Education on Statistics for Public Health Nurses at a Statistics Seminar

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Abstract

It is quite important to effectively develop community healthcare services and health promotion activities in an aged society. Therefore, statistics for understanding local characteristics is essential for evidence-based healthcare services and healthy-policy decision in a community. We started a "HIMUKA health research seminar" project in April 2015. The purposes of the seminar are education and training of the study driving force, enhancement of knowledge and capability of public health nurses to utilize statistics for healthy-policy decision. The total number of seminar participants was 545 in 2 years. The major motivations for participating in the seminar were their interest in "Analytical methods using Excel", "Visualization of data by creating tables and figures", "How to work out a questionnaire", and "How to reflect analyzed data to a healthy policy".

Keywords: Education on statics, Public health nurses, Compound seminar

Introduction

In Japan, the population aging rate (=proportion of people aged 65 and over) is rapidly increasing from less than 5% in 1950, 10.3% in 1985, then 20.2% in 2005, and up to 26.7% in 2015[1]. This tendency is considered to steadily continue until 2060, and as many as one out of 2.5 people are to become elderly persons aged 65 and older. In such an aging society, it is quite important to decide how to handle and develop the healthcare services and health promotion activities in a community. The knowledge on epidemiology statistics for understanding regional characteristics is indispensable to conduct evidence-based healthcare services and decide a health policy in the community. The data-based policy on health promotion and regional activation is the only way to effectively utilize limited resources.

Since April 2016, we have often conducted a "HIMUKA health research seminar" as a community contribution research project at Miyazaki Prefectural Nursing University. The purposes of the seminar mainly targeting at regional- and industrial public health nurses are to develop their capability for research/observation and health policy implementation needed for their daily health promotion activities.

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Through the seminars, we have aimed at enhancement of their skills, knowledge and capability needed for health guidance, statistical analysis, and implementation of a health policy based on epidemiology statistics. We consider it possible to grasp health problems of the community through collaborative studies with the seminar participants. Thus, we conducted a questionnaire survey on the participants in the first seminar, and analyzed their satisfaction and needs. The results are reported here together with the contents of the seminar.

Subjects and Methods

A self-completed anonymous questionnaire survey was conducted on 50 participants in the first seminar before and after the seminar. The pre-seminar question included their "sex", "age", "profession", "experience of a statistical job, job details, and difficulty in a statistical job", and "motivation for participating in the seminar". The post-seminar question included their "satisfaction level with the seminar" and "expectation".

After the primary aggregate calculation of each variable, analysis was conducted using the results of "Self-assessment on statistical analysis" as dependent variables. The respondents who answered "(I am) very confident (in statistical analysis)" and "confident" were categorized as a "High self-assessment group", and those who answered "not either", "not so confident" and "never confident" were categorized as a "Low self-assessment group". Then, Fisher's exact tests were conducted. The software "IBM SPSS Statistics, version 22" was used for all of the statistical analyses.

For ethical considerations of the study, prior oral explanations were given to the seminar participants mentioning that the results of the questionnaire surveys will be used as a reference material of future seminars. In addition, before the analysis, the private information such as individual names was deleted from the questionnaires. Also the descriptions in the questionnaires were carefully treated with so that neither individuals nor organizations can be identified.

Results

The completed questionnaires were retrieved from 25 participants (a 50% response rate). Table 1 shows the basic attributes of the respondents. The respondents were eight males (32.0%) and 17 females (68.0%), being seven persons (28.0%) in their twenties, 12 (48.0%) in their thirties, five (20.0%) in their forties, and one (4.0%) in his/her fifties. Their professions were the public health nurse in 20 persons (80.0%), managerial dietitian in 1 (4.0%), health exercise instructor in 1 (4.0%), and others in 3 (12.0%). Their places of work were the public health centers in 5 persons (20.0%), municipalities in 6 (24.0%), industry in 1 (4.0%), medical facility in 1 (4.0%), and others in 12 (48.0%). The length of their service was less than one year in one person (4.0%), one to less than five years in 7 (28.0%), five to less than 10 years in 6 (24.0%), and more than 10 years in 11 (44.0%).

