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Topics: Recent topics in public health in Japan 2024

＜ Review ＞

Epidemiological topics in Japan in the last decade

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Abstract

This paper describes recent trends in the fields of disaster epidemiology, social epidemiology, and birth cohort research. The experience of the Great East Japan Earthquake in 2011 has attracted attention to disaster epidemiology. Social epidemiology aims to identify social environmental exposures associated with various physical and mental health outcomes. Birth cohorts are often differentially affected by social events. Epidemiological research methods are used in a wide range of fields, and can be expected to continue to develop in the future. In addition, it is expected that the results of various epidemiological studies will be implemented in society.

keywords: epidemiology, disaster epidemiology, social epidemiology, birth cohort study, Internet of Things

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I. Introduction

Epidemiology is defined as "the study of the occurrence and distribution of health-related events, states, and processes in specified populations, including the study of the determinants influencing such processes, and the application of this knowledge to control relevant health problems." [1] Based on the 34th Annual Scientific Meeting of the Japan Epidemiological Association, the presentation categories are shown in the table, and a wide range of epidemiological fields are classified (Table) [2]. In this paper, I discuss recent epidemiological topics such as disaster epi-

Table　A list of categories of epidemiology †

Epidemiological methodology
Bioethics
Social epidemiology
Infectious diseases
Cancer
Cardiovascular diseases
Mental health
Nutritional epidemiology
Physical activities
Environmental epidemiology
Occupational health
Maternal and child health
Gerontology and Geriatrics
Genetic/Molecular epidemiology
Disaster epidemiology
Non-communicable diseases（obesity, diabetes, metabolic syndrome)
Global health
Oral health
Others

† This list was prepared based on the presentation categories of the 34th Annual Scientific Meeting of the Japan Epidemiological Association.

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demiology, social epidemiology, and birth cohort study, and finally introduce an epidemiological study using Internet of Things (IoT).

II. Disaster epidemiology

The experience of the Great East Japan Earthquake in 2011 has attracted attention to disaster epidemiology. There have been more opportunities for epidemiologists to be involved, such as health surveys after the nuclear accident at the Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi Nuclear Power Plant. The Fukushima Health Management Survey is an epidemiological survey planned in light of the health concerns after the accident at TEPCO's Fukushima Daiichi Nuclear Power Plant, and the need to monitor the health of the people of Fukushima Prefecture and assess the health effects [3]. The main objective of the study is to monitor the long-term health of the population and to determine if long-term low-dose radiation exposure affects their health. The study design of the Fukushima Health Management Survey is a cohort study, which covers all persons living in Fukushima Prefecture after the earthquake, and consists of a basic survey and four detailed surveys. The basic survey estimated the level of external exposure of all 2.05 million residents. The internal radiation dose was estimated by Fukushima Prefecture using a whole-body counter. The detailed investigation included thyroid ultrasound examinations of all children under the age of 18 in Fukushima Prefecture, comprehensive medical examinations for all residents of the evacuation zone, an evaluation of the mental health and lifestyle habits of all residents of the evacuation zone, and records of the pregnancies and births of all residents who became pregnant on March 11. The basic survey had a low response rate (<30%), which was thought to complicate an estimation of the health effects. The importance of mental health care was revealed in the mental health and lifestyle survey, as well as the pregnancy and childbirth survey. Zhang W., et al. examined the relationship between lifestyle and dietary intake using cohort data from the Fukushima Health Management Survey [4]. Data from 52,314 subjects (23,149 males and 29,165 females, aged 15 years or older) were analyzed. The evacuees were classified into three categories: shelters and temporary housing, rental housing and apartments, relatives' homes, and their own homes. Dietary intake was calculated by segmentation into grains, fruits and vegetables, meat, soy products, dairy products, and fish. Daily consumption of more than the third quartile (Q3) of each food group was defined as "high consumption," and prevalence ratios and 95% confidence intervals (CIs) were estimated using a modified Poisson regression analysis. Compared to respondents living in relatives' homes or in their own homes, people living in rented apartments consumed a significantly lower intake of fruits and vegetables (other than juices), meat, soybean products, and dairy products, while people living in shelters or temporary housing consumed a significantly lower intake of fruits and vegetables (non-juice), meat, soybean products, and dairy products. The authors conclude that after the disaster, life outside of personal homes and the homes of relatives is associated with shortages of fruits and vegetables, meat, soy products, and dairy products, and that it is necessary to provide balanced meals to those who are disadvantaged.

