Chapter 4
Emerging Issues and Japan's Milestones in Science and Technology for Disaster Risk Reduction

Sakiko Kanbara

Abstract The realization of wellbeing for each individual requires a style of innovation, and the early completion of Society 5.0 requires a change of gears, the development of new technologies, and the combination of existing technologies and social systems. Continuation of diverse lifestyles of individuals through the utilization of diverse personal data is what leads to DRR. In the first half of this chapter, the points that need to be taken into account in information sharing and communication were extracted and described based on the experiences and observations of disasters that occurred in Japan in the Society 4.0 era. In the latter half of the chapter, it was emphasized that the first step toward such "transformation" of society as a whole begins with "observation" of the actual situation. It was shown that it is important for the sustainable resilience of a region to break down the issues and resources in the region into small pieces, and to care them in the local community.

Keywords Human security · Wellbeing · Information communication technology · Care

4.1 Introduction

Natural disasters directly impact those affected, resulting in physical and psychological damage. In the immediate post-disaster recovery phase, disaster relief efforts undertaken by health care workers often require intervention. One of the most urgent tasks, as crucial as rescuing and treating the injured, is to provide supplies to the victims in the affected areas. On the other hand, victims frequently endure being deprived of food, water, and shelter until relief arrives. Therefore, it is essential to recognize the need to improve access to primary health care for victims of natural disasters. As health is defined as "a state of complete physical, mental and social wellbeing (WHO 1948)", it is necessary to establish a systematic protocol for disaster relief workers to ensure that individuals have access to primary health care during a

S. Kanbara (✉)
Kobe City College of Nursing, Kobe, Japan
e-mail: s-kanbara@kobe-ccn.ac.jp

S. Kanbara et al. (eds.), *Society 5.0, Digital Transformation and Disasters*,
Disaster Risk Reduction, https://doi.org/10.1007/978-981-19-5646-1_4

time of disaster. Ensuring clean water, food, and sanitation are available in disaster areas is the most prominent and vital step in improving health security. It is also essential to know how to protect the elderly, women, and children and prevent the affected population from falling into vulnerable situations such as social poverty and underdevelopment.

Moreover, demographic changes and crises create multiple imbalances in sharing burdens and demands, both in the short and long term. Areas that were neglected and under-reported included the risk management of these conditions in the community and the impact upon delayed events and health problems (Bradshaw 2004). There is a need to promote universal access to health services for equitable health, the establishment of health care systems, human-centered health services, human resource development, and global health worldwide. The people most affected by the lack of universal access to health are those living in the most vulnerable situations (Cannon et al. 2003).

Various efforts have been made worldwide to develop technologies for disaster response. At the same time, advanced medical care and emergency services need to be concentrated in hospital facilities if we do not reduce prevention and risk at home and in the community. The burden on medical care and the spread of disease will become increasingly severe, and disasters may have the worst possible consequences (Rentschler et al. 2021).

This chapter highlights the importance of linking science policy practices to sustainable development by presenting the experiences of technology diffusion within Japan and the critical lessons learned from various community-based activities. However, individual baseline and research data are being produced in increasing quantities to serve as the indicators for the new global agenda by 2030. There is a need to construct cross-sectional databases and risk reduction models across disciplines such as meteorology, geology, civil engineering, social science, health, etc. The realization of wellbeing for each individual requires a style of innovation; early completion of Society 5.0 requires a change of gears and the development of new technologies and the combination of existing technologies and social systems. It also explored why "co-creation with sustainable community" through the case study.

4.2 Lesson Learned from Disaster Responce and Information Management by DRR3.0 × Society 4.0 in Japan

Information sharing has been done by having representatives from the relevant departments of the disaster response headquarters gather in one place. The concern was how, when, and where to share the collected and organized information with the most severely affected "local task force" or the prefectural task force-missing this goal led to information confusion and delays in decision-making. It is organized into items by departmental resources in charge of human casualties, property damage,

and response. However, the issue was how to share the information collected and managed by each site individually.

4.2.1 Systematization of Sharing Data

For the individual lifelong and disaster risk reduction in the community, time is the only universal axis that runs through the disaster process. The use of maps in the immediate aftermath of a disaster can significantly improve information sharing and consensus-building among organizations, facilitating rescue and recovery efforts (National Research Council, & Mapping Science Committee 2007).

