Danuta Naruszewicz-Lesiuk, Mirosław J Wysocki

THE SCOPE AND RESULTS OF SELECTED EPIDEMIOLOGICAL STUDIES CONDUCTED AT THE NATIONAL INSTITUTE OF HYGIENE IN THE YEARS 1945-1989

National Institute of Public Health – National Institute of Hygiene in Warsaw

ABSTRACT

The authors present the first article in the series concerning the scope of research, scientific, practical, educational and other achievements of the National Institute of Hygiene (PZH) since 1945.
This article is limited to discussing selected studies conducted in the field of epidemiology until the year 1989.
The selection was based on PZH annual reports on the accomplishment of planned objectives and the literature positins listed in these reports, as well as other documents.
The criterion for selection was how the scope of the research matched the epidemiological situation within a historical context.
The authors chose research that yielded practical results which made an impact on the epidemiological situation, particularly concerning infectious diseases in Poland. The significance of epidemiological research of non-infectious diseases was also stressed. In addition, research that was considered by scientists in Poland and abroad as contributing to the development of medical methodology was included in the selection.

Keywords*: epidemiology, infectious diseases, non-infectious diseases, National Institute of Hygiene, history of medicine, Poland*

INTRODUCTION

After World War 2, the National Institute of Hygiene (PZH) resumed its activity in May 1945.

In the years 1945-1951, due to the great danger of infectious disease epidemics spreading across the country, the PZH was to a large extent involved in control and prevention of diseases. The PZH ran diagnostic laboratory tests for the whole country, initiated and planned controling and preventing epidemics by means of, among others, vaccines produced by the PZH.

In the years 1954, 1967, 1986 and 1992 the statute of the PZH was modified so that both the scope of its activity as well as its organisational structure matched the medical needs of the country.

The primary task with the highest priority throughout this entire period was "conducting work aimed at adapting and utilising the newest discoveries for the purposes of protecting public health in Poland" (1).

The aim of this publication is presenting a broad overview of how this goal was realised by the PZH within the field of epidemiology.

SELECTED RESEARCH IN THE EPIDEMIOLOGY OF INFECTIOUS DISEASES

The first step in conducting epidemiological research was formulating a notion of epidemiology as a science and area of medicine dealing with the etiology and factors determining the development and spread of infectious and parasitic diseases, as well as the efficiency of the means and methods employed to prevent and control these illnesses.

The scope of the first studies after the war, which dealt with typhus, conformed to this notion.

These studies resulted in:

- showing the epidemiological and clinical differences between sporadic infections and infections transmitted by lice
- confirmation of the hypothesis on chronic carrier state of *Rickettsia prowazekii* in people who were infected with typhus in the past
- discovering the role of typhus recurrence in sustaining the endemics of this disease during the interwar

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period and after World War 2 in Eastern and Central Europe, including Poland (2).

The most important research in descriptive and analytical epidemiology includes:

- an evaluation of the epidemiological situation of infectious and parasitic diseases, including an evaluation of applied methods of prevention and treatment of these diseases in Poland in 1919-1962 – a collaborative study edited by *J. Kostrzewski* (3).

The results of this evaluation have been used, among other purposes, to formulate research aims and tasks for the practice of recognising and identifying biological threats to the population of Poland, and to implement preventive measures in high risk groups. The authors' efforts in collecting data about infections and deaths, which were scattered throughout various archives especially until 1950, resulted the formulation of guidelines for reporting and registration of infections, and for gathering such data in Poland.

This in turn facilitated the process of preparing an evaluation of the epidemiological situation of 32 infectious and parasitic illnesses or groups of illnesses in the years 1961-1970. According to prof. *J. Kostrzewski* "Ten years is a period long enough for an epidemiological evaluation of specific infectious diseases in the country, for tracking increasing and decreasing trends in incidence rates as well as the reasons for these fluctuations, and for evaluating the efficacy of various means and methods of combating these diseases. At the same time, ten years is a short enough period that the statistical and epidemiological data pertaining to it may be valid and useful for epidemiological analyses and evaluations of the next few years" (4).

"Surveying the epidemiological situation of infectious and parasitic diseases in Poland in the years 1970-1979 had an additional goal in comparison to previous years. This was presenting the statistical data from Poland and other countries in a way that would enable readers, especially epidemiologists, to begin working in their area (analyses and comparative studies)" (5).