There are affected areas where a cohort of residents was set up and surveyed before the Great East Japan Earthquake occurred. The post-disaster health effects in this area are being examined in a manner that fits one of the designs of intervention studies, referred to as natural experiments. Hikichi H., et al. examined whether pre-disaster community levels of social cohesion were associated with PTSD risk after the Great East Japan Earthquake and Tsunami [5]. The population cohort in the target area was established seven months before the earthquake, mainly for seniors aged 65 years and older. A follow-up survey was conducted roughly two and a half years after the disaster. Of the 3,567 people analyzed, 11.4% of respondents reported severe PTSD symptoms. Social cohesion at the individual and community levels before the disaster was also significantly associated with a reduced risk of PTSD, after adjusting for depressive symptoms at baseline and experiences during the disaster (such as loss of a loved one). The study concluded that social cohesion at the community level will strengthen the resilience of residents after disasters. Another study examined whether group exercise and regular walking participation in disaster areas could reduce the worsening of depressive symptoms in older adults [6]. Changes in depressive symptoms were assessed using the 15-item Geriatric Depression Scale (GDS). From pre-disaster to post-disaster, the mean change in GDS score increased by 0.1 percentage points (95% CI: -0.003 to 0.207). During the same period, the frequency of group exercise participation and daily walking time also increased by 1.9 days/year and 1.3 minutes/day, respectively. After adjusting for all covariates, including personal disaster experiences, increases in the frequency of group exercise participation and daily walking time were associated with lower GDS scores. They concluded that group exercise participation and regular walking may alleviate the worsening of depressive symptoms in older adults who have experienced natural disasters.

In order to grasp the long-term health status of disaster victims aged 18 years and older in four districts in Miyagi Prefecture, I next introduce a study by the Center for

Community Health at Tohoku University Graduate School of Medicine, which continues to conduct health surveys. Sekiguchi T., et al. clarified the change in the rate of subjective symptoms of victims of the Great East Japan Earthquake (hereinafter, referred to as the "complainant rate"), and examined the factors involved in the new occurrence of subjective symptoms in which the rate of complaints increased [7]. Based on the Comprehensive Survey of Living Conditions, the rate of cases of subjective symptoms per 1,000 persons was calculated for each subjective symptom item. Of the 1,239 subjects analyzed (mean age: 62.6 years; 55.6% females), the incidence rate decreased significantly after four and a half years, compared to six months after the earthquake and tsunami for "irritability" and "dizziness." On the other hand, "low back pain" and "urinary incontinence (leakage of urine)" increased significantly. It was found that the occurrence of new low back pain was associated with drinking habits of more than twice a day and subjective economic situation, and that the new occurrence of urinary incontinence was significantly related to old age. In the coastal areas where the damage was severe in the Great East Japan Earthquake, it is said that many people moved out of the area after the disaster. Sugawara Y., et al. examined whether the health status of the victims differed depending on the extent of their relocation after the disaster [8]. In the seventh year after the earthquake, a self-administered questionnaire was conducted on 3,517 persons, among whom 2,342 (66.6%) were subjected to analysis. Of the respondents, 51.9% were in the "living in the district" group, 36.1% were in the "moving within the city" group, and 12.0% were in the "moving out of the city" group. The odds ratio for sleep disturbances was significantly higher in the group that moved from the affected area, and the relationship between the extent of the relocation and sleep disturbances was stronger as the group that moved away from the area where they lived before the disaster. On the other hand, it was reported that there was no relationship between the extent of relocation after the disaster, subjective sense of health, and psychological distress.

As a future issue for disaster epidemiology, Yasumura S. proposes the following [9]. In the event of a disaster, epidemiologists in the area should be aware of the possibility of situations in which they may have to engage in the planning, operation, and evaluation of epidemiological investigations, regardless of their desires. In particular, we have learned from the recent nuclear accident that not only the municipalities where nuclear power plants are located, but also neighboring municipalities are not unrelated. At the very least, epidemiologists need to be constantly concerned about the health effects of radiation.

