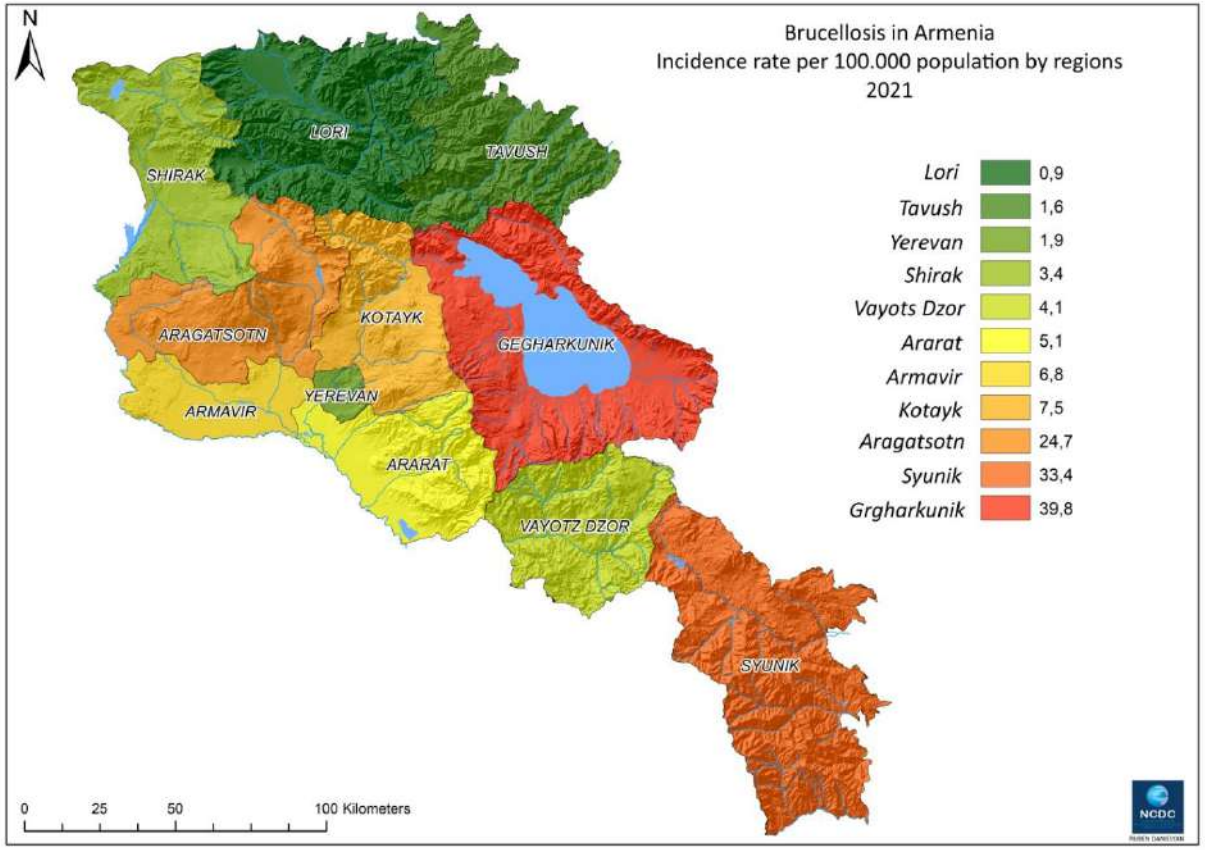
- 10 in Shirak marz

INCIDENCE OF BRUCELLOSIS PER 100.000 POPULATION, 2008-2021

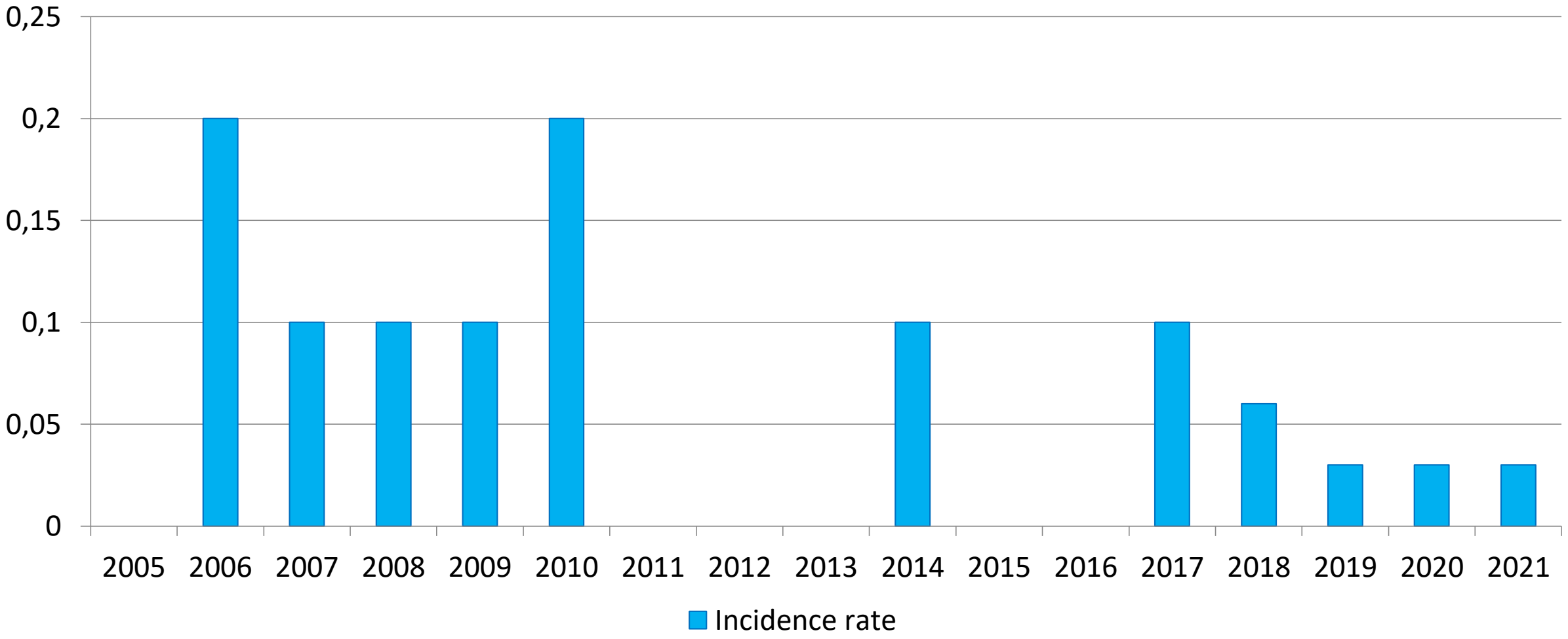


INCIDENCE OF BRUCELLOSIS PER 100.000 POPULATION BY REGIONS 2020-2021

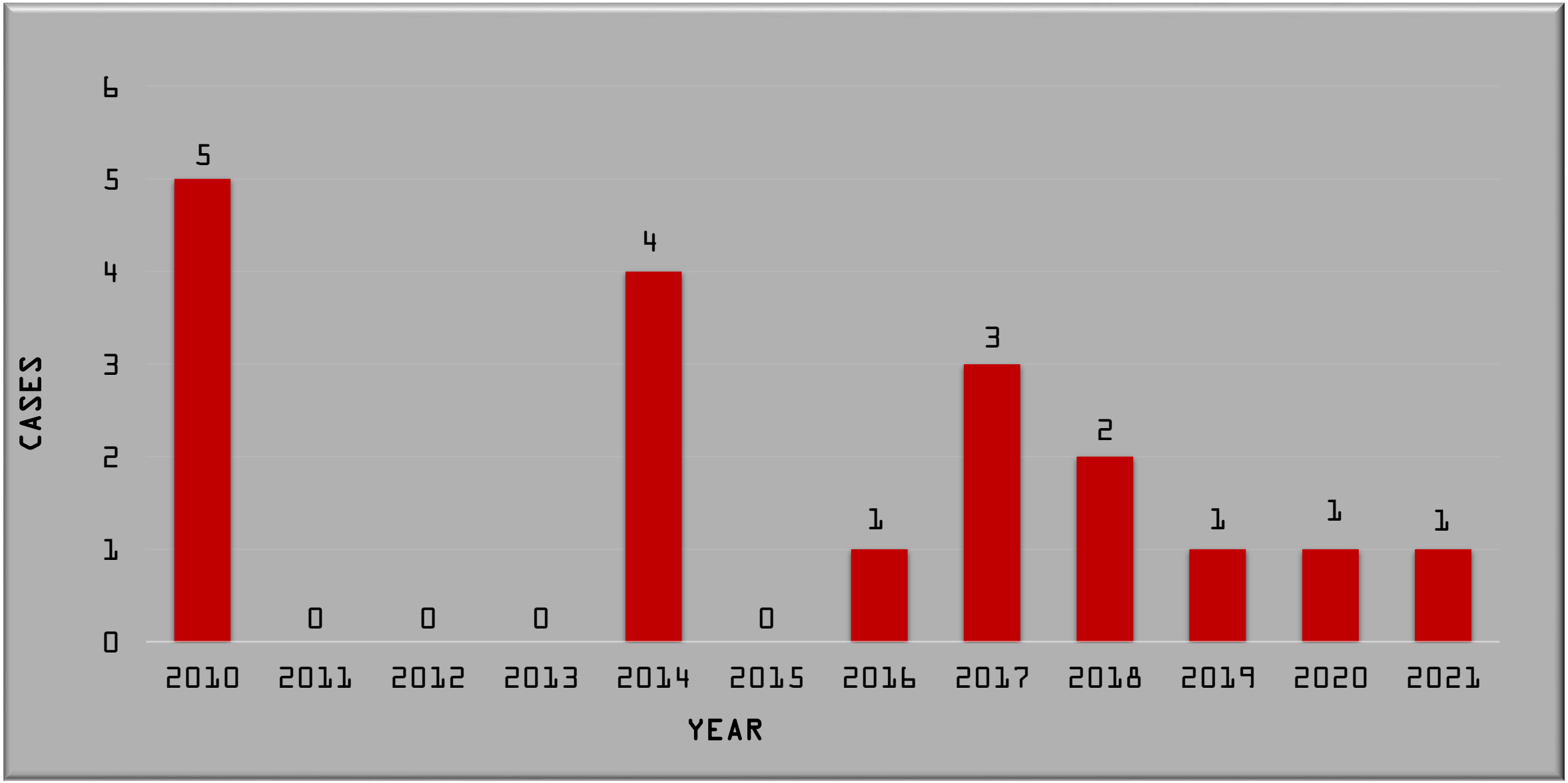




INCIDENCE OF LEPTOSPIROSIS PER 100.000 POPULATION, 2005-2021



NUMBER OF CASES OF LEPTOSPIROSIS, 2010-2021



Q-FEVER

- 1950s - sporadic cases and outbreaks have been reported
- 1956

- Coxiella burnetii was found in kettle in 9 rayons (from 32)
- human cases in 14 rayons

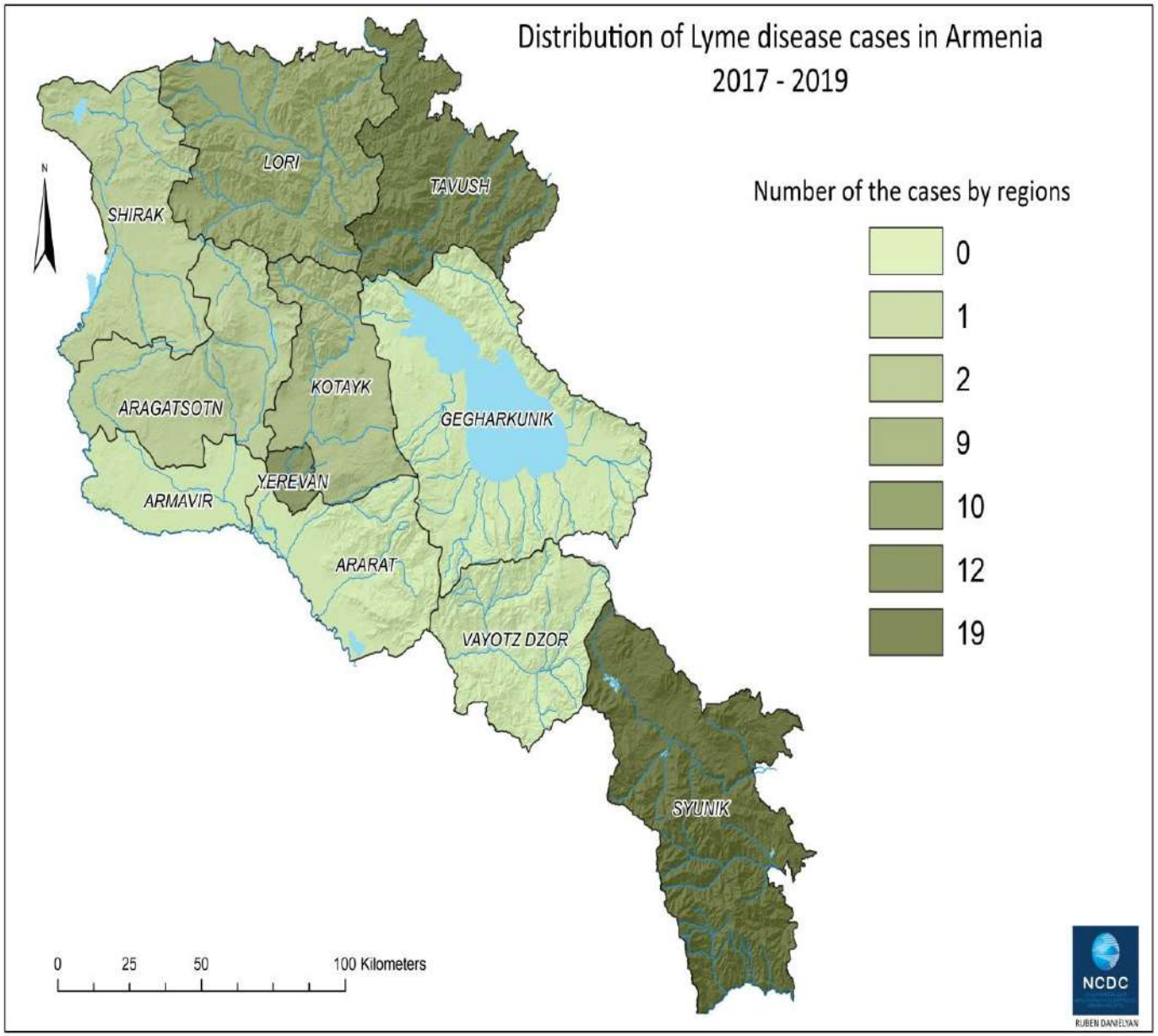
- Recent epidemiological data on C. burnetii distribution, the existence of Q fever disease foci, and the incidence of the disease is not available