The epidemiological evaluation of infectious diseases in Poland pointed toward a need of researching the efficiency of preventive methods, such as vaccines.

An analysis of the diphtheria component in polyvalent diphtheria-tetanus-pertussis vaccines of domestic make showed the necessity of increasing that component's efficacy (6). A reference vaccine was prepared and rules for standardising the diphtheria and tetanus components were created. It was found that a change in state control requirements for the immunogenic properties of diphtheria vaccines was necessary. An optimal diphtheria vaccination schedule and booster dose administration were proposed.

During the period of mass vaccinations, Schick-method screening tests to qualify children for vaccination were introduced. Introducing an effective vaccine had a major impact on eliminating diphtheria infections in Poland.

After 1951, the rapid increase of the incidence of poliomyelitis in Poland has led to launching many studies on the subject. Among these, particular attention should be paid to detecting the risk of post-polio disease accompanying the use of live attenuated polio virus strains, especially type 3, and pointing out the necessity of increasing the safety of these vaccinations.

Studies devoted to the safety of type 1 (CHAT) and type 3 (W-FOX) attenuated poliomyelitis oral vaccines are of particular note (8).

In the years 1960-1970 a rapid development of experimental epidemiology took place. In 1966, in a report on studying the means of infectious disease prevention, the World Health Organisation Expert Committee laid down the rules for organising controlled epidemiological field trials and recommended them as one of the basic methods for controlling and evaluating vaccines (4). In the same year in Poland, the results of a controlled epidemiological field trial of vaccines against typhoid were already gathered and implemented. The trial took place in 1961-1964 (9, 10). It resulted in indication a vaccine type adequate for use in mass vaccinations. A consequence of this trial was discontinuing the production of Grasset-Ślopek vaccines and introducing the far more effective formalin-phenol vaccine which was already in use in Poland since 1964.. In addition, laboratory tests that had results strongly correlated with epidemiological test results were found. These tests had to be recommended for the laboratory control of immunogenic properties of typhoid vaccines before accepting them for use (11).

The methodology of these studies became a part of epidemiological methodology canon worldwide.

In 1967-1969 a controlled epidemiological field trial of live attenuated measles vaccines using the strains Schwarz, L-16 – (Leningrad 16) and EschCZ (Enders-Shwarz-Chumakov) took place (12). The aim of the trial was to gauge the safety, reactivity and efficacy of these vaccines (13). The result of the study formed the basis of the Ministry of Health and Social Care's (MziOS) decision of introducing measles vaccinations in Poland in 1975 (14).

The introduction of these vaccines led to an increased interest in the occurrence of subacute sclerosing panencephalitis (SSPE) in Poland.

In 1976, retrospective epidemiological studies of SSPE infections in Poland in the years 1971-1976 were designed (15). The gathered data enabled the creation, for the first time in Poland, of an epidemiological characteristic of SSPE and determine the frequency of such sequelae.

The fifteen years of epidemiological research on SSPE (1977-1991) produced evidence to support the claim that the etiological factor of the disease is a "wild" strain of the measles virus, rather than viruses found in vaccines. It was determined that the persistent vaccination of children against measles, leading to the elimination of measles in time, will also eliminate SSPE (16).

The global progress in research on the etiological factor of viral hepatitis in the 1960s, as well as the unfavourable epidemiological situation of this disease influenced the decision to take up epidemiological research in this field at the PZH.

A study of the possible influence of mass vaccinations against measles in 1963 on the incidence rate of viral hepatitis in Poland was conducted (17). An evaluation of the efficacy of pre-season gamma globulin use in preventing viral hepatitis in school children was carried out (18). Already in 1970, the result of an evaluation of viral hepatitis effects was published, showing that preventing and treating viral hepatitis in Poland was ineffective and required fundamental changes (19). Utilising the numerous, previously-published epidemiological evaluations of viral hepatitis in Poland, a concept of improving the situation was developed, and a program of preventing and treating viral hepatitis in Poland in 1976-1980 was designed. In 1973, After several discussions, evaluations, etc. the final version of this program was accepted for realisation by the government (20). The implementation of this (21), and later stages of the program contributed to a radical improvement of the epidemiological situation of type B viral hepatitis in Poland.

At the beginning of the 1960s, work on measuring the occurrence and possibilities of combating hospital infections in Poland developed at the PZH.