III. Social epidemiology

Social epidemiology is defined as, "A branch or subspecialty of epidemiology that studies the role of social structures, processes, and factors in the production of health and disease in populations. It uses epidemiological knowledge, reasoning, and methods to study why and how the distribution of health states is influenced by factors such as ethnicity, socioeconomic status and position, social class, and environmental and housing conditions." [10] Social epidemiology aims to identify social environmental exposures associated with various physical and mental health outcomes [11]. It focuses not on diseases, but on social phenomena such as social stratification, social networks, discrimination, workplace organization, and public policy. Socioeconomic status (SES) is strongly associated with health, and it is known that lower SES is associated with unhealthy and shorter life expectancy [12]. In social epidemiology, three types of income, educational history, and occupation are often measured as SES. Income has a material meaning, such as the amount of economic resources and the ability to consume, as well as a psychosocial meaning such as status. However, there are many points to be aware of when measuring it, such as various types, such as labor income, assets, and social security. Educational experience is often measured by the number of years of education or the final educational attainment. Educational background reflects the ability to utilize the resources and knowledge necessary to maintain and improve health that is acquired through education. Occupations are measured by occupation classification, industry classification, employment status, employee size, job title, etc.

A meta-analysis of income inequality and health effects was performed by Kondo N., et al. [13]. When income inequality is measured using the Gini coefficient, it has been reported that the risk of death increases by roughly 8% for every 0.05 increase in the Gini coefficient, regardless of the income level of the individual, and that such a relationship becomes stronger as income inequality increases. The mechanisms by which income inequality affects health are considered to be an increase in relative deprivation, a decline in social capital, and inefficiency in activities due to social division [14].

The life course approach is one of the methods used in social epidemiology [10]. Life course epidemiology aims to investigate the causes of social determinants of health along a time axis [15]. According to Kuh D., et al., it is defined as "the study of the long-term effects on later health or disease risk of physical or social exposures during gestation, childhood, adolescence, young adulthood, and later adult life." [16] In life course epidemiology, three main

models have been proposed [15]: (1) the theory of the Developmental Origins of Health and Diseases (DOHaD) [17], a critical/sensitive period model which holds that exposure in the fetal and childhood periods has a decisive impact on future health outcomes; (2) a risk accumulation model which states that the risk of past and present exposure has a negative impact on future health outcomes, and (3) a trajectory model/chain of risk model, in which risks at a certain point in the past give rise to risks that directly affect future health. Poverty is taken up as a social environment in childhood; however, poverty can be grasped as a deprivation, where there is nothing that should be possessed. In addition, adverse childhood experiences, such as abuse have been reported to affect physical and mental health in adulthood.

IV. Birth cohort study

A birth cohort is defined as "the location of a person in historical time, as indexed by his or her year of birth. Birth cohorts are often differentially affected by social events. Numerous cohort variations in factors that have long-term effects on health (e.g., childbearing, smoking, and physical activity) have been documented." [18]

There are several birth cohorts in Japan. Some of the main birth cohort studies are as follows. First, there is the TMM Birth and Three-Generation Cohort Study (TMM BirThree Cohort Study), which was established by the Tohoku University Tohoku Medical Megabank Organization (ToMMo) and the Iwate Medical University Iwate Tohoku Medical Megabank Organization (IMM). Once the importance of intrauterine exposure was recognized, birth cohorts were developed and used to examine the lifetime effects of intrauterine exposure. Studies that assess a person's lifelong disease risk include the development of genomic cohort designs, combined with genomic and omics information. Birth and three-generation cohort studies are considered necessary. Study design is difficult, and cohort studies that involve the actual operation of recruitment and follow-up of pregnant women, babies, husbands (or partners), and baby grandparents from the early stages of cohort construction are rare [19]. This birth cohort was planned after the Great East Japan Earthquake, and collected information on important exposure factors and outcomes, including disaster-related information for newborns and families. The TMM BirThree Cohort Study includes a plan to utilize this information as well as a wealth of family relationship information.