- Ixodes ticks – vectors of C. burnetii are found throughout Armenia

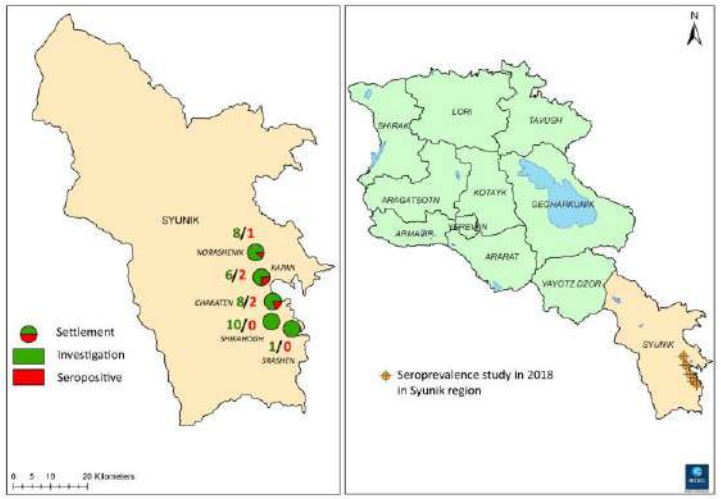
- 2019 small seroprevalence study among farmers - 19.7% seropositivity

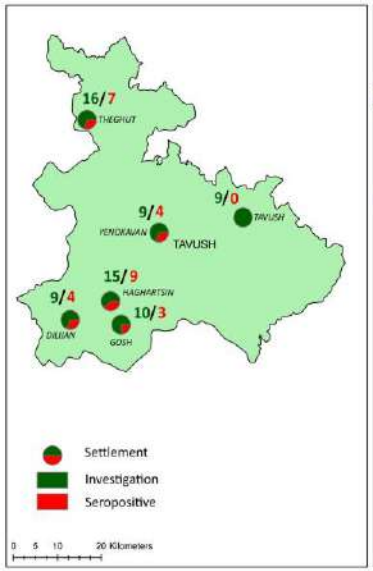
- 2021 preliminary data of the small seroprevalence study among veterinarians - 47.8% seropositivity

Lyme borreliosis



LYME BORRELIOSIS



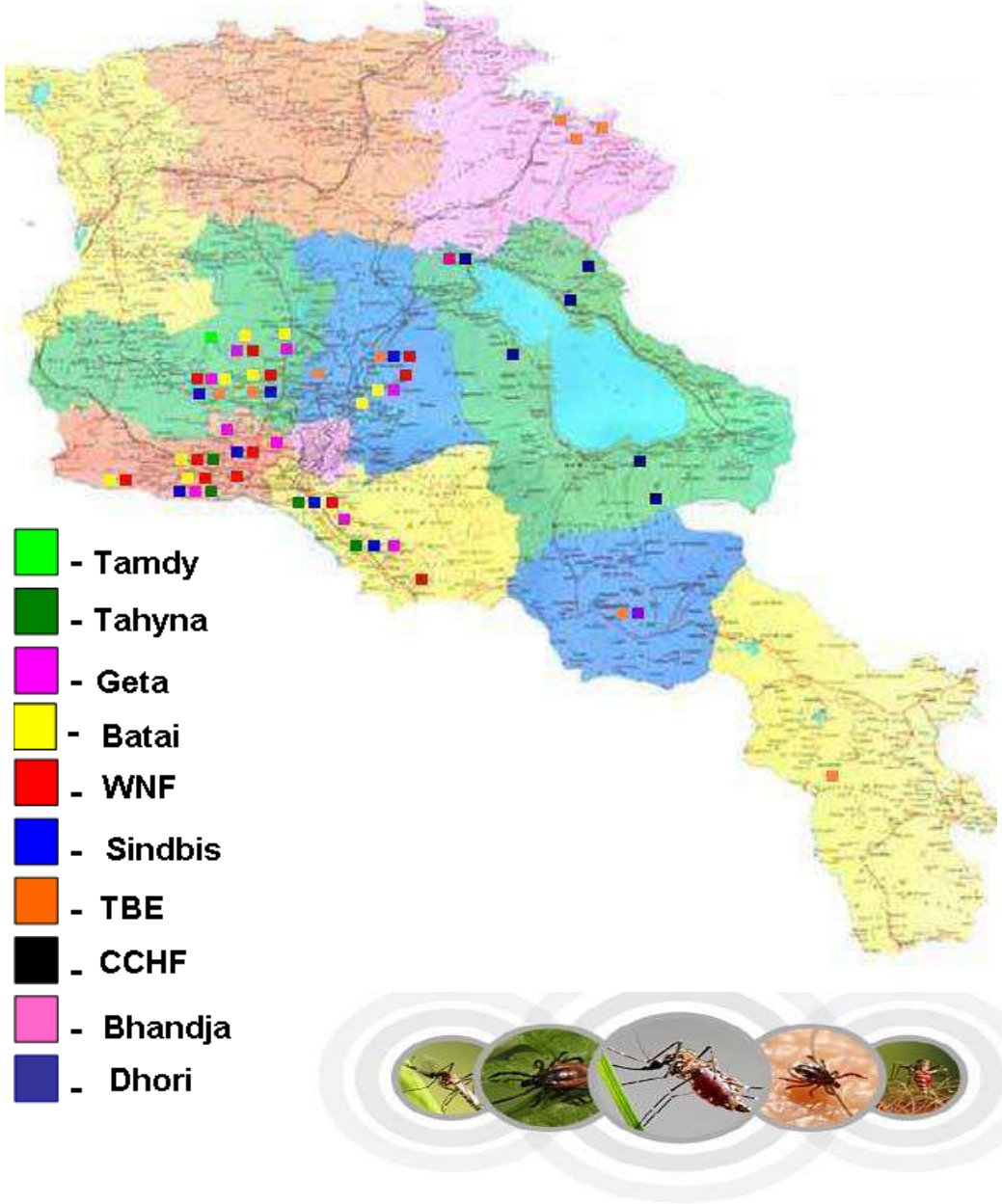


Region	Settlement	Investigation, N	Seropositive, N	Seropositive,%
Syunik	Norashenik	8	1	12,5
	Chakaten	8	2	25
	Shikahogh	10	0	-
	Srashen	1	0	-
	Kapan	6	2	33.3
Total, Syunik		33	5	15.15
Tavush	Dilijan	9	4	44.4
	Haghartsin	15	9	60
	Gosh	10	3	30
	Enoqavan	9	4	44.4
	Teghut	16	7	43.75
	Tavush	9	0	-
Total, Tavush		68	27	39.7

Seroprevalence in surveyed settlements in Syunik and Tavush marzes, 2018

Arboviral diseases: In 1985-2004, a large entomological survey (64,567 mosquitoes and 45,180 *Ixodes* ticks) identified 125 distinct strains of 10 arboviruses

ARBOVIRUS	VECTORS
CCHF	D. marginatus (ticks)
Dhori	D. marginatus (ticks)
Bhanja	D. marginatus (ticks)
TBE	D. marginatus (ticks), Rhip. bursa (ticks), Rhip. sanquineus (ticks), Hyal.asiaticum (ticks), Booph. annulatus (ticks), An.maculipennis (mosquitoes)
West Nile fever	An.maculipennis (mosquitoes), An.maculipennis+ C.pipiens (mosquitoes), D. Marginatus
Tahyna	An.maculipennis, An.maculipennis+C.pipiens
Sindbis	An.maculipennis + An.claviger (mosquitoes), An.maculipennis + Ae. Caspius
Geta	An.maculipennis + Ae. Caspius
Batai	An.maculipennis, An.maculipennis+C.pipiens
Tamdy	Hyal.asiaticum (ticks)

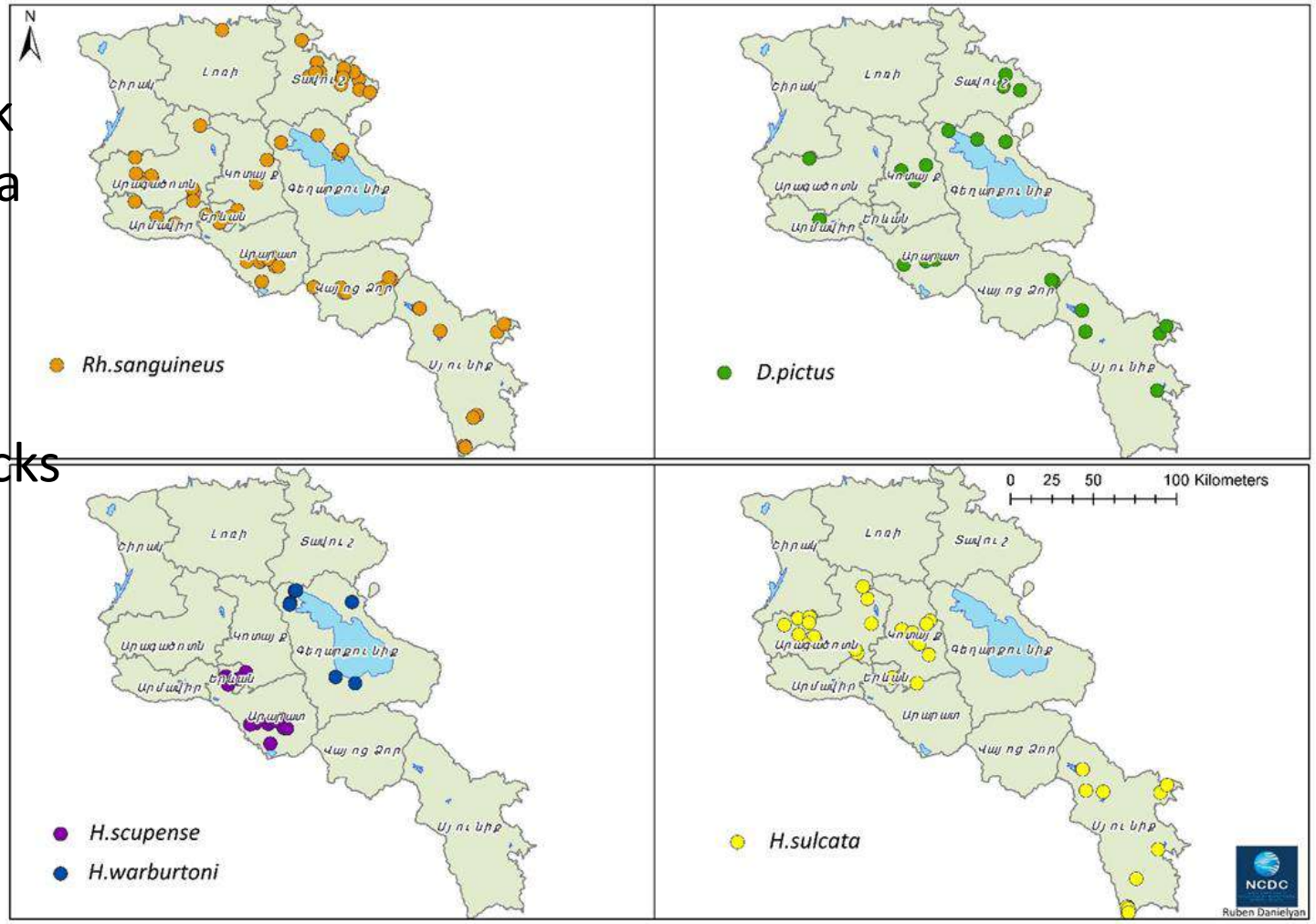


Crimean-Congo hemorrhagic fever (CCHF)