Table 1. Basic attributes of respondents

		No. of respondents n=25	%
Sex	Male	8	32.0
	Female	17	68.0
Age	20s	7	28.0
	30s	12	48.0
	40s	5	20.0
	50s	1	4.0
Profession	Public health nurse	20	80.0
	Managerial dietitian	1	4.0
	Health exercise instructor	1	4.0
	Others	3	12.0
Place of work	Public health center	5	20.0
	Municipalities	6	24.0
	Industry	1	4.0
	Medical facility	1	4.0
	Others	12	48.0
Length of service	< 1 year	1	4.0
	1 to <5 years	7	28.0
	5 to <10 years	6	24.0
	10 years or longer	11	44.0

Table 2 shows the actuality of their statistical work. Those who had been involved in a statistical (or aggregate calculation) job were 18 persons (72.0%), and the other 7 (28.0%) had not been involved in such a job. Out of the 18 who had been involved in the statistical job, six persons (33.3%) had conducted complex statistics other than a simple aggregate calculation job and the other 12 (66.7%) had done only a simple aggregate calculation job. Out of the six persons who had conducted complex statistics, five (83.3%) had had difficulty in some kinds of statistics and only one (16.7%) had not had such difficulty. In the Self-assessment on statistical analysis, only one person (4.0%) answered "very confident", five (20.0%) "confident", other five (20.0%) "not either", eight (32.0%) "not so confident", and three (12.0%) "never confident".

Table 3 shows the motivations for participating in the seminar. Multiple responses were allowed, and the reasons were, in descending order, their interest in "Analytical methods using Excel" in 17 persons (68.0%), "Visualization of data by creating tables and figures" in 16 (64.0%), "Seminar program" in 15 (60.0%), "How to work out a questionnaire" in 11 (44.0%), "How to reflect to a health policy" in 11 (44.0%), "Presentation skills" in 7 (28.0%), "Analytical methods using statistical software" in 7 (28.0%), "How to prepare a report" in 5 (20.0%), "Recommendation from a job site" in 4 (16.0%), "An opportunity to solve one's daily worries" in 3 (12.0%), "How to input data by computerization" in 3 (12.0%), "Forming a crowd" in two (8.0%), and "Desire for a supervisor" in 2 (8.0%).

A significant association with the self-assessment on statistical analysis was observed in the "Visualization of data by creating tables and figures" and the "Seminar program" ($p<0.05$). The "Analytical methods using statistic software" tended to be dominant in the "Low self-assessment group" ($p<0.1$).

Table 2. Actuality of statistical work

	No. of respondents	%
Involvement in statistical (or aggregate calculation) job	n=25	
Involved	18	72.0
Not involved	7	28.0
Involvement in complex statistical job	n=18	
Involved	6	33.3
Not involved	12	66.7
Difficulty in some kinds of statistics	n=6	
Yes, I have difficulty.	5	83.3
No, I have no difficulty	1	16.7
Self-assessment on statistical analysis	n=22	
Very confident	1	4.0
Confident	5	20.0
Not either	5	20.0
Not so confident	8	32.0
Never confident	3	12.0

Table 3. Motivations for participating in the seminar (multiple answers allowed)