Another birth cohort study is the Babies and their parents' longitudinal Observation in Suzuki memorial Hospital on Intrauterine period (BOSHI) study. One of the results of this study was a comparison of maternal home blood pressure (HBP) and clinic blood pressure (CBP) measurements before 20 weeks of gestation, which found an association with the risk of low-birth-weight in infants [20]. High maternal at-home diastolic blood pressure (DBP) and mean arterial pressure (MAP) before 20 weeks of gestation was associated with an increased risk of low birth weight, compared to clinic DBP and MAP. Therefore, in addition to CBP, it may be worthwhile to have pregnant women measure HBP to determine the risk of infant birth weight loss.

The Hokkaido study of Environment and Children's Health is a cohort study that has been ongoing since 2002, and consists of two prospective cohorts: a cohort with one maternity hospital, and a large cohort with 37 hospitals and clinics in Hokkaido [21]. This study was established to investigate the effects of environmental exposure combined with genetic predisposition on prenatal, infancy, and early childhood development and health. While several birth cohorts have been established, few reports have been published on the relationship between low levels of environmental exposure and adverse birth outcomes. In addition, in the field of infant development, the effects of mutations in the human genome and their modifications on the effects of harmful environmental exposure (gene-environment interactions) have not been fully investigated. In environmental epidemiology, it is important to conduct risk assessments based on accurate exposure measurements, and to apply scientific results to environmental policy.

The Chiba study of Mother and Children's Health (C-MACH) is a birth cohort study based on the DOHaD hypothesis, consisting of three hospital-based cohorts [22]. The aim of this study is to investigate the influence of genetic and environmental factors, particularly the fetal environment and life after birth. The primary outcomes are allergies, obesity, endocrine and metabolic disorders, and developmental disorders, and factors related to genomic levels, metabolome levels, umbilical cord DNA methylation (epigenome), gut microbiota, and environmental chemical exposure are assessed.

The Hamamatsu Birth Cohort for Mothers and Children (HBC Study) is a birth cohort that aims to clarify the trajectory of early development of children living in local communities in Japan [23]. The main objective of the HBC study is to investigate the trajectory of neurodevelopment, especially through face-to-face monitoring during the first two years of life. The HBC study also has the secondary objective of investigating topics such as the long-term effects of household income inequality and low birth weight infants. This includes long-term personal and social effects on children's neurodevelopmental processes.

Since 2011, the Ministry of the Environment Govern-

ment of Japan has been conducting a large-scale epidemiological survey involving 100,000 pairs of children and their parents in Japan [24]. This is a birth cohort survey that regularly checks the health status of children from the fetal period until the age of 13, in order to clarify how environmental factors affect the growth and development of the children. Based on the results of the Japan Environment and Children's Study (JECS), they aim to clarify the environmental factors that affect the health and growth of children, and to create an environment where children can grow up to be healthy and raise children with peace of mind. This is the largest and longest-term survey of children's health and environment that has ever been conducted in Japan, recruiting 100,000 pairs of children and their parents in 15 regions across the country. Approximately 100,000 pregnant women registered to participate in the JECS, which began in fiscal 2010, over a three-year period. Biological samples such as blood, urine, and breast milk were collected from pregnant women and their children during pregnancy and childbirth. Afterwards, follow-up is carried out to continue the survey using questionnaires and other methods until the child is 13 years old.

The main birth cohorts in Japan have been outlined above. Currently, collaboration between birth cohorts is progressing, and research is being conducted to develop meta-analyses of risk factors and prognosis for gestational hypertension syndrome (HDP) and low birth weight (LBW), respectively, and for the development of prediction and early detection methods for the disease.

V. An example of epidemiological research using the Internet of Things (IoT)

The Masuda study is an ongoing prospective cohort study of healthy community residents aged 20 to 74 years in Masuda City, Shimane Prefecture, using Internet of Things technology to monitor daily trends in blood pressure, diet, nutrition, and physical activity [25]. A total of 242 participants were examined for their daily physical activity, by wearing an accelerometer on their waist, except while bathing and sleeping. A study that assessed the number of steps taken from the day the World Health Organization (WHO) declared the coronavirus disease 2019 (COVID-19) pandemic to the day the Japanese government lifted the state of emergency found that the average number of steps per day decreased by 9.4% in the first week after the state of emergency was declared nationwide, but the number of steps recovered the following week. Thereafter, no significant decrease in the average number of steps per day was observed until the state of emergency was lifted. This study should consider the possibility of a systematic reporting bias due to changes in participant behavior when wearing the device or non-compliance with use of the device, as well as the impact of activity intensity or non-walking exercise such as cycling. Since objective data can be collected through use of the IoT, it is expected to be applied to future epidemiological research.