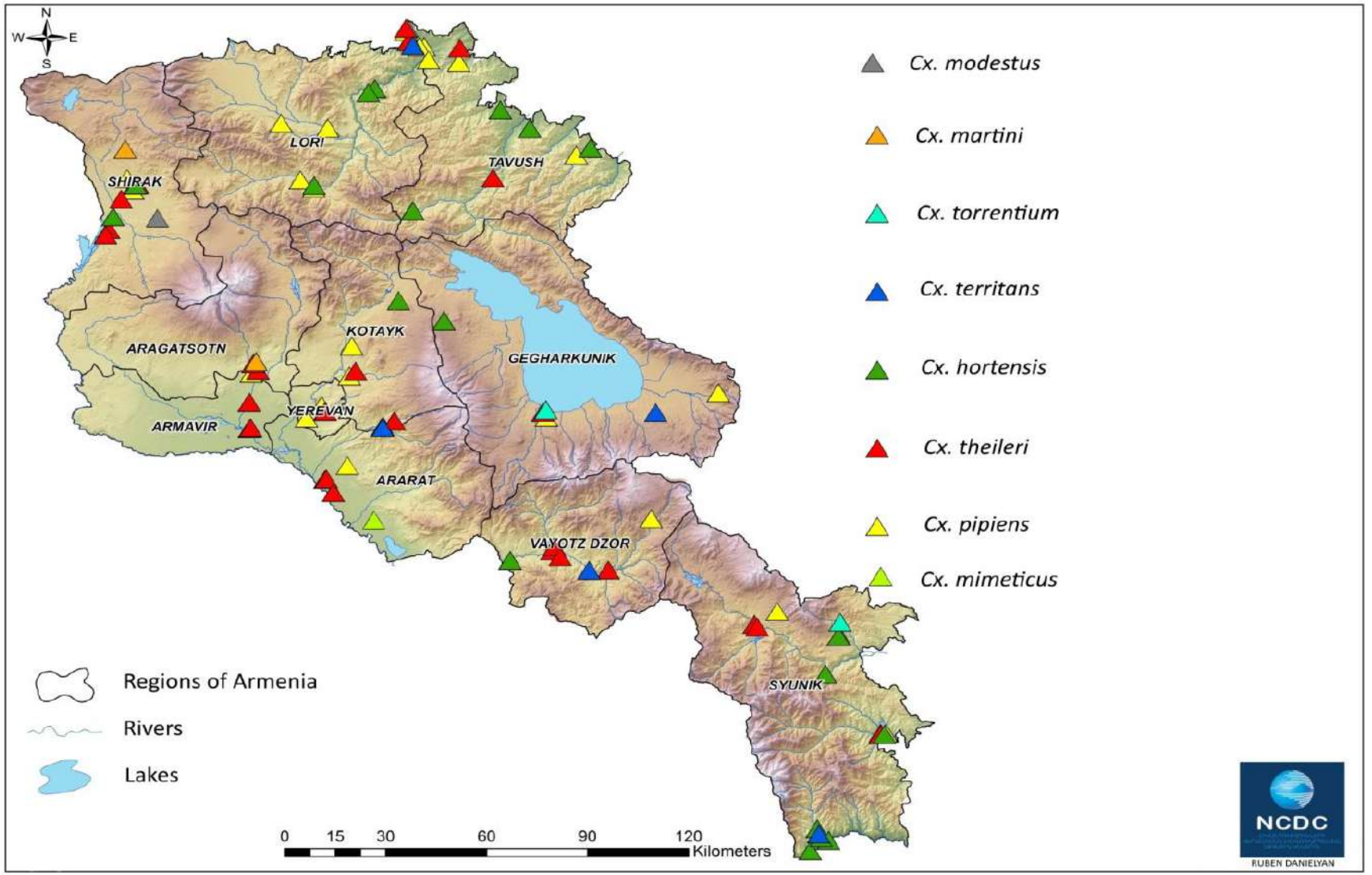
- In Armenia the only case of **CCHF** in human was registered in 1974 in Sunik region of Armenia, which ended with a death of a young zoologist

- During 1986-1996 entomological survey, the CCHF virus was found in ticks in the Syunik, Vayots Dzor and Kotayk regions in Armenia

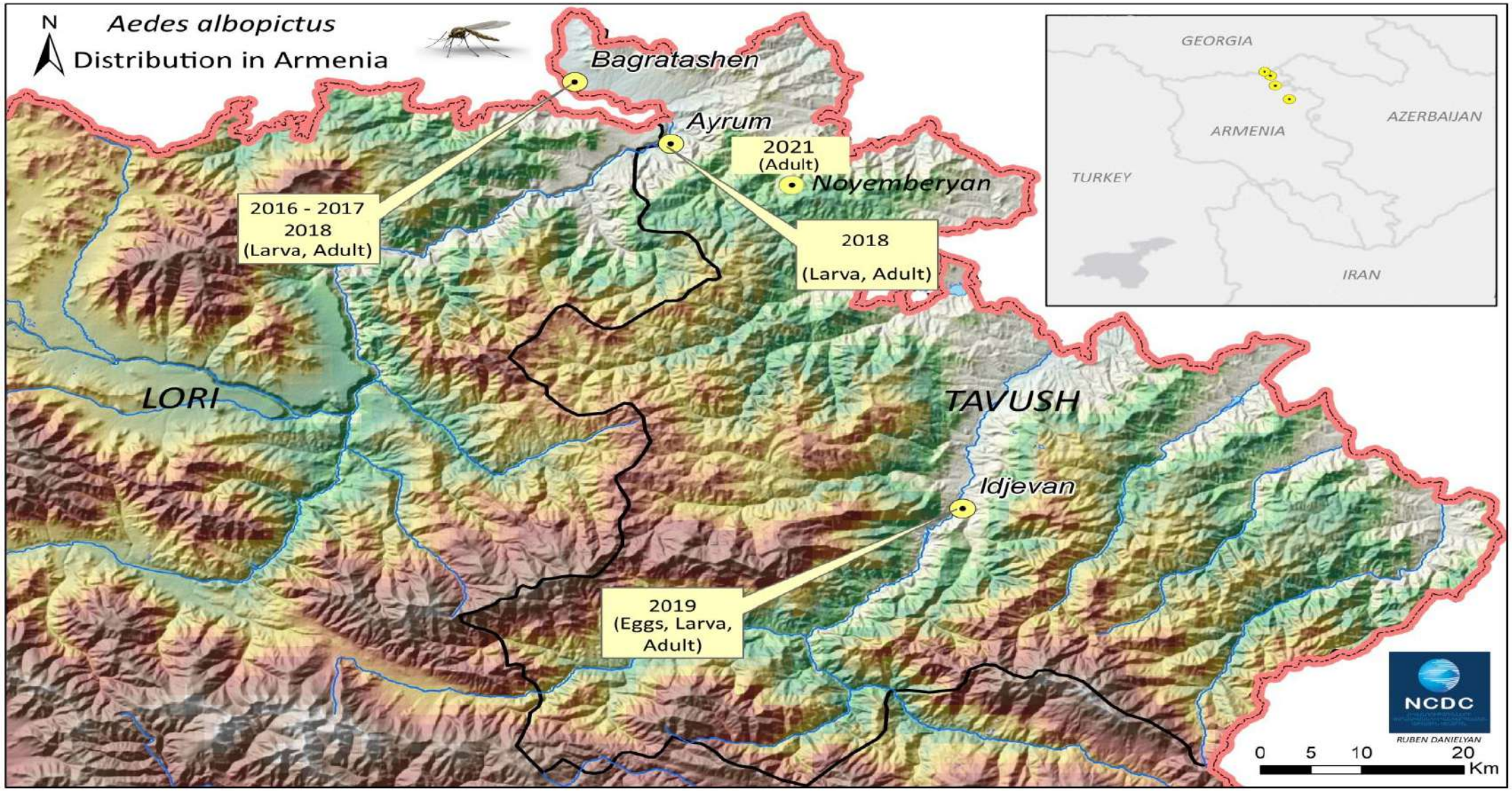
- In 2016 CCHF virus antigen was detected from 6 tick species



