Chapter III: The Public Health System of Belarus

1. History of Belarus' Public Health System[57]

Belarus is located in the center of Europe, has a land area of 208,000 km^2, and a population of about 10 million. The country is divided into six *oblasts*, which are subdivided into *rayons*. Minsk, the capital city with a population of approximately 1.7 million, is an independent administrative unit.

Unlike the other countries addressed in this report, Belarus has never possessed an AP system or housed any AP facilities. The reason is very simple; there have never been any natural plague foci within Belarusian territory. Hence, the public health system in Belarus, both during the Soviet era and in its current manifestation, is comprised of the SES, supported by the Belarus Research Institute of Epidemiology and Microbiology (NIIEM). In this section, we describe the public health system as it first began functioning during the tsarist times, was expanded during the Soviet era, and as it continues in independent Belarus.

Tsarist Era

A public sanitary system in Belarus stems from the 1870s when permanent sanitary commissions were established in several provinces and districts. This system grew over the next 20 years, encompassing several major cities. In addition, as explained in our earlier report,[58] the tsarist government was developing sanitary regulations and surveillance throughout the empire during this time, including Belarus.

Due to a rise in the incidence of venereal diseases in Minsk especially, the city government set up the Municipal Sanitary Committee in 1891. Other cities followed this example, and similar committees were set up in Vitsyebesk and Homyel in 1897, Hrodna in 1904, and Mahilyow in 1909. On the provincial level, the Medical Statistics Office headed by a sanitary physician was opened in Minsk in 1899 and its responsibilities included monitoring compliance with sanitary regulations and bringing enforcement actions against violators. In somewhat parallel developments, three sanitary stations began their operations during the first decade of the 20th century. Called Pasteur stations, two were established in 1910 in Orsha and Mahilyow, and the third in Minsk in 1911.

This system existed until the Bolsheviks took power in 1917. In general, this system was deemed primitive and under-financed, and its various components worked in an uncoordinated way. As such, it probably had a very small effect on the level of public health in Belarus.

Soviet Era

In September 1922, the SES was established in the Soviet Union. It was the result of the Russian Socialist Federation of Soviet Republic's Council of People's Commissars' decree "On Sanitary Agencies of the Republic," which defined the government's role in protecting public health in the USSR. Among the decree's provisions, it defined the duties, rights, and responsibilities of sanitary physicians, and determined the structure of the SES. Soon after, in October 1922, a sanitary-epidemiological station was set up in the BSSR—the Fifth Anniversary of the October Revolution Station. This development was promoted by Dr. K.Yu. Kononovich, then director of the Sanitary-Epidemiological Department of the Homyel *oblast* Department of

Public Health. He acted to combine sanitary and anti-epidemic work, which had previously been divided among several agencies, within one agency. This new agency worked to improve occupational and community health, fight infectious diseases, and teach and train sanitarians and other types of public health officials.[59] Kononovich's concept soon was accepted throughout the USSR and, as a result, a network of sanitary-epidemiological stations formed the backbone of the Soviet SES. Between 1922 and Germany's attack in 1941, the Belarus SES grew substantially; it came to include 147 SES stations, 57 anti-malaria stations, and 8 training institutions and employed over 200 physicians and 1,300 other medical personnel.

In great part due to the work of SES, the level of public health in the BSSR increased substantially as a result of the near elimination of diseases such as typhus, gastro-intestinal infections, childhood infections, malaria, and other common diseases of the time. Almost all of these advances were lost during the German occupation as the SES was destroyed. As a result there was a resurgence of infectious diseases in the BSSR, including typhoid, dysentery, malaria, and spotted fever (typhus). In the immediate post-war period, the Soviet health system took great effort to eradicate infectious diseases by emphasizing "sanitary protection." This included such actions as vaccine campaigns, improving water supplies and waste disposal, and rebuilding the SES.

Despite the efforts of SES, there were thousands of cases of typhus, poliomyelitis, diphtheria, and other infectious diseases in the 1950s in the BSSR. The awful public health situation stimulated the Soviet MOH to undertake a large public health program in the BSSR, which included ordering the SES to set up infectious disease offices throughout the republic that operated large vaccination campaigns. This worked well; typhus, diphtheria, and poliomyelitis were largely eliminated by 1963. Between 1963 and 1986, the level of public health continued to rise in the BSSR and the republic became one of the healthiest of the Soviet republics when measured by public health indexes such as infant mortality rates, longevity, and others.