VI. Conclusion

This paper describes recent trends in the fields of disaster epidemiology, social epidemiology, and birth cohort research. Epidemiological research methods are used in a wide range of fields, and can be expected to continue to develop in the future. In addition, it is expected that the results of various epidemiological studies will be implemented in society.

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I declare that there are no conflicts of interest.

References

[1] Porta M. A dictionary of eEpidemiology. 6th ed. New York: Oxford University Press; 2014. p.95.

[2] The 34th annual scientific meeting of the Japan Epidemiological Association. http://jea2024.umin.jp/en/index.html (accessed 2023-12-06)

[3] Yasumura S, Hosoya M, Yamashita S, Kamiya K, Abe M, Akashi M, et al. Fukushima health management survey group. Study protocol for the Fukushima health management survey. J Epidemiol. 2012;22:375-383.

[4] Zhang W, Ohira T, Abe M, Kamiya K, Yamashita S, Yasumura S, et al. Evacuation after the Great East Japan Earthquake was associated with poor dietary intake: The Fukushima Health Management Survey. J Epidemiol. 2017;27:14-23.

[5] Hikichi H, Aida J, Tsuboya T, Kondo K, Kawachi I. Can community social cohesion prevent posttraumatic stress disorder in the aftermath of a disaster? A natural experiment from the 2011 Tohoku earthquake and tsunami. Am J Epidemiol. 2016;183:902-910.

[6] Tsuji T, Sasaki Y, Matsuyama Y, Sato Y, Aida J, Kondo K, et al. Reducing depressive symptoms after the Great East Japan Earthquake in older survivors through group exercise participation and regular walking: a prospective observational study. BMJ Open. 2017;7:e013706.

[7] 関口拓矢，菅原由美，渡邉崇，遠又靖丈，丹治史也，

萩原嘉廣，他．東日本大震災被災者における震災後4年間の自覚症状有訴者率変化と関連因子の検討．厚生の指標．2017;64(4):15-21.
Sekiguchi T, Sugawara Y, Watanabe T, Tomata Y, Tanji F, Hagiwara Y, et al. [Higashi Nihon Daishinsai hisaisha ni okeru shinsaigo 4 nenkan no jikaku shojo yusosharitsu henka to kanren inshi no kento.] Kosei no Shihyo. 2017;64(4):15-21. (in Japanese)

[8] 菅原由美，遠又靖丈，辻一郎．東日本大震災の被災者における転居の範囲と健康状態との関連．厚生の指標．2019;66(11):13-18.
Sugawara Y, Tomata Y, Tsuji I. [Higashi Nihon Daishinsai no hisaisha ni okeru tenkyo no hani to kenko jotai tono kanren.] Kosei no Shihyo. 2019;66(4):13-18. (in Japanese)

[9] 安村誠司．災害と疫学：東日本大震災を通じて考えた疫学者の役割．第28回日本疫学会学術総会講演集．2018. p.53.
Yasumura S. [Saigai to ekigaku: Higashi Nihon Daishinsai o tsujite kangaeta ekigakusha no yakuwari.] The 28th Annual Scientific Meeting of the Japan Epidemiological Association Program and Abstracts. 2018. p.53. (in Japanese)

[10] Porta M. A dictionary of epidemiology 6th ed. New York: Oxford University Press; 2014. p.264.

[11] リサ・F・バークマン，イチロー・カワチ．社会疫学における基本概念．リサ・F・バークマン，イチロー・カワチ．M・マリア・グリモール，編．社会疫学（上）．東京：大修館書店；2017．p.10.
Berkman LF, Kawachi I. [Shakai ekigaku ni okeru kihon gainen.] In: Berkman LF, Kawachi I, Glymour M, edited. [Shakai ekigaku (Jo).] Tokyo: Taishukan Shoten; 2017. p.10. (in Japanese)

[12] 長谷川真帆．社会経済状況と健康．三浦克之，玉腰暁子，尾島俊之，編．疫学の事典．東京：朝倉書店；2023．p.106-107.
Hasegawa M. [Shakai Keizai jokyo to kenko.] In: Miura K, Tamakoshi A, Ojima T, edited. [Ekigaku no jiten.] Tokyo: Asakura Shoten; 2023. p.106-107. (in Japanese)

[13] Kondo N, Sembajwe G, Kawachi I, van Dam RM, Subramanian SV, Yamagata Z. Income inequality, mortality, and self rated health: meta-analysis of multilevel studies. BMJ. 2009;339:b4471.