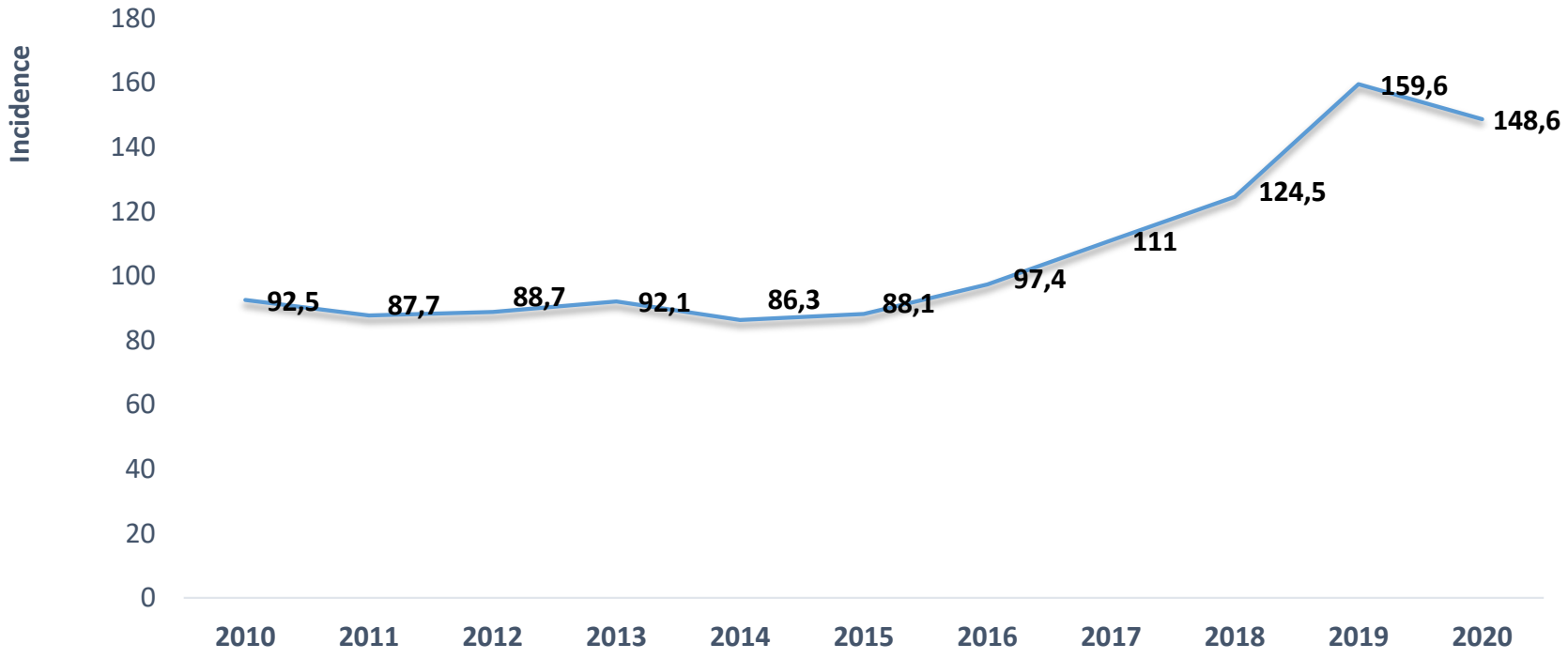
Culex mosquito species distribution



Arboviral infections, a new challenge



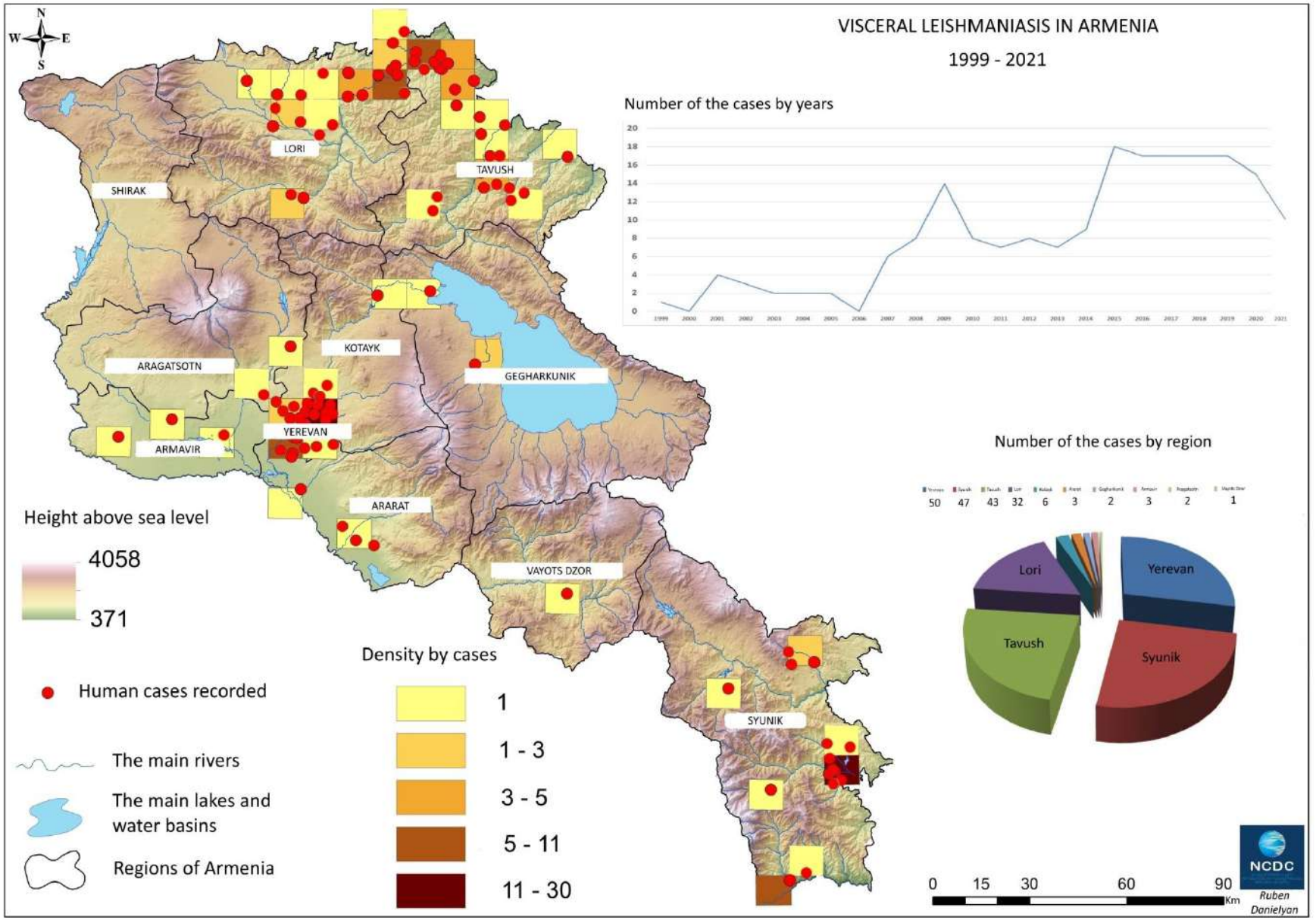
Animal bites/Rabies, 2010-2021



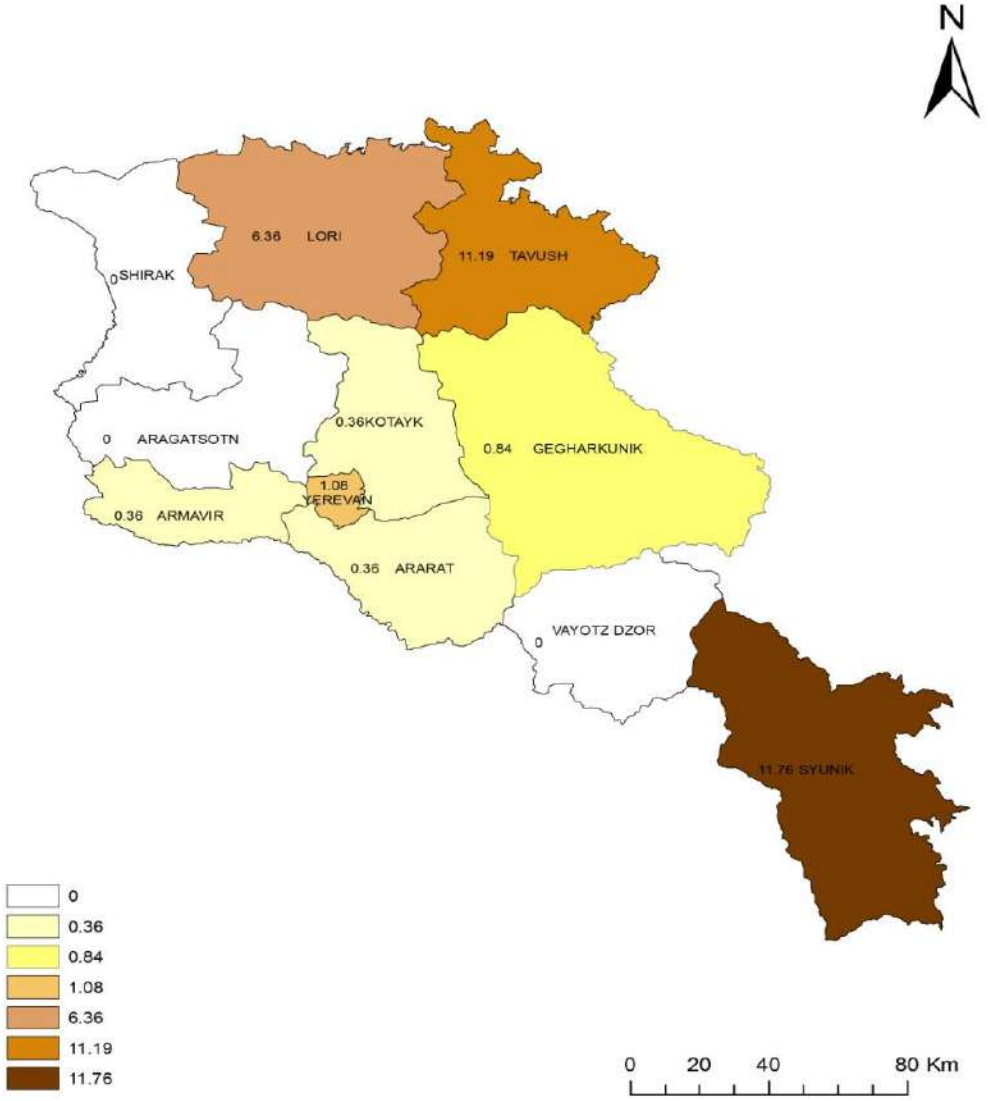
Rabies cases

- 2003 – 5
- 2008 – 2
- 2009 – 1
- 2019 – 1

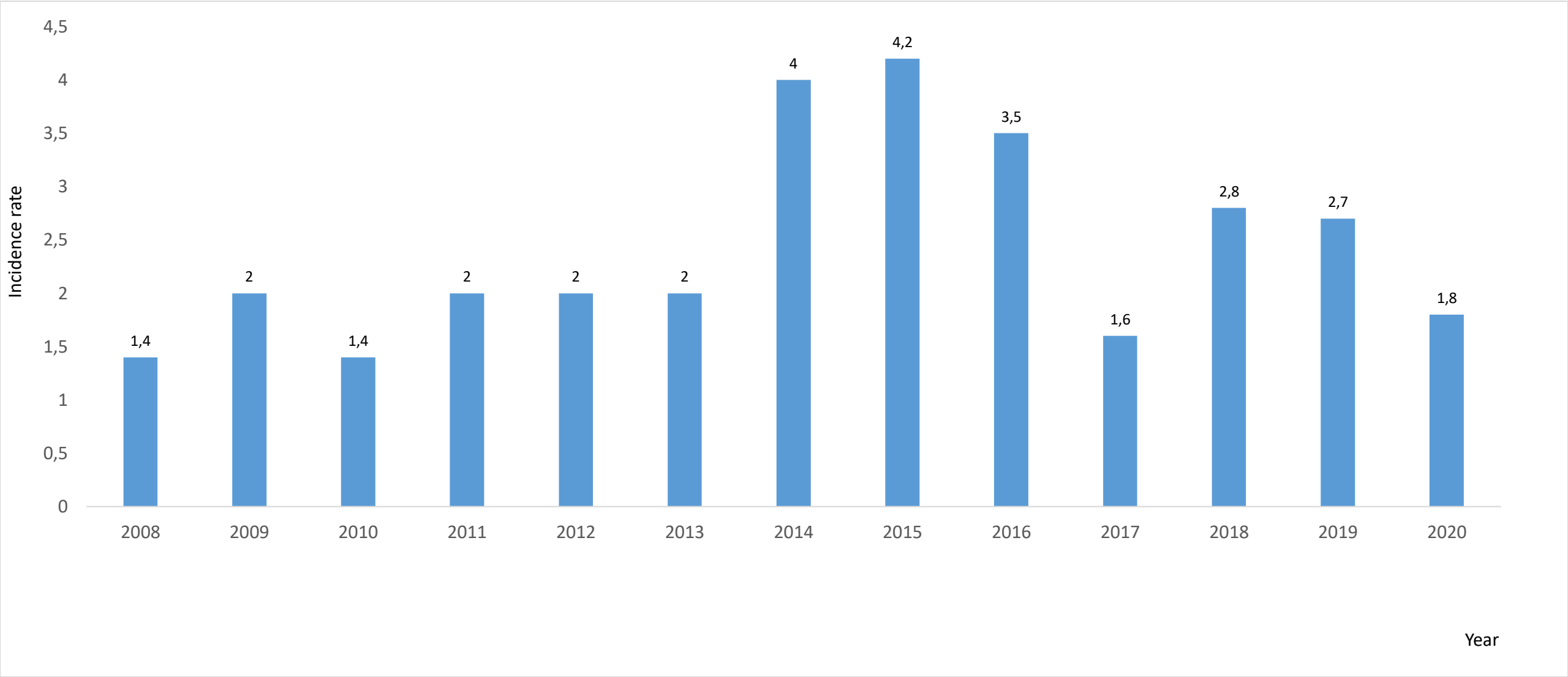
Cases of Visceral Leishmaniasis in Armenia, 1999 -



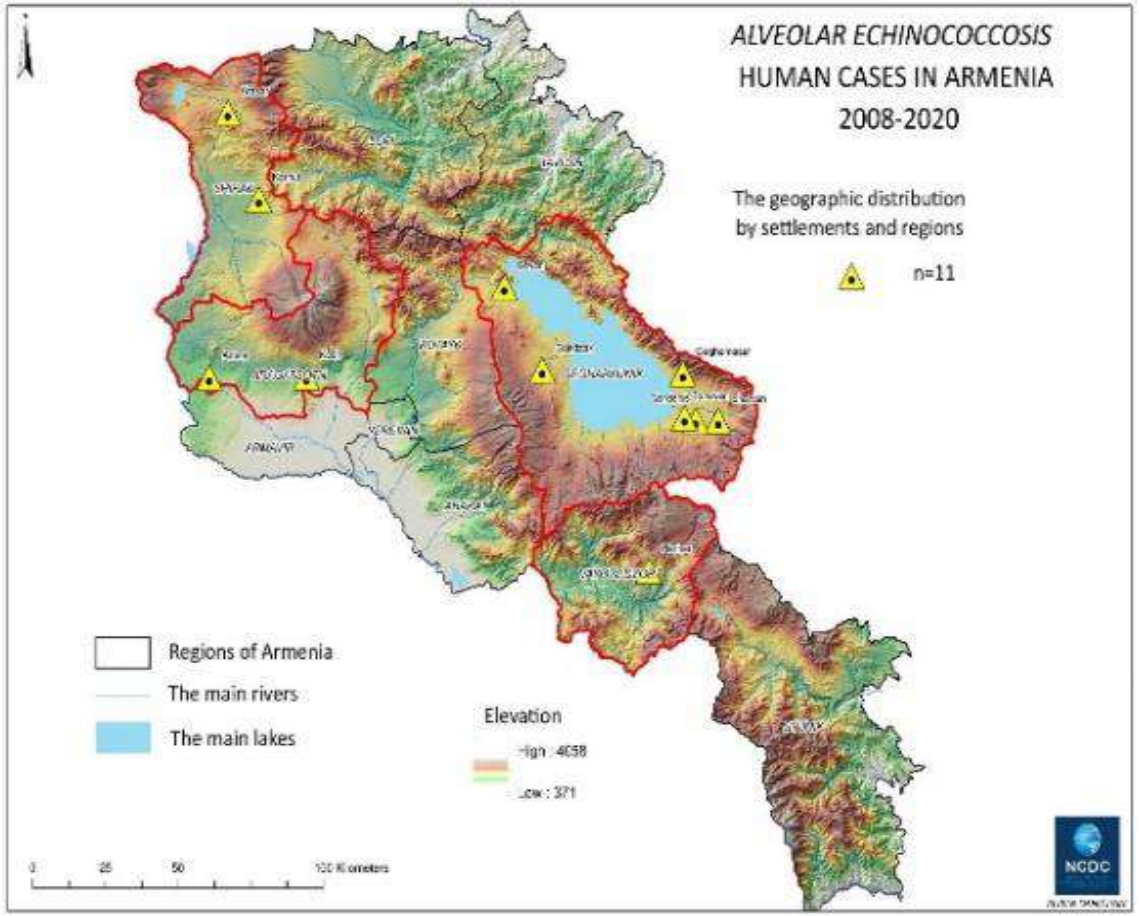
VL cases per 100 000 by Marzes, 1999-2021

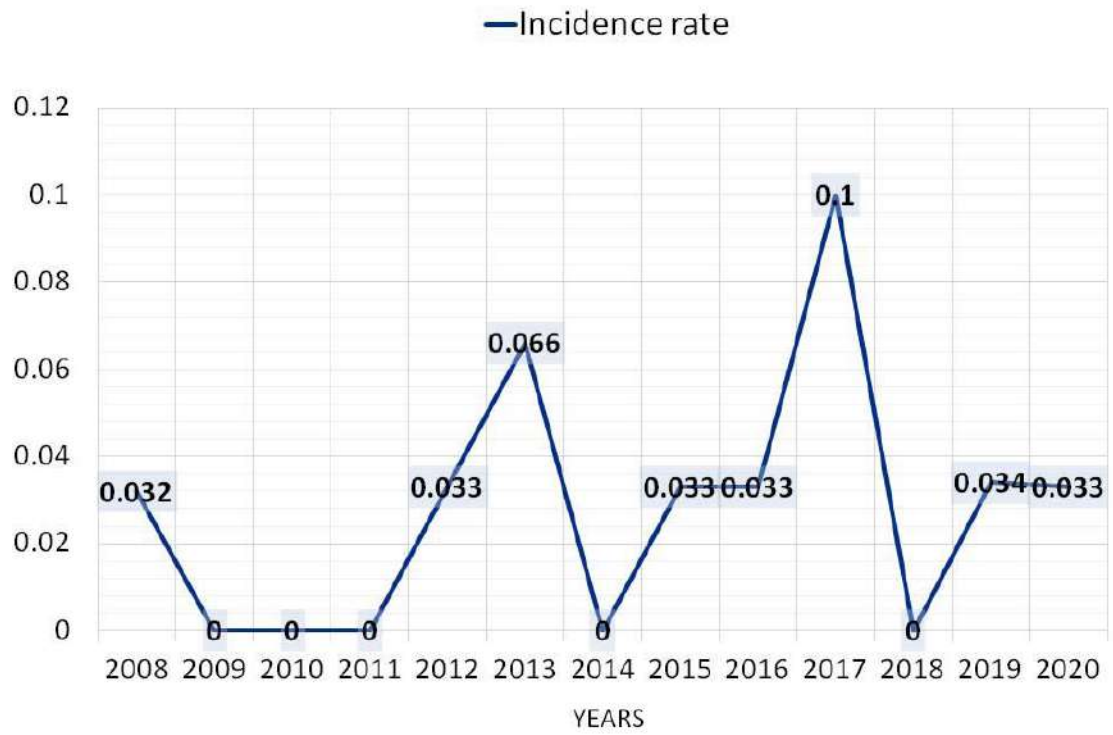


INCIDENCE RATES OF ECHINOCOCCOSIS 2008-2021, ARMENIA



Human alveococcosis cases in Armenia





Incidence rate of Alveococcosis per 100 000 population

Recommendations

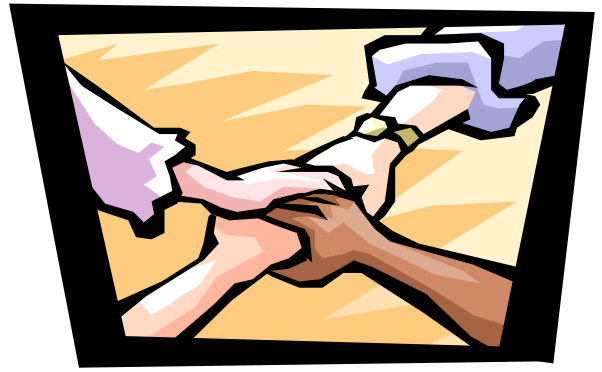
- Further strengthen the One-Health concept by integrating human and animal surveillance systems

- Enhance the use of surveillance data in order to facilitate risk assessment of zoonotic diseases

- Ensure further professional development of specialists

- Scientific research

- International collaboration, to ensure implementation of modern approaches and methods




Thank you for your attention!
armhistory.ru

OH Study in Armenia
2° workshop – 06/04/2022

Lusine Paronyan-NCDC/Georgi Avetisyan-FSIB
ISS team: Maria Grazia Dente, Silvia Declich, Alessia Milano e Claudia Robbiati
IZSAM team: Paolo Calistri, Ombretta Pediconi e Laura Amato

Programme

Time (CEST)		
12:00 AM	Welcome & Programme	Lusine Paronyan-NCDC/Georgi Avetisyan-FSIB/Maria Grazia Dente-ISS
12:10	CCHF Integrated surveillance: interviews & discussion	ISS & IZSAM &Stakeholders
1:00 PM	Break	
1:10	Antrax integrated response: the Armenian case	Lusine Paronyan-NCDC
1:20	Antrax integrated response: interviews & discussion	ISS & IZSAM &Stakeholders
2.00	Preliminary considerations and the way forward	ISS & IZSAM
2:10 PM	End of workshop	ISS & IZSAM
2:15 PM	Interviews for training needs assessment	IZSAM

CCHF/V Information collected with the Portfolio

- Aspects to be clarified/confirmed
- Missing information

Health system & Ministerial Orders

The health system in Armenia is de-centralized.