The Chernobyl nuclear power plant disaster in April 1986 struck the BSSR especially hard. The plant's plume released radioactive material equal to that which would have resulted from the explosion of 150 atomic bombs the size of the one dropped on Hiroshima. Though the plant was located in Ukraine, the winds blew in the direction of the BSSR after the explosion. As a result, 70 percent of all radioactive fallout fell on BSSR territory, heavily contaminating one-fifth of it into a zone of radioactivity. This zone's population at that time was approximately 2.5 million people and these inhabitants were the most heavily affected. However, much of the remaining Belarusian territory was also exposed to radiation to a lesser or greater degree. Chernobyl has resulted in a drastic decrease in the level of overall health in the BSSR as the incidence of cancers, genetic mutations, leukemia, and other chronic diseases, has markedly increased. For example, the incidence of thyroid cancer in the decade that followed the Chernobyl disaster increased by over 80 times.[60]

One effect of the Chernobyl accident was to stimulate some developments at the local level. The BSSR SES was provided with the resources needed to set up a new network of radiometry laboratories and to found new research institutes including the Radiation Medicine Research Institute, Belarus Center for Medical Technologies, Department of Radiation Medicine and Ecology at the Minsk Medical Institute, and the Division of Medical Consequences of the Chernobyl Disaster within the BSSR MOH.

Post-Soviet Era

The Republic of Belarus' (hereafter Belarus) economy suffered immensely after the Soviet Union's dissolution since most of the heavy industries that were the base for its prosperity went bankrupt. The substantial fall in Belarus' GDP has had many negative consequences on its health system and the public health of the population. Nevertheless, almost alone among the NIS, Belarus maintains a Soviet-style centrally planned economy, including providing universal free health care to its population.

All current public health-related activities in Belarus stem from the law "On the Sanitary-Epidemiological Well-Being of the People." The Supreme Council approved the law on November 23, 1993.[61] Briefly, this law seeks to provide Belarusians with optimum conditions for healthy living, but with a clear emphasis on disease prevention. It includes guidelines that govern the operations of public health agencies, other governmental agencies, and both public and private enterprises. The law specifies penalties for individuals and businesses that violate its provisions, and contains other regulations such as hygienic standards.

As a result of a growing understanding of newly discovered enforcement issues, the need for modern sanitary-epidemiological measures, and the need to coordinate public health laws and regulations of Belarus with other CIS members, the 1993 law was considerably revised on August 10, 2000, becoming the Council of Minister's Decree No. 1236, "On Confirming the Statute of the Government Sanitary Surveillance in the Republic of Belarus." Since then, over 100 regulations have been enacted by legislature or government agencies to implement the law's provisions. Among them are provisions that make public health duties, including disease surveillance, environmental monitoring, and certain preventive programs the responsibility of SES. The SES facilities are distributed in line with *rayon* and *oblast* divisions but report directly to the Belarus MOH.[62] In addition, government agencies other than the Belarus MOH have their own SES facilities. These include power companies, the Administration of Affairs of the President of the Republic of Belarus, and Belarus Railroad; each headed by persons with the rank of Deputy Chief Sanitary Physician.

Currently, Belarus' SES has a simple vertical organizational structure. The SES is part of the Belarus MOH,[63] and is headed by a Deputy Minister of Health who also holds the title of Chief State Sanitary Physician. The Deputy Chief State Sanitary Physician heads the Republic Center for Hygiene and Epidemiology in Minsk. The republic's sanitary-epidemiological facilities located in *oblasts*, some district seats, and major cities report to the Center for Hygiene and Epidemiology. The Belarus SES works very closely with Belarus' most important biomedical research institute, the Belarus Research Institute of Epidemiology and Microbiology (Russian acronym NIIEM).

2. Activities of Belarus' Public Health System

The development of a new, modern SES commenced with the adoption of the law "On Sanitary-Epidemiological Well-Being of the People," mentioned above, and its revision in 2000. With a clear emphasis on disease prevention, this law sets requirements for public health agencies, government administrative agencies, and businesses to provide Belarus' residents with the optimum conditions for living and for maintaining and improving their health. The law provides penalties for damages to citizens' health due to violations of health laws, health norms and regulations, and hygienic standards.