[14] 近藤尚己．社会格差と健康．三浦克之，玉腰暁子，尾島俊之，編．疫学の事典．東京:朝倉書店; 2023. p.108-109.
Kondo N. [Shakai kakusa to kenko.] In: Miura K, Tamakoshi A, Ojima T, edited. [Ekigaku no jiten.] Tokyo: Asakura Shoten; 2023. p.108-109. (in Japanese)

[15] 藤原武男．ライフコース．三浦克之，玉腰暁子，尾島俊之，編．疫学の事典．東京：朝倉書店；2023. p.114-115.
Fujiwara T. [Life course.] In: Miura K, Tamakoshi A, Ojima T, edited. [Ekigaku no jiten.] Tokyo: Asakura Shoten; 2023. p.114-115. (in Japanese)

[16] Kuh D, Ben-Shlomo Y, Lynch J, Hallqvist J, Power C. Life course epidemiology. J Epidemiol Community Health. 2003;57:778-783.

[17] Barker DJ. The origins of the developmental origins theory. J Intern Med. 2007;261:412-417.

[18] Porta M. A dictionary of epidemiology 6th ed. New York: Oxford University Press; 2014. p.26.

[19] Kuriyama S, Metoki H, Kikuya M, Obata T, Ishikuro M, Yamanaka C, et al. Cohort profile: Tohoku Medical Megabank Project Birth and Three-Generation Cohort Study (TMM BirThree Cohort Study): rationale, progress and perspective. International Journal of Epidemiology. 2020;49:18-19m.

[20] Iwama N, Metoki H, Ohkubo T, Ishikuro M, Obata T, Kikuya M, et al. Maternal clinic and home blood pressure measurements during pregnancy and infant birth weight: the BOSHI study. Hypertension Research. 2016;39:151-157.

[21] Kishi R, Sasaki S, Yoshioka E, Yuasa M, Sata F, Saijo Y, et al. Cohort profile: The Hokkaido Study on Environment and Children's Health in Japan. International Journal of Epidemiology. 2011;40:611-618.

[22] Sakurai K, Miyaso H, Eguchi A, Matsuno Y, Yamamoto M, Todaka E, et al. Chiba study of Mother and Children's Health (C-MACH): cohort study with omics analyses. BMJ Open. 2016;6:e010531.

[23] Takagai S, Tsuchiya KJ, Itoh H, Kanayama N, Mori N, Takei N, et al. Cohort profile: Hamamatsu Birth Cohort for Mothers and Children (HBC Study). International Journal of Epidemiology. 2016;45:333-342.

[24] Japan Environment and Children's Study (JECS). the Ministry of the Environment Government of Japan. https://www.env.go.jp/chemi/ceh/en/about/index.html (accessed 2023-12-06)

[25] Hisamatsu T, Taniguchi K, Fukuda M, Kinuta M, Nakahata N, Kanda H. Effect of coronavirus disease 2019 pandemic on physical activity in a rural area of Japan: The Masuda Study. J Epidemiol. 2021;31:237-238.

＜総説＞

日本における最近の疫学のトピックス

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抄録

本論文では日本における最近の疫学研究，特に，災害疫学，社会疫学，出生コホート研究のトピックスを記述する．災害疫学は 2011 年の東日本大震災の経験から注目を集めるようになった．社会疫学は社会環境の曝露と様々な身体的，精神的な健康アウトカムとの関連を明らかにすることを目的としている．出生コホートは社会状況によって様々な影響を受ける．疫学研究は様々な分野で活用され，今後も発展することが期待される．疫学研究による成果が社会実装されることが望まれる．

キーワード：疫学，災害疫学，社会疫学，出生コホート研究，モノのインターネット