The imbalance between supply and demand of health care, local disaster management as self-help by citizens mutual assistance to save lives should be organized to support public assistance that enables decision-making for a rapid response and the appropriate recovery. It would be easier to track, manage, and update the information reported from each site that should be prepared continuously.

In this regard, it is essential that: (1) Both parties should have the knowledge and skills to share information immediately in an emergency, (2) Extract meaningful information from a wide variety of information, (3) Identify specific ways to predict and share physical, technical, and linguistic barriers, and (4) Trust between the sender and receiver, especially that the receiver will take the message seriously. It is desirable to organize the information in chronological order for each source of information, such as local governments, medical teams, public health nurses, external ancestor organizations, and citizens. Also, it is crucial to promptly document the information as the "latest information" after sharing it regularly with those who are not present at the sharing.

Structuring the latest information materials and updating them with a precise date and time while preserving older information makes it possible to visualize the progress of the response. It is also easy for other media to update them. In addition, secondary use is complicated due to data format issues if the information is only published on a website, and multiple pieces of information cannot be combined for practical use. Each department's data, which can avoid duplication of work, has its characteristics. It is required to decide what data can be shared between administrations, what cannot be shared by NGOs, and rules on sharing data on individuals and the granularity of information. In advance, it is necessary to understand which data can be shared and which data need to be protected within the organization.

4.2.2 Collection, Design and Data Uncertainty

The first piece of information that should be collected is the damage caused by the disaster. Especially the damage to public infrastructures such as electricity, water, gas, communications, transportation, fires, industrial accidents, evacuation of people, and

confusion (Cabinet office 2020). Information can be obtained more quickly through social networking services such as Twitter. If the information is the same from both sources, it is likely to be accurate; if it is only on social networking sites and cannot be confirmed directly, it may have been resolved, moved, or spread (Sakurai and Murayama 2019). What is most worrisome is the blank area where the damage is presumed, but no information is available. The areas where no phone calls are being made or connected may be terrible. Rather than waiting for information reports from these areas, we need to immediately go there and confirm the information as a team, including lifesaving and rescue teams. Damage does not depend on the name of the place or the geographical boundaries of the municipality. In other words, even if an area is named in the information as damaged, some places are affected while others are not. A common understanding of location information on a map will lead to accurate information sharing. It is necessary to consider a system in which a regional staff member in charge, who is familiar with the local geography, can grasp the district's situation and make efforts to understand it.

Various supporters, volunteers in the field, and employees who seem to have nothing to do with health and medical care, may also have important information. In addition, it also requires an attitude that collaboration with all other professions is essential. There is also a need to connect with the broader community, for example, by using social networking services (SNS) and other forms of communication that residents use daily. Alternatively, by using web forms to confirm each other's safety quickly, by using grassroots activities to try to solve problems, or by listening to the voices of those who cannot speak up. On the other hand, gathering information from inside communities with information barriers, such as physically isolated places, technologically disrupted communication, and linguistically inaudible or unreadable, varies greatly depending on the information provider and listener, making it difficult to share. The non-verbal insights found in communication between vulnerable people and last-mile connections are also expected. At the same time, it is vital to be aware of gender, position, crisis, and vulnerability, respect it and subsequently protect it before being exposed to danger.

4.2.3 Processing of Information into Usable Information

There have been limitations in quickly analyzing data that can define the number of disaster victims, visualize the original demand, and determine the correct balance of supply and demand for public health care. The balance needs to distinguish between the chaotic phenomenon of forced migration away from the actual residence and mutual aid outside the familiar government and support system. Even with any data and information being received. It is necessary to analyze the situation with a biased opinion of the received information due to communication channels not being first-hand, i.e., essential information linkages cannot be established. The main common points regarding issues related to information management in healthcare

during disasters: (1) Pre-disaster information is useless due to the movement of residence, (2) IT infrastructure is uncertain, (3) Accessibility to information and data cannot be confirmed, (4) Inability to visualize welfare and residents' insights, (5) Simultaneous release of information with time differences, (6) Discrimination in information duplication, (7) Ensuring reliability and validity, (8) Setting cross-cut points for reporting information, (9) Vulnerable situations and people are overlooked, and (10) Information is not reported as improved. It is essential to recognize these factors and issue information that can be used to determine responses, instructions, and subsequent analysis (Kanbara and Shaw 2022).