The Belarus' SES vertical organizational structure in theory allows it to react quickly to emerging situations and undertake broad-scale sanitary and anti-epidemic measures. The SES is headed by the Chief State Sanitary Physician, who as Deputy Minister of Health directs the ministry's Sanitary-Epidemiological Administration. The Deputy Chief State Sanitary Physician heads the Republic's Center for Hygiene and Epidemiology.

The regions, major cities, and district seats have regional, municipal, and district Hygiene and Epidemiology Centers. Each district hygiene and epidemiology center has a sanitary-hygiene department, an epidemiology department, and a bacteriology laboratory that performs some virology (serology) work. The regional and municipal centers have a high-risk infection department and bacteriology, virology, and parasitological laboratories.

The country's SES comprises 154 sanitary-epidemiological agencies employing over 1,700 physicians, over 600 specialists with advanced non-medical degrees, and about 6,000 mid-level medical personnel. The sanitary service agencies under the Ministry of Internal Affairs, the Ministry of Defense, Belarus Railroad, and the Committee for State Security employ over 220 physicians and over 400 mid-level medical personnel.[64] The Belarus SES is responsible for the:

- collection of vital and health statistics;
- surveillance of infectious diseases and the forecasting and management of epidemics;
- management and delivery of immunization and vaccination programs;
- monitoring of environmental hazards and radiation levels; and
- supervision and enforcement of laws on sanitary conditions, including water supplies, food production, sewage disposal, and environmental pollution.[65]

The SES works closely with related scientific institutions, which, despite the difficult economic situation, have been able to provide most of the ever-increasing scientific support needed by the operational agencies. The two scientific institutions most involved in this work are the NIIEM (see above) and the S.M. Vyshelessky Belarus Research Institute of Experimental Veterinary Medicine (which is not discussed in this report due to our emphasis on human diseases).

The official registry of Belarus has five classes of endemic diseases: (1) the "most widespread infectious diseases" have annual morbidity rate of greater than 1,000 cases per 100,000 population and includes enterobiasis, influenza, and acute respiratory infections; (2) the "widespread infectious diseases" have annual morbidity rates of 100–1,000 cases per 100,000 population and include parotitis, trichuriasis, gonorrhea, epiclesis, scabies, rubella, ascariasis, and chicken pox; (3) the "frequent infectious diseases" have annual morbidity rates of 10–100 cases per 100,000 population and include dysentery, viral hepatitis A and B, measles, epidermophytosis, scarlet fever, TB, salmonellosis, microsporia, other acute intestinal infections other than dysentery and salmonellosis, and syphilis; (4) the "uncommon infectious diseases" have annual morbidity rates of 1–10 cases per 100,000 population and include trichinosis, intestinal yersiniosis, diphtheria, viral hepatitis C, meningococcal infection, herpes infection, yersiniosis, pertussis, rotaviral gastroenteritis, and infectious mononucleosis; and (5) the "rare infectious diseases" have annual morbidity rates of fewer than 1 case per 100,000 population and this heterogeneous group of 20 diseases includes, for example, typhoid fever, tick-borne encephalitis, Lyme disease, tetanus, and rabies.[66]

While a rare disease, anthrax continues to be a public health threat to Belarus. At one time, anthrax was widespread. For example, there were 3,424 anthrax cases recorded in 1901 and 6,107 cases during the period 1906–1913. Over 500 natural anthrax foci have been identified in the republic, but this does not reflect the actual situation as demonstrated by the fact that 98.8 percent of the animal anthrax cases occurred outside of the identified anthrax foci.[67] Human anthrax morbidity has been sporadic during the last 25 years. Cases typically occurred in newly identified areas due to the delayed diagnosis of animal infections. Most infections have occurred at random with no connection to occupational exposure. The cutaneous form of anthrax is predominant, presenting as a mild or moderately severe illness. No cases were recorded between 1982 and 1994, but in 1995, three persons were infected with cutaneous anthrax while slaughtering privately owned cattle.