At the initiative of prof. *Janusz Jeljaszewicz* an attempt to institutionalise the fight against hospital infections in Poland was launched, by creating a committee for combating hospital infections, working for the Minister of Health's Scientific Committee in 1961.

The results of the research done at the PZH in this area have been discussed in numerous publications, in 1978 and other years. The focus of these publications included:

- the control of hospital infections (*J Mészaros, J Jeljaszewicz*)
- registering hospital infections (*J Mészaros, B Wojtyniak, J Jeljaszewicz*)
- the tasks of the committee for controling hospital infections *(J Jeljaszewicz, J Mészaros*).

These publications were attached in the annex to the report entitled "Hospital infections – the current situation world-wide and recommendations for domestic use" (22).

At the PZH, based on the results of conducted studies, as well information received from other domestic and foreign research centres, a decree of the Minister of Health and Social Care concerning the prevention and combating of hospital infections was designed. This design, after cross-inspection and legislative preparation became the basis of the March 15th 1983 Decree of the Ministry of Health and Social Care "Regarding the prevention and controling of hospital infections".

Among the research conducted at the PZH in the field of zoonoses, the study of rabies is prominent by virtue of epidemiological results and the efficiency of preventing and fighting rabies in people in Poland.

Evaluating the epizoonotical situation of rabies made it possible to determine the main sources of infection. The results of the epidemiological evaluation of rabies, the efficacy of vaccinations and the safety of the employed vaccine formed the basis of justifying the postulates to change the Sample type vaccines used in Poland.

A vaccination schedule for people, employing a new inactivated vaccine, made in cellular cultures was published. The neurotropic properties of vaccines prepared for wild animals in cellular cultures using an attenuated vaccine virus were tested.

Modern criteria for characterising rabies vaccine strains were developed. Methods of isolating and reproducing the virus in cellular cultures in combination with the immunofluorescence method made it possible to discontinue use of laboratory animals, previously employed in serological and virusological diagnostics of rabies (23, 24).

The epidemiological evaluation of infectious diseases in Poland conducted at the National Institute of Hygiene since its beginning was used for indicating methods of preventing such diseases, especially by introduction of specific vaccinations. The PZH presented the Ministry of Health with suggestions regarding mandatory vaccinations, vaccination schedules, and even plans of organising vaccinations.

Until 1960, suggestions for and sometimes propositions of changing plans for vaccinations in the country, as well as motions for carrying out mass vaccinations were made. Such motions included e.g. vaccinations against poliomyelitis until 1972/73, and against smallpox until the middle of the 1980s.

In the beginning of the 1960s, a vaccination Calendar was prepared at the PZH. In the following years, proposals for filling in Calendars for the years 1965, 1968, 1972-73, were filed. After 1975 such proposals were presented annually (25).

In 1987, an evaluation of the temperature conditions in transporting and storing vaccines in Poland was conducted at the PZH. Rules regarding the observance of the cooling chain in the handling of vaccines were drafted.

The results of a year-long trial reporting of administered vaccinations in several voivodships conducted by the PZH became the basis of preparing suggestions for changes in the system of reporting. For example, these propositions were taken into account during the preparation of the Chief Sanitary Inspector's January 1st 1975 Directives regarding the documentation and reporting about vaccinations.

Tracing and analysing information about newly arising biological threats led to the drafting and publishing of one of the earlier publications in Polish in 1984, entitled "Information about AIDS - Acquired Immune Deficiency Syndrome" (26).

SELECTED RESEARCH CONCERNING THE EPIDEMIOLOGY OF NON-INFECTIOUS DISEASES

Work aimed at implementing epidemiological research methods for evaluation of the threat of socially significant non-infectious diseases was initiated at the National Institute of Hygiene.

This direction in research was initiated by a presentation given by K. Lachowicz and J. Kostrzewski at the IIIrd Congress of the Polish Society of Epidemiologists and Infectious Disease Specialists in Cracow in 1964 (27).

Some studies are presented below, with emphasis on the diversity of areas in which they were conducted.

In 1965 the Department of Epidemiology of the PZH, in collaboration with the WSSE in Cracow and the Department of Epidemiology of the Medical Academy in Cracow initiated a prospective epidemiological study of chronic diffuse lung diseases (CDLD) in inhabitants of Cracow (28). The study was financed and realised in collaboration with American scientists. The methods of organising and realising this study, as well as the data analysis and result interpretation were perceived as model by epidemiologists.