4.2.4 Importance of Monitoring Over Time

In a chaotic situation such as an immediate crisis, initial assessment information can determine whether any omissions in the response, including crisis avoidance, will result in people's loss of life or death and the prevention of secondary disasters. It is necessary to manage the situation and prevent omissions in the response (Bayntun et al. 2012). Specifically, the response level needed should be determined, such as first aid and transport to the hospital being provided for the seriously injured, the slightly injured, the unidentified, and those requiring medical care, and how and by whom the search is being conducted for the unknown. If detailed information can be collected to identify high-risk and vulnerable groups, equitable support and evaluation will be provided. Even within a single municipality, population density and disaster risks are diverse, and organizations involved in disaster prevention are changing. It is difficult for the government and supporters to conduct a simultaneous survey that identifies risks, needs for consideration, and vulnerabilities throughout the community. As well as having evacuation centers as one group, agreements should be made with local facilities, businesses, and schools to provide information on specific areas and incorporate information by citizens into community disaster prevention plans and health and welfare projects (Fig. 4.1).

4.2.5 Systematic Implementation of Information Collection and Organization

Because both the post-disaster situation and the information collected from people are fluid, it is necessary to extract information correctly based on time, subjectivity, and inter-organizational collaboration changes. It is important to note who should itemize the output when collecting and organizing information. At the very least, operational and human resources and things should be organized, feasibility should be examined, and the manuals should be updated to enable co-work to manage tasks and shift schedules for personnel roles. It is necessary to improve processing methods to enhance

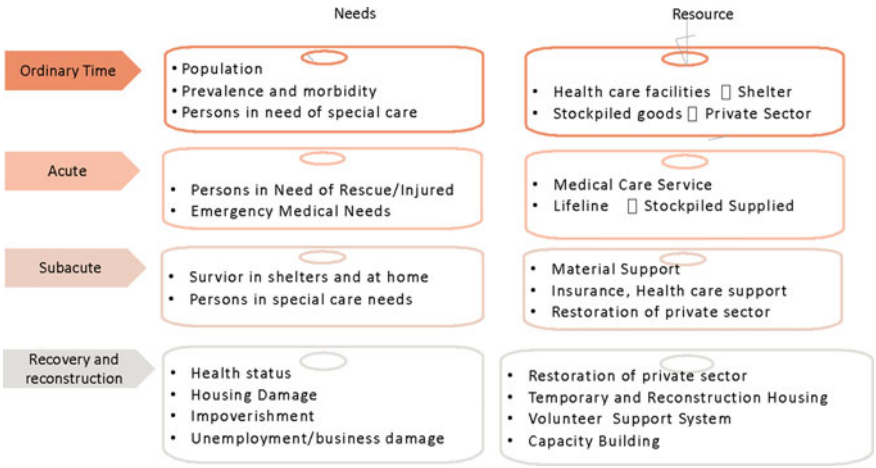

Fig. 4.1 Examples of resource and information needs for each disaster phase

information collection and dissemination functions and consider the unification of information reporting and processing methods and reporting formats.

In addition to the necessary personnel, it is essential to determine how many information devices and equipment will be needed and check their operation at least once. For example, in light of the congestion and limitations of cell phones and mobile e-mail, it is necessary to introduce satellite phones, IP phones, Wi-Fi, etc., to multiplex the system so that safety confirmation can be done without relying on a single channel. On the other hand, rapid communication via the Internet might make it easy to overlook important information. Information should be collected and disseminated based on analysis, and decision-making needs can be centrally managed and scrutinized in such a large room foremost. Also, it had better consider the situation and unify the collection tools to be used as soon as possible.

4.2.6 From Statistical Thinking to the Utilization of Non-Aggregated Data

Some overall average values are too high or stick out from the normal distribution, unlike regular times. Unexpected results can be obtained from them, and effects that cannot be explained need to be qualitatively delved into new findings. On the other hand, it is also significant to be aware that data may be entirely unchanged from regular times, contrary to expectations. There is a possibility that the voices of those who are enduring and vulnerable are not included. It is also our responsibility to confirm the facts while respecting non-aggregated data as the most solid scientific truth, rather than discarding informal and qualitative information and voices that are difficult to visualize, and that come from the voiceless. In the current situation,

where ICT and IoT are becoming the norm that can break through the barriers, dramatic progress is expected for a response based on almost real-time analysis. For this reason, the information analysis and operation planning section needs to be strengthened separately from the team on information collection and communication (Erman et al. 2021).