Another rare but problematic disease in Belarus is leptospirosis. Soils, geography, the abundance of wet biotopes, the mammal fauna, and intensive livestock production are favorable factors for the existence of natural and man-made foci of this infection. Natural foci encompass the basins of the Western Dvina, Neman, Dnieper, and Pripyat rivers. The greatest activity is found in the Hrodna, Mahilyow, and Homyel regions, which contain about 70 percent of the animal disease foci. The main reservoirs of infection are various species of small mouse-like rodents that inhabit wet areas. Human cases of the disease have been recorded since 1947. The greatest morbidity rates were recorded in the early and mid 1960s, and ranged from 1.8 to 9.1 per 100,000 population. In the 1970s, the leptospirosis epidemic situation was considered to be quiet (no more than three cases recorded a year), which led to a lessening of epidemiological and clinical watchfulness, cutbacks in laboratory diagnosis, and the relaxation of preventive measures. However, the existence of a multitude of natural leptospirosis foci presents a constant potential danger of the disease in humans and farm animals.[68]

Tularemia is yet another threatening natural focal disease in Belarus. The typical natural tularemia foci in Belarus are located in the floodplain-swamps or near floodplain-swamp-lakes. There is a variety of natural tularemia foci due to the ecological and geographical differences between zones ranging from the southern boundary of the taiga in the north to the northern boundary of the forested steppe in the southeast. Hence in the western and parts of the northern and eastern zones of the republic, the foci are small and relatively inactive. In the south and southeast (the Belarus Polesye Lowland), the foci occupy broad areas of swampy floodplains and interfluves, and have been active over many years of observation. Tularemia is enzootic in 58 of Belarus' 118 rural districts.[69]

Tularemia morbidity in Belarus has been recorded since 1943. There have been frequent epidemic increases in morbidity to as high as 7.2 per 100,000 inhabitants (1963). These occur when various factors coincide, such as epizootics among water rats, massive flights of blood-sucking dipterans, and intensive farm work by people with no immunity. Due to a broad campaign of human immunization against tularemia (2–2.5 million people were vaccinated in the last five years, primarily in rural areas), morbidity decreased to

0.01–0.02 per 100,000 inhabitants and became sporadic. No tularemia was recorded in the republic from 1986 through 2002.[70] However, as with anthrax and leptospirosis, due to the natural tularemia foci in Belarus, a serious outbreak of tularemia could occur at any time.

Rabies is a constant threat to Belarus' population. Persistent natural rabies foci cover up to 30 percent of the land area (mainly in the north and northeast of the country) and rabies has been recorded among animals in 107 of the republic's 117 administrative districts. The morbidity rate of rabies among wild carnivores is very high, accounting for over 50 percent of recorded cases of animal rabies. Of wild animals, over 80 percent of rabies cases occur in red foxes. Recent studies indicate that the rabies epizootic situation among domestic and wild animals is not improving. In 1999, there were 125 identified risk locations for rabies and 136 cases recorded in animals, of which 73 were wild animals.[71] Despite large-scale efforts to control rabies, its morbidity rate among wild animals is not decreasing. Consequently, nearly the entire country of Belarus is at risk for contracting rabies.

In view of NIIEM's importance with respect to public health in Belarus, a detailed description of it follows. NIIEM's basis was laid when the Minsk Pasteur Station (established 1911) and the Provincial Department of Health Central Chemistry and Bacteriology Laboratory (established in 1920) were combined to form the Belarus Pasteur Institute of the BSSR People's Commissariat of Health in 1924 and housed at the Belarus State University. Its main work at that time was focused on smallpox, TB, rabies, diphtheria, and pertussis. In 1931, it was renamed the Belarus Institute of Epidemiology and Microbiology of the BSSR People's Commissariat of Health and its scope of responsibilities was widened, to include investigations of typhoid fever, dysentery, measles, tetanus, and rhinoscleroma (a chronic disease of the upper airways caused by a bacterial pathogen).

After being totally destroyed during World War II, the rebuilding of NIIEM started in 1944 and was largely completed over the next few years. With the addition of new facilities, the institute gained capabilities to study viruses, including those that cause encephalitis, influenza, poliomyelitis, and hepatitis. In addition, its facilities for developing and manufacturing diagnostic preparations, vaccines, serums, antitoxins, and gamma globulin were expanded. By the mid 1970s, the institute had become the center for epidemiology, microbiology, and hygiene research and methodology in Belarus, being a leader in developments in a number of areas. Its directions and workload remained approximately the same after Belarus became independent in August 1991.

In 2005, NIIEM had six science departments; the Department of Microbiology and Immunology, the Department of Epidemiology and Immunoprophylaxis of Infectious Diseases, the Department of Biotechnology and High-Risk Infections, the Department of Ecology and Epidemiology of Natural Focal and Uncontrollable Anthroponotic Viral Infections,[72] the Department of Clinical Virology, and Department of Scientific and Medical Information. The four main departments are discussed below.