- The health care system is divided into three administrative layers: national, regional and municipal or community. With the exception of the SHAEI and several tertiary care hospitals, operation and ownership of health services have been devolved to regional and local government.
- 1985-A ministerial Order on August 20, 2014 “Prevention and control of Crimean-Congo hemorrhagic fever ”only in Armenian? Which Institutions are involved?
- 2561-A ministerial Order on August 12, 2016 “Epidemiological surveillance of Hemorrhagic syndrome” only in Armenian? Which Institutions are involved?

CCHF case definition in human in Armenia

- WHO? CDC? ECDC?
- Local case definition?
- Reference lab to confirm CCHF?
- The Arboviral diseases passive surveillance system has been operational in Armenia since 2010. It works as case-based surveillance system. A suspected case from medical facilities is reported to Head office of NCDC, from where it is reported to the regional branches.
- An epidemiological-entomological examination of the confirmed case is carried out by visiting foci.

Animal surveillance

- **Which institution is in charge for animal virology in Armenia?**

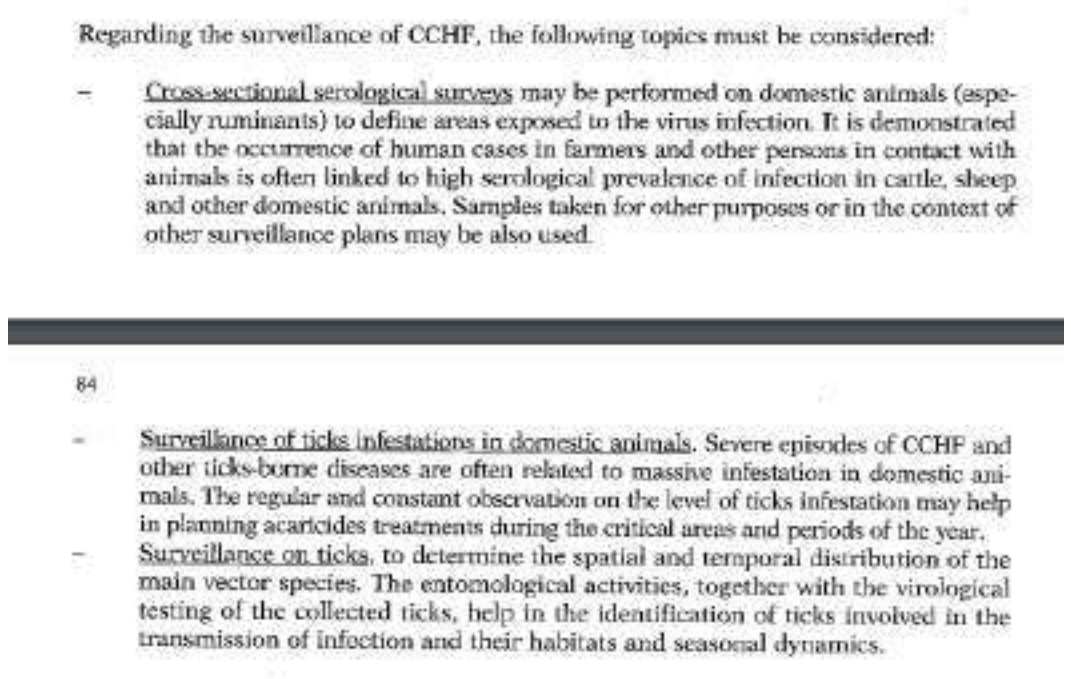
Surveillance in animals

Indicator	Collected		If YES,	Type		Coverage	
	Yes	No	Since (year)	Annual	Season.	National	Regional/areas
Animal population density							
Animal movements and trade: pastoralism and transhumance							
Animal movements and trade: import and export							
Animal movements and trade: wildlife migrations							

CCHF surveillance in animals and ticks

- Cross-sectional serological surveys on domestic animals (especially ruminants) to define areas exposed to the virus infections

- Surveillance of ticks infestations in domestic animals



Regarding the surveillance of CCHF, the following topics must be considered:

- Cross-sectional serological surveys may be performed on domestic animals (especially ruminants) to define areas exposed to the virus infection. It is demonstrated that the occurrence of human cases in farmers and other persons in contact with animals is often linked to high serological prevalence of infection in cattle, sheep and other domestic animals. Samples taken for other purposes or in the context of other surveillance plans may be also used.

84

- Surveillance of ticks infestations in domestic animals. Severe episodes of CCHF and other ticks-borne diseases are often related to massive infestation in domestic animals. The regular and constant observation on the level of ticks infestation may help in planning acaricides treatments during the critical areas and periods of the year.
- Surveillance on ticks, to determine the spatial and temporal distribution of the main vector species. The entomological activities, together with the virological testing of the collected ticks, help in the identification of ticks involved in the transmission of infection and their habitats and seasonal dynamics.

IZSAM Progetto Sarà

Vector surveillance and control

- Do you have maps of distribution of potential Arboviral diseases' vectors in your country?
  - Yes, on annual basis
- Do you monitor PCR Arboviral diseases' positivity in vector pools?
  - When possible (depends on availability of kits, was done in 2018 mosquito pools for WNV)
  - TICKS?
- Is data shared with other sectors (human health/ animal health)? For what purpose (early warning, surveillance …)
  - Not yet. Will be shared if needed.

Aspects of CCHV/D surveillance system related to risk assessment

CCHF Integrated surveillance

- At risk areas: in 2016 a study * showed that ticks collected from central regions were more infected than those from southern and northern regions were. This could be due:
- To the composition of sampled ticks from this region, where Rhipicephalus sanguineus were the most abundant species that were also showing the highest infection rate among all other tick species (less Hyalomma)
- to the concentration of livestock and the quality of breeding management. Among all the areas studied, the highest ticks' infection was identified in Kotayk Province with prevalence of 54.05%. The second highest prevalence was identified in Dilijan Town (Tavish Province).

* Gevorgyan H, Grigoryan GG, Atoyan HA, Rukhkyan M, Hakobyan A, Zakaryan H, Aghayan SA. Evidence of Crimean-Congo Haemorrhagic Fever Virus Occurrence in Ixodidae Ticks of Armenia. J Arthropod Borne Dis. 2019 Mar 30;13(1):9-16. PMID: 31346531; PMCID: PMC6643020.

CCHF Integrated surveillance

- At risk groups: . people involved in the livestock industry, such as agricultural workers, slaughterhouse workers and veterinarians.

- It is difficult to prevent or control CCHF infection in animals and ticks as the tick-animal-tick cycle usually goes unnoticed and the infection in domestic animals is usually not apparent*.

- Reducing the risk of infection in people: in the absence of a vaccine, the only way to reduce infection in people is by raising awareness of the risk factors and educating people about the measures they can take to reduce exposure to the virus: connecting at risk groups with at risk areas and at risk events (e.g. Eid-al-Adha in Afghanistan * *)

*Fanelli, A, Tizzani, P, Buonavoglia, D. Crimean–Congo Haemorrhagic Fever (CCHF) in animals: Global characterization and evolution from 2006 to 2019. *Transbound Emerg Dis*. 2021; 00: 1– 12. https://doi.org/10.1111/tbed.14120

** Sahak MN, Arifi F, Saeedzai SA. Descriptive epidemiology of Crimean-Congo Hemorrhagic Fever (CCHF) in Afghanistan: Reported cases to National Surveillance System, 2016-2018. Int J Infect Dis. 2019 Nov;88:135-140. doi: 10.1016/j.ijid.2019.08.016. Epub 2019 Aug 20. PMID: 31442628; PMCID: PMC6853159.

CCHF Integrated surveillance in Armenia

- At risk groups: . Any surveillance on at risk groups? If yes, which institutions involved? Training for at risk workers?

- Risk events: have particular events identified in Armenia to be monitored?

- Education to raise awareness of the risk factors and educating people about the measures they can take to reduce exposure to the virus: are they being implemented? If yes, which institutions involved?

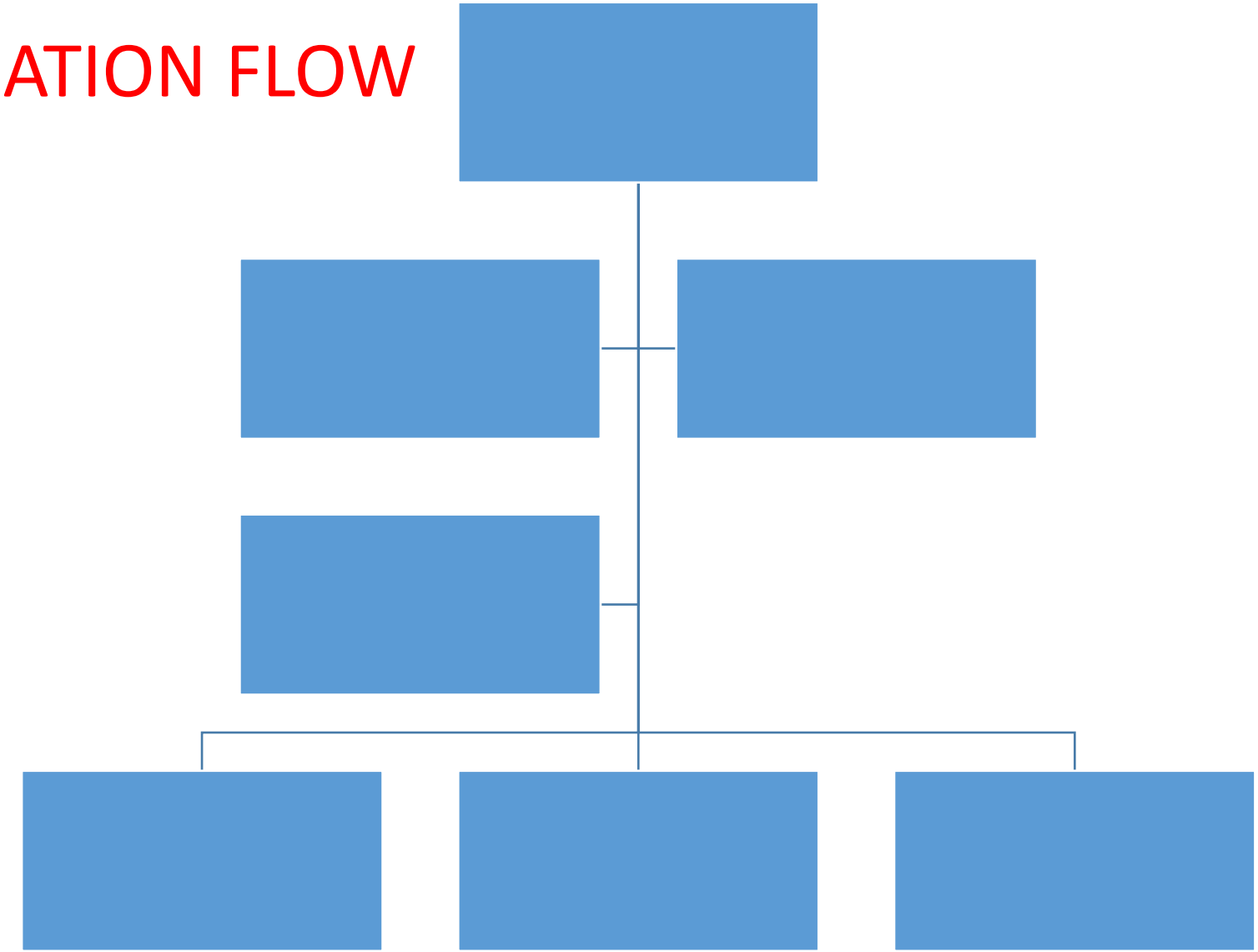
INTERSECTORAL INTEGRATED ACTIVITIES

Data collection

- Electronic Integrated Diseases Surveillance System (EIDSS) on the way of its implementation and shortly will be fully operated.

- After that only electronic notification of all the cases of infectious diseases will be conducted in real time. According to the ministerial order N 2873-A on 05.10.2017 "Measures to be taken in the foci of infectious diseases transmitted by ticks" Annex 7 of the methodological guide, we have a special form of foci epidemiological investigation.

INFORMATION FLOW



Climate and Environment

“HYDRO METEOROLOGY AND MONITORING CENTER" SNCO is in charge for climate and environment data collection.

> How have meteorological data and info helped to identify at risk areas?

INTERSECTORAL COLLABORATION AT DATA COLLECTION/ANALYSIS LEVEL

Is there interoperability between data collection mechanisms of human surveillance, animal surveillance and medical entomology monitoring for Arboviral Diseases?

No

Is there interoperability between data analysis mechanisms of human surveillance, animal surveillance and medical entomology monitoring for Arboviral Diseases?

No

Is regular exchange of information occurring across sectors involved in Arboviral Diseases surveillance regardless of full interoperability of the data collection and analysis systems?

No

INTERSECTORAL COLLABORATION AT DATA DISSEMINATION LEVEL

Are Arboviral Diseases joint surveillance reports issued that include data on human surveillance, animal surveillance and medical entomology monitoring?

No

Is there a two-way communication in place between public health and other sectors involved in Arboviral Diseases surveillance?