As for the analysis itself, it is imperative to take a bird's eye view of the disaster site using descriptive epidemiological methods (Rothman 2012). Therefore, standardized metadata for time, location, and attributes, which are the basis of epidemiology, should be added to the various information, which will lead to a variety of subsequent analyses. By displaying the data spatially and looking at differences from ordinary times and from region to region, it is possible to improve support fairness in the future. By looking at fixed-point data from various groups over time, it is possible to confirm differences in change.

For advanced analysis, universities and companies would become volunteers to collect the data if they reach out to people who can handle GIS and IT across disciplines. It is also vital how to collaborate with such external supporters.

4.2.7 Message Distribution

In the acute phase, it is necessary to share the information quickly. Consider promptness in the acute phase and timing according to needs in the subacute phase and beyond. The latest information can be disseminated to the outside world by sharing it prior to the countermeasure meeting or by adhering to deadlines for newspapers and media while considering confidentiality (Cabinet office 2010). This continuation leads to transparency and trust, and both parties can actively participate in obtaining information. Dissemination from higher-ups and professionals in the task force will lead to credibility. At the very least, the loud voices of vulnerable people and women should not be allowed to disappear from the record. Sensitive information about minorities should be considered for distribution, several copies, and handling.

4.2.8 Consensus Building: Decision-Making, Accountability, and Collaboration

It is necessary to have a leader who can make decisions based on various opinions from a bird's eye view. It is not a matter of having a good sense but continuous training in tactics (Dyess and Sherman 2009). The participation of diverse people and transparent communication, the human-centered approach, the involvement of the people, the coordination and integration of multiple fields, and the use of appropriate technology is highly appreciated to achieve the target.

In addition, it is necessary to establish a system of cooperation that links various experts, specialized organizations, support groups and support companies that can provide advice and collaboration on multiple issues related to health, medical, and welfare and peripheral areas to respond quickly. Sharing information on good practices and ideas from different perspectives will lead to more efficient resources and time. The collaboration will also prevent the burden of repeated investigations by the same people. It is necessary to conduct After Action Reviews (WHO 2019) and continuous monitoring to understand vulnerabilities, response capabilities, and lack of resources. It is also imperative to identify predictable and avoidable risks and create a cycle for improvement, rather than just concluding with an internal evaluation report.

4.3 Observation to Orient, Decide, and Act: Demand Based Innovation on Emergency

The risk environment is rapidly changing, with extreme weather events, natural disasters, and unknown virus outbreaks on a global scale, while information technology is quickly advancing and social systems and people's literacy are changing rapidly. Such a global situation, Boyd's OODA loop (Von Beakley and Patricelli 2008) that was used in the military, is now used in politics, education, startups, and companies as a business model. In the context of the lessons learned as described in the previous section, approaches to existing knowledge management, technical issues related to access to relevant multi-disciplinary information and knowledge, and decision-making processes based on past disaster management systems have become more complex. As a result, the management of large-scale disasters is often inefficient and may be very costly.For further disaster risk reduction, it is necessary to understandinnovation processes that occur in daily operations and to effectively and take advantage of efficiently incorporate science and technology. The following unpredictable and dynamically changing health crises demonstrate the beginning of science that innovative solutions can be derived and resolved by employing decision-making based on the OODA (Observe, Directions, Decide, Act) loop, which begins with observation.

The Industrial Revolution brought a rapid influx of workers to cities at the beginning of public health. However, no environment and system could ensure all health and well-being. The standard of living for low-wage workers was miserable and threatened human security. The Crimean War broke out in 1854; many people died, not from the fighting itself but from infections, epidemics, and starvation. Nightingale observed simple cleanliness and a sense of smell, making it essential to look good and not stink by working on basic hygiene and diet to care for wounded soldiers. She explained using infographics to reveal the unsanitary conditions (spread of infectious diseases) in hospitals. The mortality rate of wounded soldiers dropped (Fee and Garofalo 2010; Gill and Gill 2005; Cohen 1984).

In 1854, John Snow, known as the father of epidemiology, discovered from his community observations that people who drank contaminated well water suffered, then established epidemiological methods to elucidate the source, route of infection, and biological factors (such as pathogens). Even though there were some unknowns, observing social factors and conditions, the epidemic of infectious diseases was contained. (Snow 1855). Before 30 years, Robert Koch discovered Vibrio cholera (Lippi and Gotuzzo 2014).