Department of Microbiology and Immunology

The major research topics of this department, which was established in 1998, include the principles, propagation mechanisms, and variability of pathogenic microorganisms in the environment and the human population; mechanisms of acquiring resistance to drugs (antibiotics) and antiseptics in hospital settings; and the morphological and functional properties of immunocompetent cells. The department consists of three laboratories, as follows:

- The Laboratory of Clinical and Experimental Microbiology develops modern microbiology laboratory technologies and test systems for the diagnosis, treatment, and prevention of bacterial infections of concern. Research is conducted on pathogen biology and the pathogenesis of nosocomial and other bacterial and viral infections of particular concern to Belarus.
- The Biochemistry Laboratory conducts research on proteins and enzymes, particularly on the structural and functional properties, activity regulation mechanisms, principles of biosynthesis, and role in cell metabolic processes. Scientific approaches are being developed for designing new therapeutic and diagnostic preparations by microbial synthesis, as well as preparations for correcting metabolic disorders that accompany enzymopathies.
- The Interferon and Immunocorrection Group works on the development and clinical implementation of methods of stimulating interferon formation and methods of immunocorrection. New interferon inducers are tested on volunteers and in clinical settings.

Department of Epidemiology and Immunoprophylaxis of Infectious Diseases

The department's major research interests are to improve epidemiological surveillance of infectious diseases and develop and implement methods and means for diagnosing, preventing, and treating these diseases. The department now has four laboratories and two special groups:

- The Laboratory of Influenza and Influenza-Like Diseases serves as the National Center for Influenza and Acute Respiratory Diseases. Its major areas of activity are to study the epidemic process and develop anti-epidemic measures against influenza and acute respiratory diseases; prepare analytical overviews and predictions for the Republic MOH; study the effectiveness of vaccinations and chemoprophylaxis against influenza; develop recommendations; develop and improve methods of isolating, indicating, and identifying acute respiratory disease pathogens; develop and implement diagnostic preparations; and collaborate on science and methodology with the Republic Center for Hygiene and Epidemiology and with WHO centers and National Centers for Influenza and Acute Respiratory Diseases.
- The Immunoprophylaxis Laboratory is a WHO-affiliated National Reference Center for Poliomyelitis. Its responsibilities are to study the epidemiology of controllable infections, particularly poliomyelitis and diphtheria; develop and implement epidemiological surveillance programs for these diseases; study various population groups for humeral and cell immunity against controllable infection pathogens; conduct molecular epidemiological monitoring for polioviruses and corynebacteria circulating in the republic; study the mutagenic and recombinant variability of vaccine polioviruses; and prepare materials for international certification of the eradication of poliomyelitis from the republic.
- The Laboratory for Diagnosis of Combined Bacterial-Viral Infections and for Biological Monitoring studies the epidemiology and pathogenesis of chlamydial-

viral infections; develops methods of diagnosing and treating combined bacterial-viral infections; and is responsible for the quality control of indigenously produced and imported immunobiological drugs.

- The Viral Hepatitis Laboratory's main work relates to viral hepatitis and rotavirus infections. It is Belarus' lead institute for carrying out two republic-wide programs; to develop measures for lowering viral hepatitis morbidity and a program against intestinal infections. To do this, it develops and improves methods of isolating, indicating, and identifying the pathogens of viral hepatitis and viral diarrhea; monitors the presence of these pathogens in the environment; and develops, manufactures, and implements diagnostic, therapeutic, and preventive preparations for this group of infections.
- The Epidemic Analysis and Epidemic Process Prediction Group carries out systems evaluation of sanitary, hygienic, epidemiological, clinical, environmental, and other parameters affecting the state of public health.
- The Epidemiological Surveillance Group for Parasitic Diseases carries out epidemiological surveillance for parasitic diseases and develops effective methods for exterminating parasitic worms in the environment, taking into account spontaneous soil-cleaning processes, the influence of climatic conditions, and industrial pollution.
- The Department of Biotechnology and High-Risk Infections conducts research pertaining to immunobiological and molecular biological diagnostic preparations for high-risk viral pathogens; clarifies the molecular mechanisms of pathogenicity of high-risk infections; performs molecular-epidemiological analysis of extraordinary infections; and develops drugs against certain infectious viral diseases.
- The Laboratory of Biotechnology and Immunodiagnostics of High-Risk Infections studies the antigen spectrum of viral, bacterial, and other infection pathogens and the mechanisms for the circulation of genetic structures in natural focal viral infection pathogens. It also is responsible for developing tests to diagnose high-risk viral infections (such as Lassa, Marburg, and Ebola hemorrhagic fevers), as well as lymphocytic choriomeningitis, tick-borne encephalitis, HIV, measles, diphtheria, hemorrhagic fever with renal syndrome, and hepatitis C.
- The Laboratory of Genetic Engineering Research Methods conducts molecular-biological analysis (genotyping) of poliomyelitis viruses circulating in the republic. Research is also being conducted to develop recombinant plasmids with inserted DNA copies of the genomes of high-risk pathogenic viruses.
- The Chemotherapy Laboratory uses viral infection models to investigate new and existing drugs, including official ones, in order to identify synthetic substances with antiviral properties. The mechanisms of development of drug-resistance in viruses are studied, as well as ways of overcoming such resistances. Researchers also study the etiology and clinical aspects of Lyme disease in Belarus.
- The Science-Production Laboratory studies leptospirosis and its role in infection pathology, develops methods and preparations for diagnosing this infection in Belarus, and carries out experimental production of test systems developed in this country.