No

ANTRAX OUTBREAK: integrated preparedness

Assessing integrated preparedness in place with the One Health Conceptual Framework (OHCF)

OHCF Targets

ONE HEALTH-BASED CONCEPTUAL FRAMEWORK

Scope and purpose of the framework						
The present framework aims at guiding the relevant national sectors to implement harmonized and context-driven One Health strategies in the prevention and preparedness to threats to health						
Expected outcome						
Prevention and preparedness plans benefiting from information and data collected and analysed with a One Health approach						
GOAL of the Strategy						
To facilitate detection of threats at the human–animal–environment interface, assess potential risks for pandemic, support evaluation of possible impacts at system levels and provide back strategies to improve and strengthen prevention						
Targets						
National legislative and procedural framework that allows/imposes mainstream One Health approaches in all the prevention strategies and allocates the necessary resources One Health National Centres	**Prevention and preparedness plans developed,** implemented and monitored with a One Health approach, including community empowerment strategies, for the prevention and containment of health threats.	**National sectors driven database** interoperable and accessible to all the institutions/sectors involved in the One Health Team	**National training plan on One Health strategies** agreed between institutions and integrated in the relevant national plans	**Evaluation plans** to assess the effectiveness of One Health in reducing the risks of potential epidemics (prevent); in supporting the early identification of epidemic risks (alert); in contributing to the reduction of the impact (mitigate)	International Framework enabling harmonized integration of One Health strategies in all relevant regulations and communications	International training plans and tools aimed at facilitating OH training at national and cross-country level.

OHCF Priorities

Priorities for Action						
National level					International level	
Priority 1	**Priority 2**	**Priority 3**	**Priority 4**	**Priority 5**	**Priority 1**	**Priority 2**
GOVERNANCE	**PREVENTION AND PREPAREDNESS**	**DATA COLLECTION AND ANALYSIS**	**CAPACITY BUILDING**	**CONSOLIDATION AND EVALUATION OF THE SYSTEM IN PLACE**	**HARMONIZATION OF PLANS AND CROSS BORDER COLLABORATIONS**	**HARMONISED CAPACITY BUILDING**
Establishing a national multisectoral and multi-institutional team to set principles, rules and procedures to allow operationalization of One Health strategies. Assessing the opportunity and benefits of setting up a One Health National Centre (OHNC) Enacting laws and identifying resources for One Health operationalization	Connecting One Health strategies to prevention and preparedness plans by establishing a multisectoral team (One Health Team) (1) in charge of development, implementation and monitoring of plans	Identification of national priority areas (2) to be monitored and related monitoring indicators/metrics (3) Verifying available sources of information and data Development of integrated and interoperable database (4) connected with early warning and surveillance systems	Development of training curricula based on One Health prevention and preparedness Training of staff involved in activities including One Health Strategies Piloting and exercising	Identifying monitoring and impact indicators Assessing level of implementation of One Health indications in prevention and pandemic plans Assessing added value of One Health in prevention and preparedness	Developing and updating guidance and regulations to integrate OH strategies in prevention and preparedness plans and international early warning systems Identification of OH preparedness indicators/metrics in collaboration with National OH Teams Establishing WHO/OIE/FAO tripartite collaborating centres at OH National Centres Facilitating Networking opportunities between OHNCs	Integration of OH principles in International trainings for Preparedness and in Tools aimed at assessing level of capacities Promoting harmonised and multi-country exercises

Priority 1: Governance

- Has been a multisectoral and multi-institutional team established in Armenia?
- If so, when?
- Member Institutions:

- Members/Roles/Activities during:
- non emergency phase and in emergency phase
- National One Health platform: OH stakeholders

- Enacting laws:
- Dedicated resources:

- OH National Center?

Priority 2: PREVENTION AND PREPAREDNESS PLANS

- Plan available for the prioritised threat:
- Institutions/stakeholders involved in the plan:
- Development; implementation; monitoring; updating

Priority 3: DATA COLLECTION AND ANALYSIS

- Identified priority areas relevant to the prioritised threats to be monitored:
- related monitoring indicators/metrics:
- check also for less frequent indicators:
- wildlife? Environment?
- Verifying available sources of information and data
- Integrated and interoperable database connected with early warning and surveillance systems established?
- If so, governance of the database, stakeholders etc.
- OH community-based activities?

Priority 4: TRAINING

- Development of training curricula based on One Health prevention and preparedness:
- Training of staff involved in activities including One Health Strategies
- Piloting and exercising

Priority 5: CONSOLIDATION AND EVALUATION OF THE SYSTEM IN PLACE

- Any evaluation plan in place?

- Identifying monitoring and impact indicators
- Assessing level of implementation of One Health indications in prevention and pandemic plans
- Assessing added value of One Health in prevention and preparedness
- Any indicator relates to WHO IHR-2005?
- Were gaps identified by national plan testing, (JEE, OIE-PVS evaluations, After Action Reviews) addressed?

Priority 5: CONSOLIDATION AND EVALUATION OF THE SYSTEM IN PLACE

- Any evaluation plan in place?

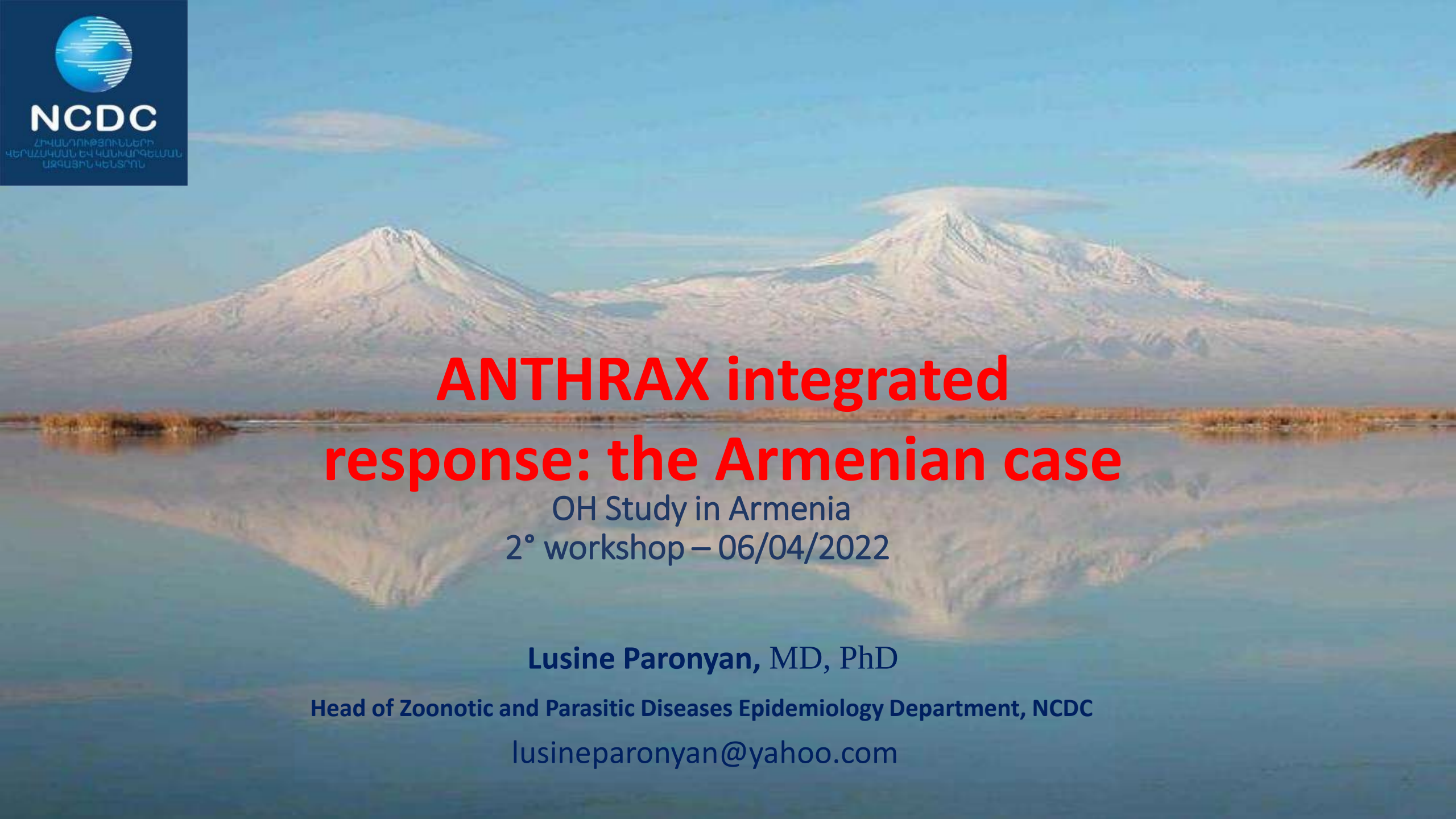
- Identifying monitoring and impact indicators
- Assessing level of implementation of One Health indications in prevention and pandemic plans
- Assessing added value of One Health in prevention and preparedness
- Any indicator relates to WHO IHR-2005?
- Were gaps identified by national plan testing, (JEE, OIE-PVS evaluations, After Action Reviews) addressed?

INTERNATIONAL FRAMEWORK

- Were tools or guidance provided by international organisations (e.g. WHO, OIE, FAO) utilised to implemented One Health approaches in the country?
- If so, which ones:

OH Study in Armenia
2° workshop – 06/04/2022

Thanks to all!