In Japan, in 1833, a warship on a training voyage to South America produced 169 cases of severe leg sickness out of 376 crew members, 25 of whom died. Navy doctor Kanehiro Takagi, noting the difference in diet, procured meat and vegetables from Honolulu harbor and fed them to his patients, all of whom recovered. Relying on British evidence-based medicine, he assumed that the lack of protein intake was the cause of the disease, tried a Western and wheat diet, and dramatically reduced the incidence from 23.1% in 1883 to less than 1% in two years after its introduction in 1884. Although the theory was wrong, the scientific evidence for epidemiology was obtained as a preventive measure against beriberi. His discovery of the cause of beriberi 15 years before the discovery of anti-beriberi vitamins by Aikman and others is highly regarded overseas (Sugiyama and Seita 2013).

Primary social analysis can be understood through on-site observation during emergencies. Everyone involved in clinical and public health practice recognizes this when living in a disaster and providing services to people with threatening human security. Today, people are increasingly taking advantage of vaccines, diagnostics, and effective treatment kits. However, health disparities exist in the context of social forces such as racism, pollution, poor housing, and poverty that shape pathways within individuals, families, and groups (Bailey et al. 2017).

In uncertainty, expectations are high for problem-solving based on social and human sciences thinking. Information related to disasters, life, and health should not be focused on only the occurrence of emergencies. It is essential to consider indicators and methods that allow for deep and continuous monitoring of disaster risks and district understanding and diagnosis to take measures in public health and health policies and projects during normal times. If a disaster strikes, the prognosis for all aspects of the community is uncertain, budgets may not be fixed, ethical considerations are localized, cross-sectoral, forcing us to respond to crises in a way that cannot be designed or pre-tested. 2018 It is then necessary to consider and prepare for collaboration across disciplines and fields, norms of behavior based on users' information literacy and roles, and ways to engage people while observing social trends. Native researchers, technologists, or practitioners may sustain the initiative as local citizens (Kanbara et al. 2020).

4.4 The Role of Local Institute: Co-Creation of Care Science for Disaster Risk Reduction

Once a disaster strikes, people's access to routine medical care will be complicated. Medical tightness will occur, leading to poor sanitation and health conditions in evacuation centers and the community. Nurses, the primary health care providers in the community, are often called upon to gather information amidst the chaos and coordinate with local hospitals, city halls, and public health departments to assist. The Science Council of Japan proposed "care science," a new system of knowledge in which multiple academic disciplines, citizens, and government agencies work together to address common social issues related to care. The goal is a mutually supportive society built by embedding care science and its results in people's lives (The Science Council of Japan 2020).The university's mission also includes contributing academically to the development of the local community. Local universities must co-create knowledge and skills in a sustained manner, both suddenly and in the face of recovery due to disasters. More than 270 nursing colleges and universities in Japan (JANPU 2022) are required both functions, and need to experiment, verify, and pioneer disaster risk reduction by the times, including the latest information sharing, so that they do not panic when a disaster strikes in their communities (Kita et al. 2012). As for local disaster reduction involving universities, they are the integration of education and research, the effective utilization of knowledge and its new development, and the upgrading of communities and their active involvement and participation in disaster risk reduction. This case study will introduce a people-centered approach to community disaster management through nursing at a public university in Kochi Prefecture and emphasize the importance of community engagement in university community disaster management.

Kochi Prefecture is affected by typhoons and heavy rains every year, a phenomenon frequently seen in developed countries due to climate change. Furthermore, there is a 70% probability that an earthquake of magnitude eight and a tsunami of 34 m high will occur within 30 years. With the super-aging society, the shortage of doctors in remote areas is becoming a problem in the region. The 1998 torrential rain and floods triggered the Kochi Disaster Nursing Support Network (damage: 6 people killed in the prefecture, 12 injured, 12,380 houses flooded above floor level, 9,885 homes flooded below floor level (Shikoku Disaster Information Archives 2022). At that time, with the implementation of the Decentralization Act, there was a growing tendency for local governments to deal with regional disasters, and the role of municipalities in times of disaster was becoming more extensive. It makes sense for municipalities to make decisions since they have the best understanding of the situation and needs of the affected areas. Still, municipalities are faced with issues of human and financial resources. The necessity for the prefectural government and municipalities to work together in response to disasters was understood. The Kochi Prefecture Disaster Nursing Support Network Study Group organization was adopted as a project proposed by Kochi Prefecture officials in 1999 (University of Kochi 1999). In the course of these activities, research acquired by the university

budget and team members has been conducted, information sharing meetings and events have been held, and agreements are signed to strengthen cooperation between the university and related institutions. In addition, the university has established the Global Leader Development Program under the MEXT's Leading Program for Doctoral Education, and doctoral graduate students have been participating in local projects to deepen their research and learning and contribute to disaster mitigation in the region.