Department of Ecology and Epidemiology of Natural Focal and Uncontrollable Anthroponotic Viral Infections

This department's major areas of activity are to develop and introduce modern methods of monitoring natural focal and uncontrollable anthroponotic viral infections; to study the mechanisms and principles of the vector, water, and food routes of transmission of natural focal and enteroviral infections in humans; to perform exploratory methodological, functional, and organizational development work related to testing and obtaining new viral inhibitors, including substances and preparations that prevent viral replication in the cells and body of hosts, or that neutralize the infectiveness of viruses in the environment; and to develop anti-epidemic and therapeutic measures for preventing outbreaks and epidemics of disease in Belarus. The department has four laboratories:

- The Sanitary Virology Laboratory conducts research on the biological properties of human pathogenic viruses circulating in the environment. New methods of detecting viruses in water and food products are developed. Molecular-epidemiological methods are used to study the geno- and serotypes of enteroviruses circulating in Belarus. Criteria are developed for virological assessment of drinking water quality to ensure human health safety. Experiments are conducted to investigate the influence of radiation factors on the biological properties of viruses in order to predict the course of epidemic situations in radiation-contaminated areas. One area of applied research is the development and experimental production of test systems for diagnosing human enterovirus infections and detecting these pathogens in water.
- The Laboratory of Ecology and Epidemiology of Arbovirus Infections performs research to identify, study, and map natural arbovirus disease foci. The biological and serological properties of isolated viruses are studied and the role of these viruses in human pathology is determined. Researchers study the ecology of natural focal infection pathogens that are "new" to Belarus. Diagnostic preparations are developed for rapid indication and identification of isolated arbovirus strains.
- The Laboratory for Prevention and Treatment of Group II Viral Infections develops scientific approaches, methods, and means for emergency prevention and treatment of such group II viral infections as the viral encephalitides (rabies, tick-borne, and West Nile) and hepatitis C. Current applied research relates to the development of practical active chemotherapeutic antiviral preparations that will afford a high index of protection for suppressing pathogenic agents during the early stages of infection (the incubation period).
- The Laboratory for Preclinical Study of Inhibitor Specific Activity studies the antiviral properties of new synthetic and natural substances and drugs and is building a databank of research findings. The laboratory investigates the action of antiviral preparations and develops ways of overcoming the resistance of viral infection pathogens to them. It also conducts epidemiological monitoring for resistance of viral infection pathogens to disinfectants used in Belarus.

Department of Clinical Virology

The department's major areas of research are: laboratory diagnosis and investigation of the pathogenesis, clinical signs, and course of the viral infections that are most common and of greatest significance to public health; developing modern methods and means of etiological and differential diagnosis, therapy, and prevention of persistent viral and bacterial infections (HIV infection and AIDS; various forms of herpes and cytomegalovirus infections; Epstein-Barr virus, varicella-zoster virus, adenovirus, hepatitis B and C, chlamydia, and other infections), including congenital infections and infections in newborns; and monitoring the incidence of HIV infection in Belarus using methods of molecular epidemiology and molecular virology. The department has three laboratories.