ANTHRAX integrated response: the Armenian case

OH Study in Armenia

2° workshop – 06/04/2022

Lusine Paronyan, MD, PhD

Head of Zoonotic and Parasitic Diseases Epidemiology Department, NCDC

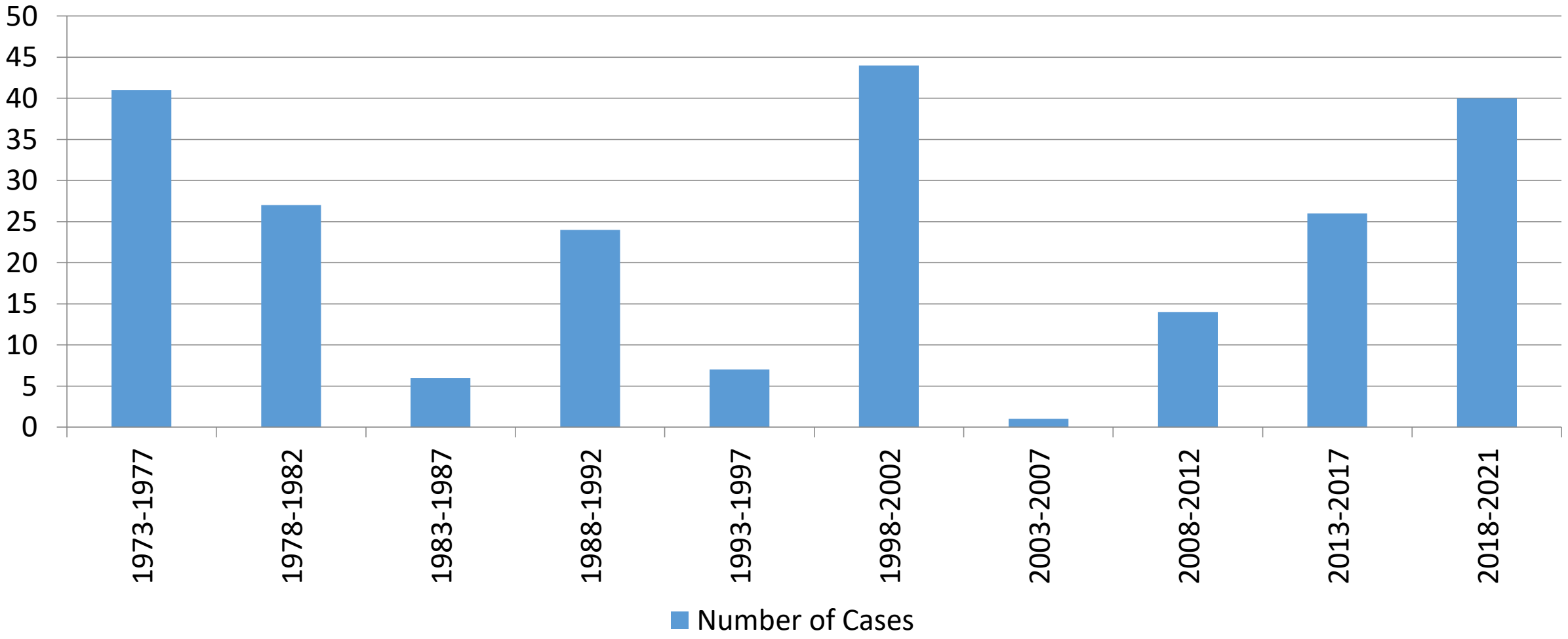
lusineparonyan@yahoo.com

ZOONOSES IN ARMENIA

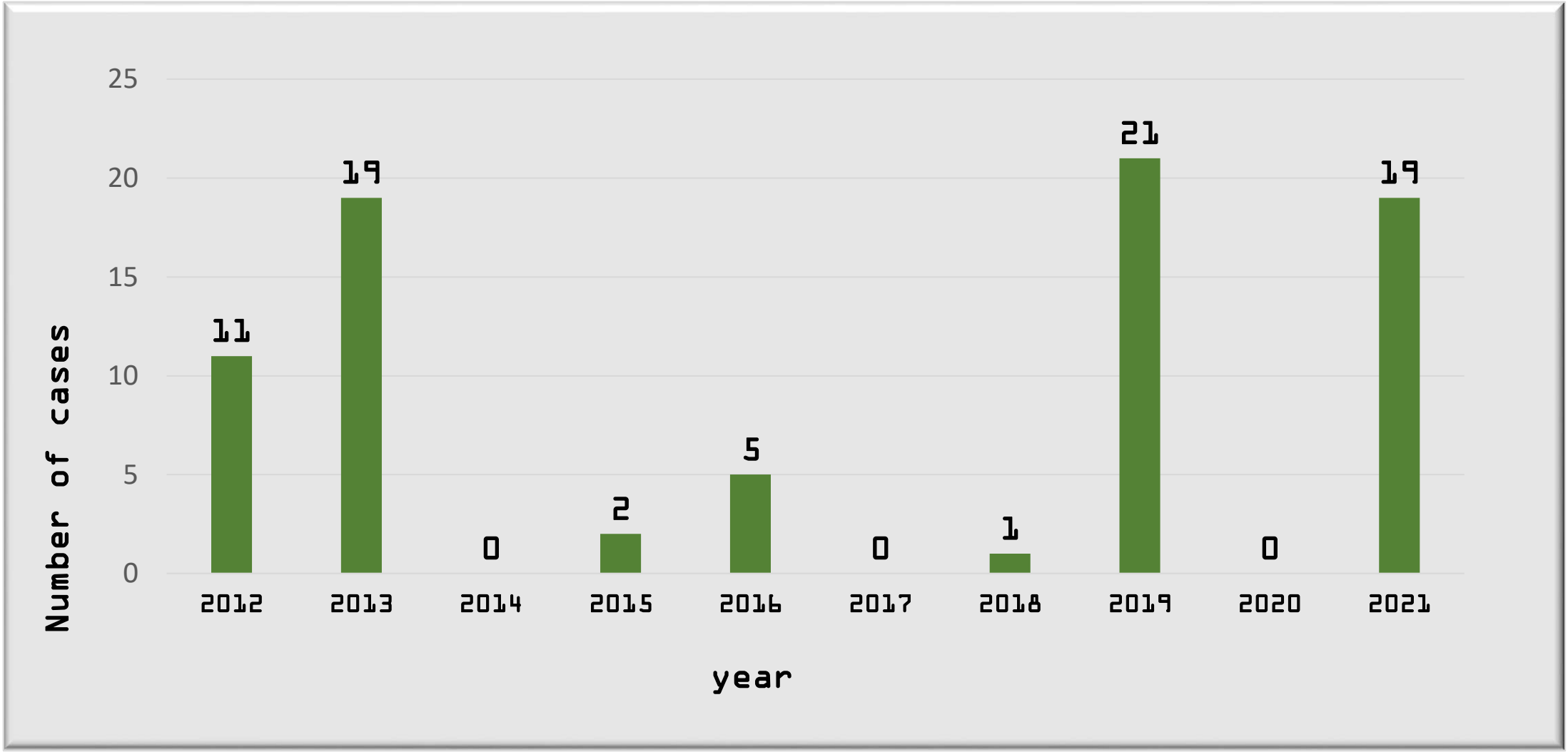
- Tularemia
- Anthrax
- Brucellosis
- Leptospirosis
- Rabies
- Q-fever
- Lyme disease
- Leishmaniases
- Echinococcosis
- Teniidoses
- Listeriosis
- Arboviral infections
- Plague

National Center for Disease Control and Prevention, MoH

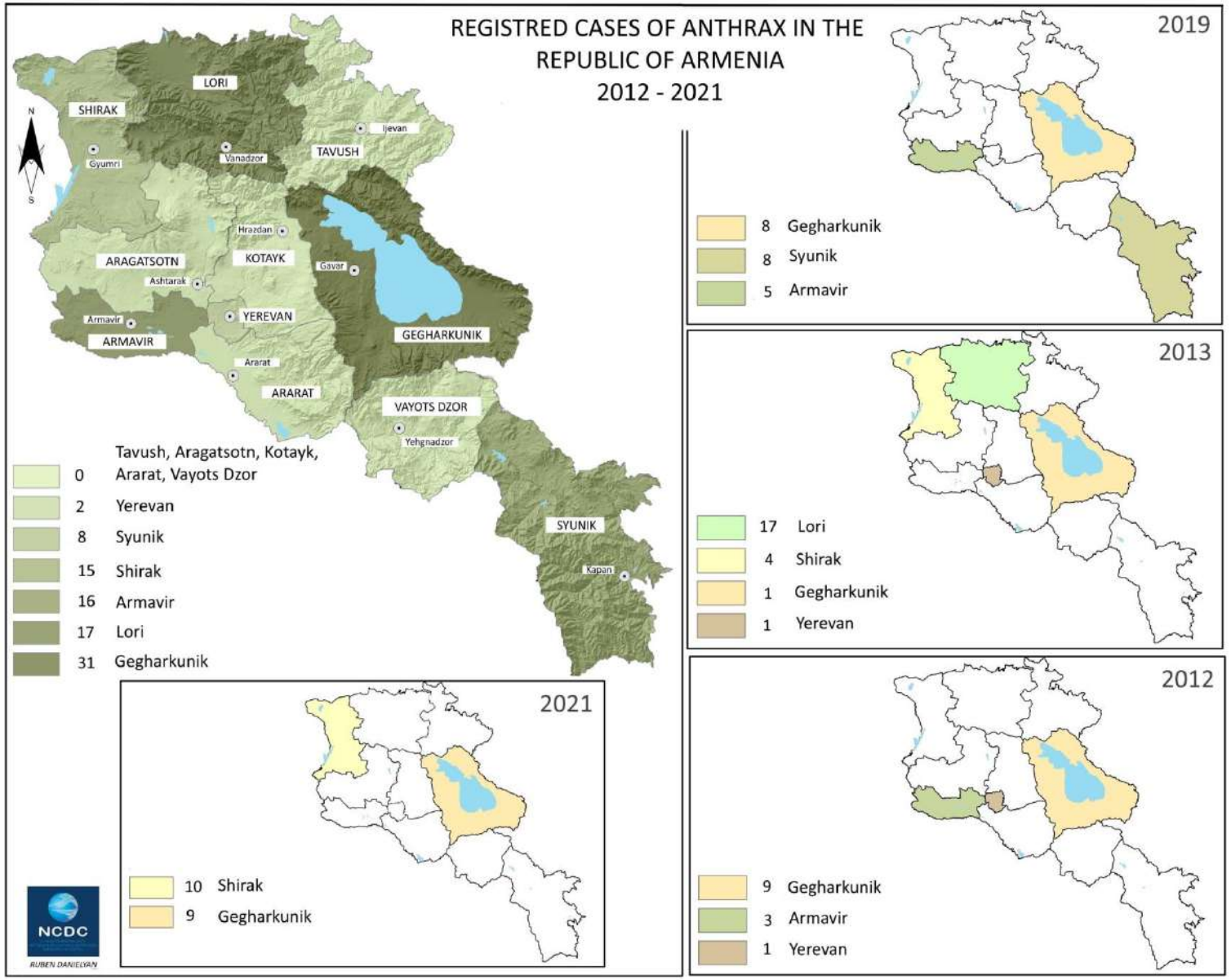
ANTHRAX CASES OF IN ARMENIA, 1973-2021



ANTHRAX CASES IN ARMENIA, 2012-2021

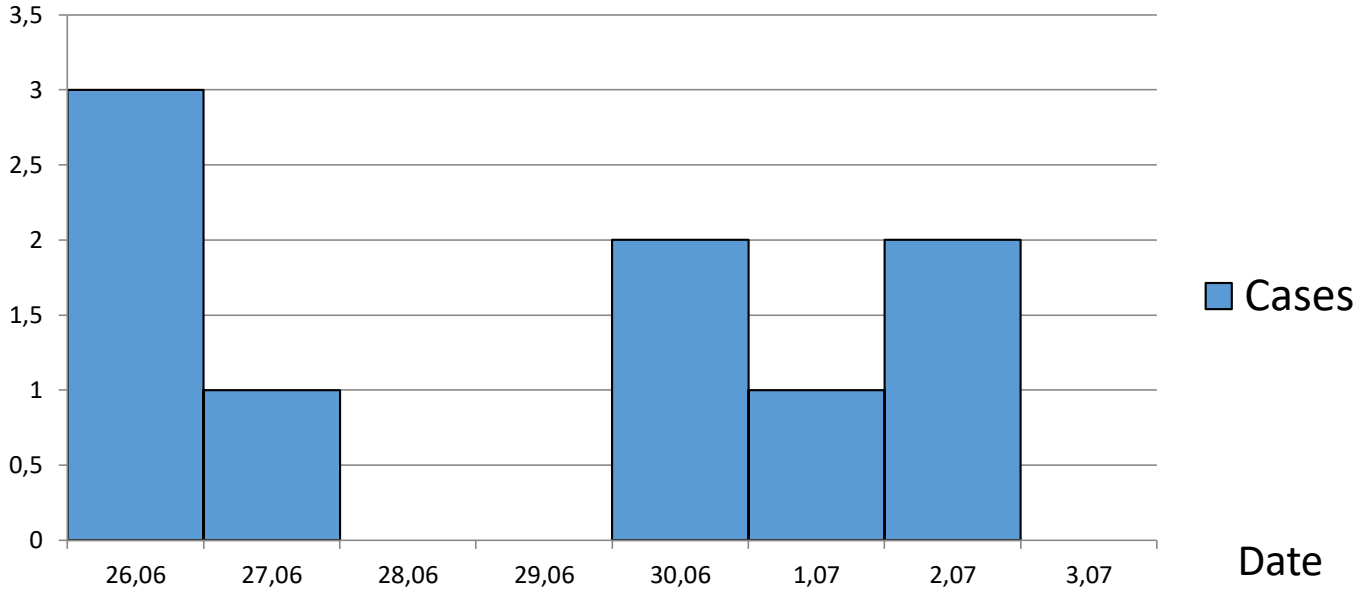


ANTHRAX CASES BY REGIONS, 2012-2021

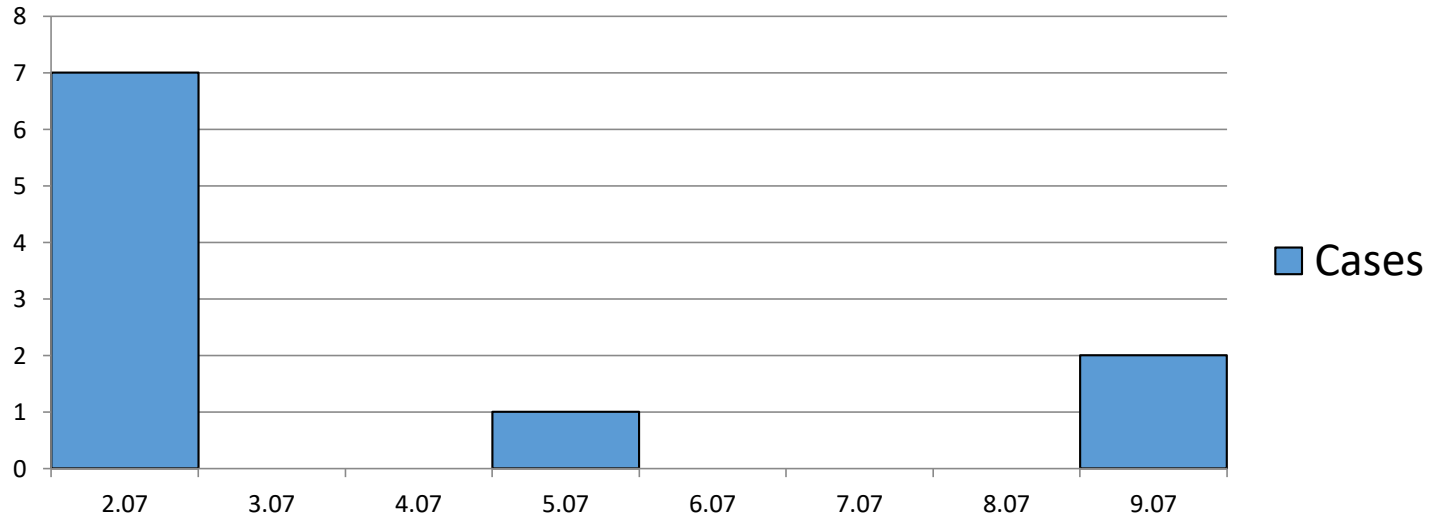


EPICURVES ANTHRAX OUTBREAKS IN GEGHARKUNIK & SHIRAK REGIONS, **2021**

N=9 in Gegharkunik marz



N=10 in Shirak marz

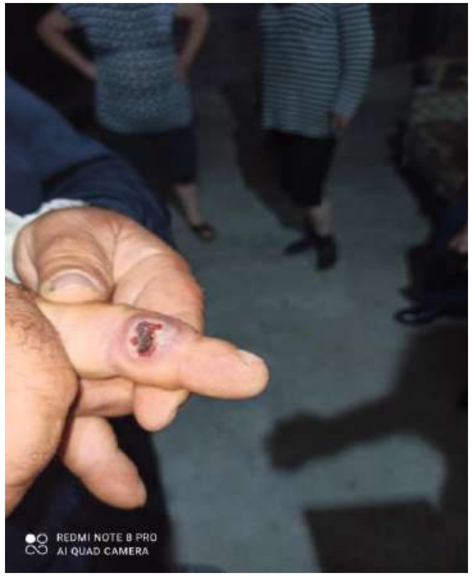


ANTHRAX OUTBREAKS IN GEGHARKUNIK & SHIRAK REGIONS, 2021

- Outbreaks in animals and people
- In total, 19 cases were registered among the population:

-9 in Gegharkunik marz

- 10 in Shirak marz



ANTHRAX OUTBREAKS IN GEGHARKUNIK & SHIRAK REGIONS, 2021

Collaborative actions:

- ✓NCDC
- ✓MF
- ✓FSIB
- ✓NSS
- ✓Police
- ✓Regional administrations

Recommendations

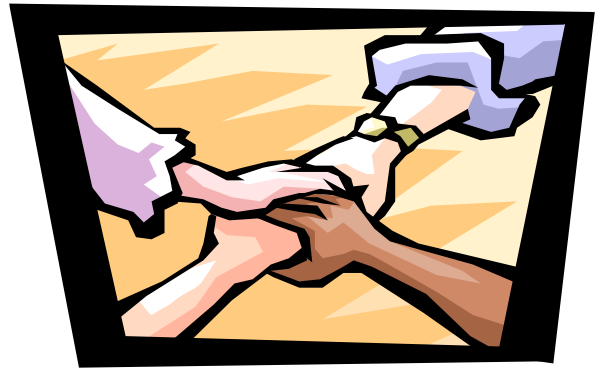
- Further strengthen the One-Health concept by integrating human and animal surveillance systems

- Enhance the use of surveillance data in order to facilitate risk assessment of zoonotic diseases