For example, Kochi Prefecture Nurses Association, in collaboration with universities, has started to train its own "Community Disaster Support Nurses." That prepares to respond locally and rapidly to a large-scale disaster in the event of a predicted Nankai Trough earthquake after the Great East Japan Earthquake. The Japan Nurses Association has been dispatching disaster relief nurses to the disaster area as a nationwide effort that takes about three days to dispatch the nurses by request from the disaster area coordination.

In another case, with the strategic research funding by the President at first, they worked on "Mapping and Socialization of Care for DRR that Leaves No One Behind" in Kochi Prefecture. We devised a system that allows communities to share map information necessary for evacuation, living during the evacuation, and returning to daily life, especially for disabled people and women raising children.

It was challenging to adjourn the research activities and still sustain in the community. By positioning Kochi as a "research station" in the field, local industry, government, academia, and the private sector while utilizing their respective strengths, have continued to care for DRR. Fund and requests for co-creation came in from Kochi City and other local governments, which led to the development of Community Based Participatory Research (CBPR) to propose solutions that fit the actual situation of the local government or organization. The specifics of the research appear in several scenes in Chaps. 5, 6, 7 and 8 of this book.

Through repeated workshops and drills with residents, especially those in need of care, we explored the development of community-participatory research methods and social contributions as a prefectural university with industry-government-academia cooperation and collaboration. What gradually emerged from the research activities is that we should develop a sustainable communication ecology as a form of human security to not repeat the same problems in the local community. People require personal communication, personal data, and livelihoods to protect themselves in emergencies. Through the operation of IoT and communications, residents' lifelong health status and medical information can be visualized to meet their essential health and wellbeing. They continue explore self-care and local mutural care in community so thatindividuals can provide their PLRs to enable essential health management, which can be fine-tuned to consider their human rights need.

4.5 Way Forward: To Distributed Sheltering and Communication and Care

In the information society of the past (Society 4.0), information sharing in the community was inadequate. In the society to be realized in Society 5.0, "all people and things will be connected by the Internet of Things (IoT), and various knowledge and information will be shared, creating new values that have never been seen before.

Activities related to disaster response are diverse, ranging from small-scale activities by individuals to large budgets involving national and international organizations. However, we need to be aware that the results of these activities will provide information that will be useful for future disaster responses, and we need to disseminate this information. The results of these efforts will be helpful information for forthcoming disaster responses. Participatory change needs to occur from the forming stage, with vulnerable people contributing to regional and community development and private investment considerations.

The community-based approach involves looking closely at phenomena, such as concerns about living life and wellbeing. For a people-centered approach, it is essential to combine different research methods. In recent years, computer technology has advanced data analysis, complex models that contribute to disaster and social research approaches are being analyzed, and strategies are becoming more diverse.

When co-designing a single project, it is necessary to understand what objectives, when, and types of research can be applied. It is essential to consider the feasible data collection for each study, which research methods will be used for data collection and analysis, and whether the data analysis will focus on quantified or non-quantified data. Researchers will be expected to articulate the purpose of using qualitative data and quantitative data. It is essential to understand what types of research can be applied ethically. Data collection itself is often a significant constraint in the data processing flow. Reviewing data collection will allow for a more realistic logic and discussion. Then, identify the resources available for the analysis and visualization phase. The vast amount of data generated in various fields need to be utilized cross-sectionally to share knowledge and information throughout society. To this end, it is necessary to promote the disclosure and distribution of knowledge and information and promote cross-sectoral collaboration to care for people rather than harm them. On the upper stream of that, it is required to solve technical issues based on institutional problems and international trends in technological development.

Acknowledgements This research was partially supported by University of Kochi, YAHOO! Foundation.