- The Laboratory for Diagnosis of HIV and Accompanying Infections diagnoses the most common viral and bacterial infections using modern virological, serological, and molecular-biological methods; monitors the incidence of HIV infection in Belarus; conducts sero-, geno-, and phenotyping studies of HIV; and studies the pathogenesis of HIV and herpes viruses.
- The Clinical Division of Neuroinfections studies aspects of the clinical and laboratory diagnosis of infectious diseases affecting the nervous systems of children and adults, develops criteria for diagnosing these diseases, studies pathogenic mechanisms, and compares the effectiveness of therapeutic methods. Division staff members regularly work with colleagues at virology and immunology laboratories on problems of tick-borne, herpes, and prion infections. The division also is a collaborator in the WHO program to eradicate poliomyelitis. The division serves as the Republic's Center for Chronic Viral Infections, which provides consultants on practical health care.
- The HIV Laboratory conducts research to find HIV-inhibiting compounds, develops test systems for diagnosing HIV, and sets up experimental production of test systems developed in the country. The laboratory assists health-care agencies in the republic and provides therapy for people infected with HIV.

The construction of a group I level pathogen facility in Smolevichi, which was begun before the dissolution of the USSR, has been on hold since 1992 due to a lack of funding.

In 2004, the NIIEM employed approximately 240 persons. Of these, 95 were scientists, including 5 professors, 14 doctors of science, and 38 candidates of science. Further, its scientists included 2 academicians, 1 corresponding member of the Belarus National Academy of Sciences, and 7 members of the New York Academy of Sciences.

In general, scientists in Belarus are significantly underpaid compared to other professions. At NIIEM, a senior scientist earns the equivalent of about $100 per month. Scientists may supplement their salaries through income from the sale of items such as biological preparations, but this possibility is afforded to only a small number of scientific workers. By far the main provider of funding to the NIIEM is the Belarus MOH.

During 2004-2005, the institute moved from its old location in central Minsk to a suburb. CNS staff was unable to visit the new facility so thus are not in a position to describe it. We have received information to the effect that although the institute will have completely new laboratories, the building was not designed for use as a biological research institute and therefore must undergo substantial alterations. Further, the institute's vivarium is not in good shape because it does not have sufficient funding to adequately house the number of animals it contains. Reportedly the institute is setting up a National Culture Collection of Viruses and Other Microorganisms, but it is unclear how this project has progressed.

3. International Activities That Involve the Belarus Public Health System

The NIIEM receives some funding to support its research from foreign sources. Thus, some of its scientists have been able to have projects funded by the International Science and Technology Center (ISTC), Inco Copernicus (an EU assistance program), the Pasteur Institute in France, certain German institutes, the Chernobyl investigation on effects of radiation on immunological systems, and the WHO programs on influenza and poliomyelitis. However, in general Belarus is not in a good position to ask for, or receive, international assistance due to the repressive policies of its President, Mr. A. Lukashenko.

It is worth noting that in 2005 the Belarus Minister of Health, Dr. L.A. Postoyalko, signed a collaborative agreement with the WHO Regional Office for Europe that includes provisions for "Achieving measles and rubella elimination through strengthened immunization services with high quality and safe immunization delivery systems" and "Strengthening surveillance for effective monitoring of immunization systems and assessment of disease burden related to vaccine preventable diseases."[73] As of this writing, the budget for the agreement had not been specified, nor whether the WHO will fund it.

4. Analysis of the Belarus Public Health System's Weaknesses and Proliferation Potential

During the Soviet era there was an excellent system for training highly skilled personnel. Specialists in high-risk infection departments of sanitary-epidemiological stations took a 3–6 month specialization course at Soviet AP institutes in Stavropol and Rostov-on-Don, with refresher courses every 3–5 years thereafter. Bacteriologists, virologists, parasitologists, and other specialists at SES stations took specialization training and continuing education in the corresponding departments of various continuing education institutes for physicians. Scientists at NIIEM were trained mainly in specific graduate programs at the D.I. Ivanovsky Institute of Virology in Moscow.

After the Soviet Union's dissolution, high-risk infection specialists for the centers for hygiene and epidemiology have been trained mainly at workplaces in the Republic Center for Hygiene and Epidemiology and in departments of the Belarus Medical Academy of Postgraduate Education. As a result, the quality of practical training for specialists has diminished. In recent years, NIIEM has started graduate programs in specialties such as microbiology, virology, and infectious diseases, but it is impossible at this time for an outsider to assess their quality. The institute has a special council for the defense of doctoral and candidate dissertations. NIIEM and the Republic Center for Hygiene and Epidemiology organize and conduct various seminars, conferences (including international ones), and symposiums for continuing education for specialists. In addition, many staff members receive practical training in the United States, Germany, France, and elsewhere. Of course, some highly qualified specialists do not return to Belarus after training, but instead chose to remain abroad.