Attention was drawn to the synergistic influence of smoking tobacco and air pollution on CDLD occurrence, as well as reducing of symptoms as a result of quitting smoking.

In 1981, a field trial took place that included patients studied in 1968. The results confirmed the strong predicative significance of respiratory function impairment in relation to the general and circulatory system-related mortality rates (29).

The influence of atmospheric air pollution on the mortality rate of adults was evaluated (30).

Also within the scope of Polish-American scientific collaboration was the study of risk factors for developing leukaemia. The relationship between developing leukaemia and being exposed to X-ray radiation from roentgen diagnostics was studied. This was the first randomised control trial on such a scale in the area of non-infectious diseases (31).

A study of the influence of professional exposure to X-ray radiation for developing leukaemia was also conducted.

Already at the beginning of the 1970s, prospective epidemiological studies of the natural history of diabetes and its vascular complications were initiated. Research was performed on patients in diabetology centres in Warsaw, by the PZH in collaboration with the Medical Academy in Warsaw (33).

In the years 1983-1988, the PZH scientists from the PZH participated in a study of type I diabetes incidence in children below 14 years of age and teenagers and young adults in the age group 15-24, determining the mean incidence rate for men and women in age groups and comparing the resulting data with data from other countries (34).

Researches from PZH took part in epidemiological field trials of musculoskeletal diseases not caused by injuries. From this study, the results of an analysis of musculoskeletal diseases incidence rate were published, with special emphasis placed on rheumatoid arthritis (35). A pooled analysis of the results of original research and data collected from other studies made possible an epidemiological evaluation of the problem of non-injury related musculoskeletal diseases (36).

In the 1970s, prevalence was measured in Poland (37), including hospitalisation rates of patients living in cities and in the country side in the period 1961-1972 (38), as well as prevalence in hospitals and projected hospitalisation rates of the inhabitants of Poland in 1980 (39). In addition, the relationship between hospitalisation frequency and factors unrelated to health was studied, and a prognosis of hospitalisation frequency in Poland was made.

The health evaluation of the Polish population published in 1977 (40) began a series of reports published by the PZH presenting a view of public health shaped not only by illnesses, but also risk factors stemming from lifestyles, health expenses and the road accidents.

In 1975, the Ministry of Health and Social Care entrusted the National Institute of Hygiene with coordinating research for the inter-departmental problem "The influence of environmental pollution on the life and health of humans" (MR problem 12), which was carried out in Poland in 1976-1985. The results of this research were discussed in 1445 publications, of which 277 were published by peer-reviewed journals outside Poland, and 1168 were published in domestic journals. The most important results became the subject of 20 habilitation theses and 43 doctoral dissertations, most of which were written by contractors in the realisation of the problem.

In the years 1986-1990, work initiated in the MR 12 program continued as part of the Central Research and Development Programme (CPBR 11.12) entitled "Preventing the adverse health effects of environmental pollution in humans".

The aims of the MR 12 problem may be summarised as "Developing new methods of researching, detecting and evaluating the influence of biological, chemical and physical environmental pollution on human health". The aim of the CPBR 11.12 problem was pointing out ways of improving the sanitary condition of the country, limiting factors that are harmful for human health in the environment, and, as a result, improving public health.

The results of the work done for the MR 12 and CPBR 11.12 problems were to a major extent utilised in the study of the influence of environmental pollution, and particularly in the evaluation of significant risk factors that it carries, on public health. This evaluation is still being continued.

The aims of this work did not include listing information about PZH involvement in practical anti-epidemic work, which at times was considerable and had a definitive impact on combating various epidemics. Some examples include epidemics of: typhus, paratyphoid fever B in the Rzeszowskie voivodeship, typhoid fever in Stara Wieś, viral hepatitis in the Bieszczady region, and the most frequently described, smallpox in Wrocław in 1963.

Information about environmental research, practical anti-epidemic activities, achievements in the methodology of diagnostic laboratory research, and other areas will be discussed in future publications about the PZH. Together, these papers may provide an insight into the contributions that the PZH has made into maintaining and improving public health in Poland.

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Address for correspondence:
Prof.dr hab. Danuta Naruszewicz-Lesiuk
Department of Epidemiology
National Institute of Public Health
-National Institute of Hygiene
24 Chocimska str. 00-791 Warsaw, Poland
Tel. +48 22 54 21 222