References

Bailey ZD, Krieger N, Agénor M, Graves J, Linos N, Bassett MT (2017) Structural racism and health inequities in the USA: evidence and interventions. The Lancet 389(10077):1453–1463

Bayntun C, Rockenschaub G, Murray V (2012) Developing a health system approach to disaster management: a qualitative analysis of the core literature to complement the WHO Toolkit for assessing health-system capacity for crisis management. PLoS currents 4

Bradshaw S (2004) Socio-economic impacts of natural disasters: a gender analysis. ECLAC

Cabinet Office (2010) Expert committee on earthquake disaster prevention in local cities, discussion point 4: information dissemination and public relations—Cabinet Office Disaster Prevention Information. https://www.bousai.go.jp/jishin/chihou/bousai/5/pdf/sub2.pdf. Accessed 3 April 2022

Cabinet office (2020) White Paper Disaster Management in Japan. https://www.bousai.go.jp/en/documentation/white_paper/pdf/R2_hakusho_english.pdf. Accessed 3 April 2022

Cannon T, Twigg J, Rowell J (2003) Social vulnerability, sustainable livelihoods and disasters. Report to DFID conflict and humanitarian assistance department (CHAD) and sustainable livelihoods support office, 93

Cohen IB (1984) Florence nightingale. Sci Am 250(3):128–137

Dyess SM, Sherman RO (2009) The first year of practice: new graduate nurses' transition and learning needs. J Contin Educ Nurs 40(9):403–410

Erman A, De Vries R, Sophie A; Thies SF, Kabir K; Maruo M (2021) Gender dimensions of disaster risk and resilience: existing evidence. World Bank, Washington, DC. https://openknowledge.worldbank.org/handle/10986/35202 License: CC BY 3.0 IGO

Fee E, Garofalo ME (2010) Florence nightingale and the Crimean war. Am J Public Health 100(9):1591–1591

Gill CJ, Gill GC (2005) Nightingale in Scutari: her legacy reexamined. Clin Infect Dis 40(12):1799–1805

Japan Association of Nursing Programs in Universities (JANPU) (2022) About JANPU. https://www.janpu.or.jp/en/. Accessed 3 April 2022

Kanbara S, Pandey A, Estuar MRE, Lee HJ, Miyazaki H (2020). EpiNurse, health monitoring by local nurses on Nepal Earth Quake 2015. In Public Health and Disasters. Springer, Singapore, pp 229–244

Kanbara S, Shaw R (2022) Disaster risk reduction regime in Japan: an analysis in the perspective of open data open governanace. Sustainability 14(1):19. https://doi.org/10.3390/su14010019.Accessed3Apr.2022

Kita E, Yamase Y, Uemura T, Kita E, Yamase Y, Uemura T (2012) Nursing education in disaster-prone times. Proceedings of the Academic Conference of the Japanese Society for Nursing Education 22:109–109

Lippi D, Gotuzzo E (2014) The greatest steps towards the discovery of *Vibrio cholerae*. Clin Microbiol Infect 20(3):191–195

National Research Council, & Mapping Science Committee (2007) Successful response starts with a map: improving geospatial support for disaster management. National Academies Press

Rentschler J, Klaiber C, Tariverdi M, Desjonqueres C, Mercadante J (2021) Frontline

Rothman KJ (2012) Epidemiology: an introduction. Oxford University Press

Sakurai M, Murayama Y (2019) Information technologies and disaster management–Benefits and issues. Prog Disaster Sci 2:100012

Shikoku Disaster Information Archives (2022) Torrential rain disaster in Kochi in 1998. https://www.shikoku-saigai.com/archives/26587?preurl=&query_pref=%E9%AB%98%E7%9F%A5%E7%9C%8C&query_city=%E9%AB%98%E7%9F%A5%E5%B8%82&query_dis_kind=%E9%A2%A8%E6%B0%B4%E5%AE%B3

Snow J (1855) On the mode of communication of cholera. John Churchill

Sugiyama Y, Seita A (2013) Kanehiro Takaki and the control of beriberi in the Japanese Navy. J R Soc Med 106(8):332–334

The Science Council of Japan (2020) Proposal formation of a foundation for care science and creation of a future society

University of Kochi (1999) Formation of "Disaster Nursing Support Network Study Group, Disaster Nursing Support Network Study in Kochi. https://www.u-kochi.ac.jp/~disaster/report-11/report-0.htm. Accessed 3 April 2022

World Health Organization (2019) Guidance for after action review (AAR) (No. WHO/WHE/CPI/2019.4). World Health Organization