The Soviet-style anti-epidemic protection system still exists in Belarus is its public health sector. The system is based on the preparation for and responding to natural disease outbreaks. It is therefore not adequately trained or equipped to respond to a bioterrorism event. The problem is not just insufficient funding and not enough highly qualified specialists, but also is one of biomedical scientists being entirely ignorant of such a threat. Obviously, the new conditions require a review of biological weapons defense within the framework of national security, which is something that is beginning to be realized in Belarus.[74]

In conclusion, as outsiders we find it very difficult to determine whether or not the public health system in Belarus, whose main component is SES, is an effective one in meeting the challenges posed by infectious diseases. In general, infectious diseases are not a large problem in Belarus, being responsible for less than 1 percent of all deaths in the country.[75] However, it is difficult to determine if this low mortality rate is due to the Belarus possessing a climate that is not conducive to infectious diseases, its population in general is a healthy one, or the SES is working effectively. We know that the SES has been effective in meeting the goals of immunization programs achieving, for example, 96 percent coverage against measles by 1994.[76] This seems to indicate good coverage throughout the nation, but does not tell us anything about the SES's ability to quickly detect and monitor infectious diseases, especially those that might suddenly appear as a result of importation or emergence. From our survey of diseases afflicting the republic it appears as its potable water delivery system and, probably, waste disposal systems are in very bad shape. This means that the possibility of serious water-borne infectious disease outbreaks such as cholera, dysentery, typhoid fever and other salmonellosis, and others occurring is high. Many Belarusians worry about their country's porous borders, which allow for the ready cross-transport of Asians, Africans, and Eastern Europeans to destinations in wealthy northern European countries, some of who may carry nasty pathogens that could be contracted by Belarusians. It is probable that if faced with a major outbreak of an unfamiliar infectious disease, the poorly equipped SES would not be up to adequately dealing with the challenge.

The main biological weapons proliferation threat presented by Belarus is related to the National Culture Collection of Viruses and Other Microorganisms at the NIIEM. During Soviet times, NIIEM was an open institute although it did have closed laboratories that performed work for "Problem 5," the code name for the Soviet biological weapons defense project.[77] Of greater importance, however, is that NIIEM provided highly dangerous viral pathogens to the offensive Soviet biological weapons program, including the Ebola and Marburg viral strains that were weaponized at Vector in Koltsovo. To this day, NIIEM's culture collection houses many of the world's most dangerous group I and II pathogens, but in facilities that foreign experts have deemed as unsatisfactory, from both the biosafety and biosecurity viewpoints. Regarding the biosafety issue, the facilities housing highly dangerous pathogens and the laboratories where work with these microorganisms are performed are inadequate, so the probability that workers could be exposed to organisms or that organisms could escape the facility's confines is unacceptably high.

Of more pertinence to this report is the biosecurity problem. Within the MOH there is the Committee for Control over Compliance with the Requirements of Biological Safety and Anti-Epidemic Conditions that oversees biosecurity regulations aimed at preventing unauthorized access to culture collections and facilities where investigations are carried out. However, there are questions whether enforcement of these regulations is strong. The regulations do not include mechanisms for control over potentially dangerous scientific technologies or how results from research may be applied. Recognizing the weaknesses of the current system, in March 2006, the Committee established an ad hoc group to: (1) analyze existing international codes and different professional regulations; and (2) identify criteria for risk assessment of research projects and on the basis of that analysis, develop a national code of conduct for the life sciences recommendations for setting up institutional controlling bodies to oversee dual-use biological research.[78] We do not know the results of these initiatives, but they appear to be on the right track to correct some of the deficiencies in the Belarus' biosecurity.

Yet, concerns remain among both biosafety and biosecurity experts about NIIEM's culture collection of highly dangerous pathogens, with the main issue being whether Belarus has the capability of adequately securing these pathogens and preventing unauthorized access to them. The prevalent opinion among foreign experts is that Belarus does not have these capabilities. This being the case, suggestions has been made for the international community to make political overtures to the Belarus government to secure its permission to move the most dangerous pathogens from the NIIEM culture collection to a safe site in another country, possibly Sweden. At the time of this writing, there has been no apparent movement on this proposal.