- Ensure further professional development of specialists

- Scientific research

- International collaboration, to ensure implementation of modern approaches and methods




Thank you for your attention!
armhistory.ru

OH Study in Armenia
3° workshop – 21/06/2022

Lusine Paronyan-NCDC/Georgi Avetisyan-FSIB
ISS team: Maria Grazia Dente, Silvia Declich, Alessia Milano and Claudia Robbiati
IZSAM team: Paolo Calistri, Ombretta Pediconi and Laura Amato

Agenda

Time (CEST)		
12:00	Introduction to the workshop	ISS & IZSAM
12:15	Consolidation of the draft report & Portfolio: comments, integrations and clarifications	ISS&IZSAM&Stakeholders
1:15	Break	
1:25	Study Results and opportunities to enhance the system: pools on feasibility and discussion	ISS & IZSAM &Stakeholders
2.25	Preliminary considerations and way forward	ISS & IZSAM
3:00	End of workshop	ISS & IZSAM

Consolidation of the draft report & portfolio: comments, integrations and clarifications

- Aspects to be clarified/confirmed
- Information on drivers/causal factors

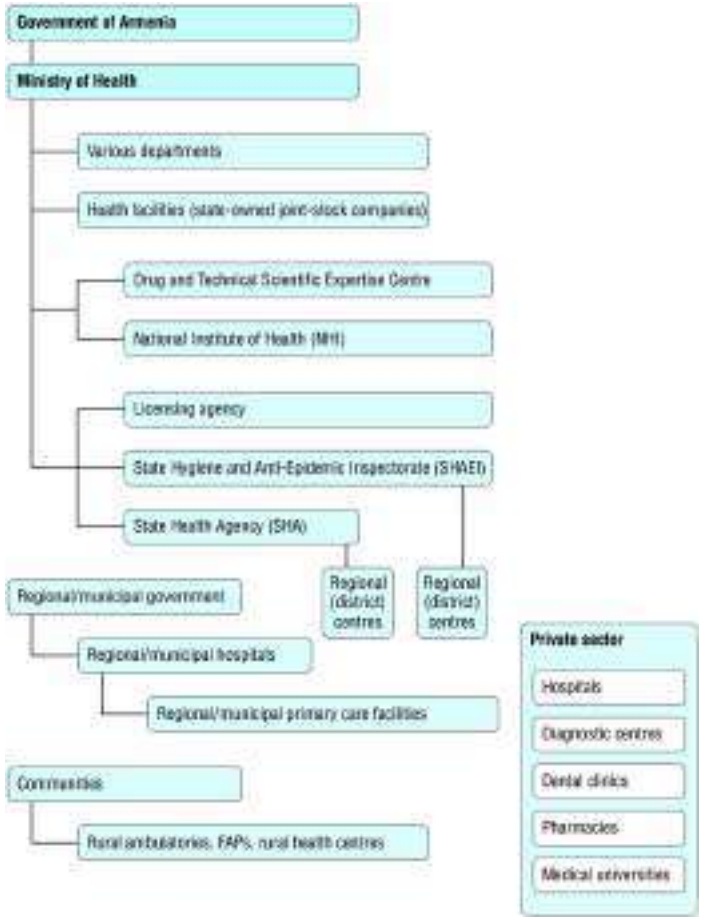
Armenian Institutions in portfolio

- In the Portfolio (integral part of the Study Report), only the NCDC is described.

➢please insert information on the other Institutions involved in this study and their role in the surveillance of health threats.

Insert website in english if available

MoH and MoA structure in Armenia



- Ministry of Agriculture

Food Safety Inspection Body of the Government of the Republic of Armenia, MoA

CCHF: human surveillance

Indicators collected	Collected		If YES, Since (year)	Type		Coverage	
	Yes	No		Annual	Season	National	Regional /areas
Population density	✓		1926	✓		✓	
Population age distribution	✓		1926	✓		✓	
Arboviral Disease frequency or occurrence: new notified cases/outbreaks per year	✓		2010				
Arboviral Disease frequency or occurrence: number of confirmed laboratory cases per year	✓		2010				
Arboviral Disease frequency or occurrence: persons with specific antibodies (seroprevalence)		✓					

CCHF: animal health

- Animal identification system online, are data available? What kind of information? Regional data?
- “There are some investigations about animal movements and population density monitoring and boarder control to notify OIE”: What kind of investigations? Are data accessible? Are there cross-border collaborations in place?
- Institute of Zoology Reports, what animals do they study? Are there collaborations on place with Universities and private Institutions?

CCHF: animal health

Indicator	Collected		If YES, Since (year)	Type		Coverage	
	Yes	No		Annual	Season.	National	Regional/areas
Animal population density	x			x		x	
Animal movements and trade: pastoralism and transhumance	x			x		x	
Animal movements and trade: import and export							
Animal movements and trade: wildlife migrations							

- In which database do you have these information? Are they available?
- Do you collect indicators about wildlife migrations, import and export? If yes, is it annual or seasonal? Is it national or regional? Since when do you collect these indicators?

CCHF: medical entomology

- You collect Ixodes ticks and describe maps of distribution of potential arboviral diseases in the country. What kind of data were used to do these maps? Are they available online?
- Did you collaborate with Iran authorities during 2018 outbreak?
- You mentioned a potential OH study: what this would be about?
- If ticks are positive, with whom do you share the info?

CCHF: medical entomology

Indicator	Collected		If YES, Since (year)	Type		Coverage	
	Yes	No		Annual	Season.	National	Regional/areas
Vector presence	✓			✓		✓	✓
Vector abundance/density		✓					
Vector seasonality	✓						
Vector infection rate	✓					✓	

- In which database do you have these information? Are they available?
- Since when do you collect these indicators?

CCHF: climate/environment

- Are climate and environmental data available to the national institutions?
- Did/Do you perform studies on how climate and environmental factors impact CCHF or other diseases?

Anthrax: aspects to be clarified

- Under WHO International health regulations (IHR), there are 2 multisectoral groups: (when they were activated/what they do?)

  1.Intersectoral steering committee at high level. 2.Expert group under the MoH.

  They were not activated during this outbreak. Why weren't they activated?

- OH platform being developed with WHO: about what?
- There are no specific response plans for Anthrax, only a generic one for response. Is it only for response? Or also for preparedness and prevention? With a One Health approach?
- Cattle vaccinations are free? Vaccine coverage?
- Community vets: What is their background? To whom they report? Are they really 6000? How they are distributed? Do they engage communities with risk communication/awareness programs?

Anthrax: aspects to be clarified

- Last year a training on One Health was organised: What kind of training? Who participated? Who organized it?
- The only evaluation plans in place are JEE and OIE evaluation in 2019 (?). What they evaluated? In the OIE's evaluation only animal health and the food safety part addressed the identified gaps. How did you address the identified gaps?

- Which WHO, WOAH and FAO One Health guidance, manuals and tools do you used/use in particular?

Drivers/causal factors of Arbovirus

- What are the main potential drivers for CCHF/V Arbovirus in your country?
- For ticks-CCHF: concentration of animals and quality of breeding (Gevorgyan H, Grigoryan GG, Atoyan HA, Rukhkyan M, Hakobyan A, Zakaryan H, Aghayan SA. Evidence of Crimean-Congo Haemorrhagic Fever Virus Occurrence in Ixodidae Ticks of Armenia. J Arthropod Borne Dis. 2019 Mar 30;13(1):9-16. PMID: 31346531; PMCID: PMC6643020.

- Are there any study/project/programme that aim at targeting these drivers? What sectors are involved?
- If not do you think it would be feasible to monitor the drivers? What challenges you may face?
- Could monitoring drivers help identify hotspot areas at risk of outbreak?
- Are there risk communication/community engagement intiatives?

Drivers/causal factors of Anthrax

- Were Anthrax outbreaks' drivers/causal factors investigated? If yes, what they are?
- Are there other study/project/programme about Anthrax drivers?
- Anthrax outbreaks are developing in areas with specific characteristics?
- Were strategies adopted to mitigate these drivers? (Examples)
- If not, why?
- Do you think applying strategies to mitigate drivers could be effective in preventing outbreaks?
- Are there community risk communication/awareness/engagement intiatives?

Consolidation of the results of the study

Consolidation of the results of the study

Several law acts based on WHO IHR requirements (including Joint Orders and Standard operating Procedures in PH & Veterinary service)
Arboviral diseases (AD) are notifiable in Armenia. CCHF is in the list of immediate notification. NCDC is responsible for human surveillance. The diagnosis of CCHF is based on the WHO case definition or from 2013 in accordance with EU directives?.see Lusine presentation at the 1st workshop
The AD diseases passive surveillance has been operational in Armenia since 2010. What happened in 2010? It works as case-based surveillance system.
In Armenia the only case of CCHF in human was registered in 1974 in Sunik region of Armenia, which ended with a death of a young zoologist
No studies and surveillance on CCHFV in animals
No veterinary surveillance system is in place for AD
The reference Institution is the Food safety inspectorate- Veterinary Services. Staff and equipment are available, also a small quantity of kits for CCHF. They mainly perform activities for inspection control policies of OIE.
In the CCHF 2018 outbreak in Iran, at the borders with Iran ticks from animals were collected and analysed with PCR with negative results. DID VET AND ENTOMOLOGISTS WORKED TOGETHER IN THIS OCCATION?
During 1986-1996 entomological survey, the CCHF virus was found in ticks in the Syunik, Vayots Dzor and Kotayk regions in Armenia In 2016 CCHF virus antigen was detected from 6 tick species Ticks are investigated. Ixodes ticks were collected and maps of distribution developed for the country. Medical Entomologists work at NCDC, regularly conducting field work and sharing findings. In case of identification of a case of an Arboviral disease, data are shared with veterinary service (FSIB), through informal communication, for early detection and prevention
Presently prevention activities on groups at risk for zoonosis, but CCHF not included No prevention activities done with the involvement of relevant sectors
Electronic Integrated Diseases Surveillance System (EIDSS) on the way of its implementation.
HYDRO METEOROLOGY AND MONITORING CENTER at SNCO is in charge for climate and environment data collection and the Ministries may receive this data that are presently distributed mainly for malaria control
Involvement of Ministry of Environment in Migratory birds monitoring Institute of zoology in Yerevan is conducting investigation on wildlife for these diseases.
Mechanisms enabling intersectoral activities are not fully in place E.g. Mechanism to regularly share data between sectors are not available
Intersectoral strategies aimed at assessing and addressing relevant risk factors are not fully in place
The Arboviral diseases surveillance system has never been evaluated

Consolidation of the results of the study

Armenia: the situation during the response to Anthrax Outbreak 2021						
Under WHO International health regulations (IHR-2005) country capacity there are 2 multisectoral groups: 1. high level Intersectoral steering committee 2 .Expert group under the MoH. They were not activated during this outbreak being it a national emergency not under IHR legal framework. For IHR there are specific funds and specific Terms of reference to follow. They also have government decisions, joint decrees on information exchanging and on actions in case of zoonotic events. They (IHR national capacity?) are trying to create a OH platform with WHO, they want to create a program for the implementation of the tripartite guide.	They do not have specific response plans for anthrax, only the generic preparedness one.	The entire country is at risk, this is the reason why the government gave all the vaccinations for cattle and small ruminants, so they are not doing any additional surveillance activity. Is there a low vaccination coverage considering the recurrent outbreak? There are communitarian vets and if they see suspected symptoms, they inform the regional offices of government where there is one department that works with farmers. Waiting for the Electronic Integrated Diseases Surveillance System (EIDSS)which will collect data of all infectious diseases	Last year a training was arranged (BY WHOM?) for different people (WHO?) with different backgrounds, it was a one-shot training. Now they are conducting field epidemiology training with epidemiologists from public and animal health. A specific intersectoral training curriculum on One Health is not available	The only evaluation plans in place are JEE in 2016 and OIE evaluation in 2019. In the OIE's evaluation only vets and the inspectorate (food) part addressed the identified gaps		Armenian relevant institutions and laboratories use laboratory manuals and some publications from FAO and OIE. In May there will be a workshop for the implementation of the tripartite.

Opportunities to enhance the system: pools on feasibility and discussion

Opportunities to enhance the One Health system

↑**Intersectoriality**	Feasibility
Governance	
Leveraging on WHO IHR requirements to enhance intersectoral activities at National level (e.g. exploiting bodies/committee established for IHR for national priorities; integrated risk assessment; etc.)	
Preparedness plans with a OH approach	
Multisectoral Training Curriculum on One Health	
Operationalisation	
Education and awareness campaigns involving all the sectors (One Health)	
Prioritize training on Electronic Integrated Diseases Surveillance System (EIDSS) transversally to all sectors involved at national and peripheral levels	
Include climate, environmental and socio-cultural data and identify trends and drivers	

Opportunities to enhance CCHF/V preparedness & early warning

↑early warning	Feasibility
Human and Animal surveillance	
Serological surveys on humans/Groups at risk to define areas exposed to the virus infections Cross-sectional serological surveys on domestic animals (especially ruminants) to define areas exposed to the virus infections Surveillance of ticks infestations in domestic animals in at risk areas	
Vector mapping	
Consolidate maps of distribution of ticks in the country as potential vectors of arboviral diseases and identify priority areas to be monitored	
Risk assessment	
Collecting and analysis data to monitor risk groups, risk areas and at risk events	

Opportunities to enhance Anthrax preparedness & early warning

↑prevention and early warning	Feasibility
Identification of drivers	
Armenian institutions are aware of possible enhancing drivers of Anthrax recurrent local outbreaks and the veterinary services reported in detail some of these aspects. It would be a big opportunity to study in detail these aspects in order to guide prevention actions. Collect data systematically to find evidence OH KAP Survey on Anthrax?	
Communitarian vets	
6000 communitarian vets inspectors more involved in preparedness and prevention (i.e. vaccination)	

Preliminary considerations and way forward

- Comments on the report?
- Schedule for the finalisation of the report:
  - ISS/IZSAM to Armenian Institutions final draft> 1° week of July
  - Armenian Institutions possible comments/integrations to ISS/IZSAM> end of July

  After the final report will be disseminated

THANKS A LOT TO ALL !!!!!