	No. of respondents. (%) n=25	High SAG* n=6	Low ASG* n=16	P value**
Analytical methods using Excel	17（68.0）	4 (25.0)	12 (75.0)	n.s.
Visualization of data by creating tables/figures	16（64.0）	2 (12.5)	14 (87.5)	<0.05
Interested in seminar program	15（60.0）	6 (42.9)	8 (57.1)	<0.05
How to work out questionnaires	11（44.0）	4 (36.4)	7 (63.6)	n.s.
How to reflect to a health policy	11（44.0）	4 (40.0)	6 (60.0)	n.s.
Presentation skills	7（28.0）	3 (42.9)	4 (57.1)	n.s.
Analytical methods using statistical software	7（28.0）	0 (0.0)	7 (100.0)	<0.1
How to prepare reports	5（20.0）	0 (0.0)	4 (100.0)	n.s.
Recommendation from a job site	4（16.0）	1 (33.3)	2 (66.7)	n.s.
Wanted an opportunity to solve daily worries	3（12.0）	0 (0.0)	3 (100.0)	n.s.
How to input data by computerization	3（12.0）	1 (33.3)	2(66.7)	n.s.
To form a crowd	2（8.0）	0 (0.0)	1 (100.0)	n.s.
Wanted a supervisor	2（8.0）	1 (50.0)	1 (50.0)	n.s.

* High SAG = High self-assessment group; Low SAG = Low self-assessment group

** Fisher's exact test

Discussions

The results of the present questionnaire surveys demonstrated that 72% of the respondents had been involved in the job-related statistical work. Thirty-three percent of the respondents had been involved in complex statistics other than a simple aggregate calculation job, and 83% of them had had difficulty in the statistical analyses. Zukawa et al. [2] pointed out that one of the difficulties that new public health nurses have just after graduation from a university is "ambiguity of the work assessment methods". They also pointed out that a computer-handling skill is one of the items that the new public health nurses regret having not studied when they were at university. Tanaka et al. [3] reported that, the ratio of college teachers specialized for epidemiology and/or biostatistics is as little as 20% and the ratio of those who join academic societies of epidemiology and/or biostatistics is also low. Also reported were problems that college teachers have, such as: 1) there are little good textbooks, materials for demonstration, and workbooks, in particular, textbooks including practical nursing examples are desired; 2) the number of college teachers and tutors is insufficient; and 3) students' motivation is low and their knowledge for mathematics, computer, and information processing is insufficient.

In the present questionnaire surveys, the major motivations for participation in the seminar were their interest in "Analytical methods using Excel" and "Visualization of data by creating tables and figures", and another motivation "Analytical methods using statistical software" was likely to be dominant in the "Low self-assessment group". Tanaka et al. [3] reported that 90% of nursery universities are implementing the courses "Basic concept in statistics" or "Basic statistical analysis" but the course "Medical and epidemiological research design" is being implemented at only 70% of such universities. NAKANO et al. [4] reported that 90% of postgraduate students are not confident in the knowledge and skill of statistics and about 50% of them are not aware of statistical software. Thus, weakness of statistical education and insufficiency of education on practical statistics are reported. Therefore, it is problematic that, in some cases, the statistical course at nursery postgraduate school has to be implemented inevitably at a university level in quality.

NAKANO et al. [4] also reported that 20% of nursery university students have difficulty in "understanding of a relationship between two variables", suggesting that it is one of the major bottlenecks for understanding descriptive statistics. In addition, 40% of the students have difficulty in "logics of tests and estimates" suggesting that the inferential statistics and subsequent statistical methodology are the difficult subjects for the students to understand, and so the authors suggested that it is necessary for college teachers to be careful in time allocation and assignment of examples.

Our seminar targets at not only school- and university students but also people at work. Therefore, the program includes intentionally not only the "methodology on statistical theory" and "usage of statistical analysis software" but also the "subjects linked to the job site". In order to effectuate the "link to the job site", the questionnaire of our first survey included the questions about actual difficulty in statistics at work and what the participants want to know. The result showed that many respondents had expected a seminar where basic statistics (aggregate calculation) is lectured using a familiar and at-hand tool, as shown in the participation motivations such as "Analytical methods using Excel" and "Visualization of data by creating tables and figures". Furthermore, they also expected to know how to effectively utilize statistics for their job, as shown in the answers such as "How to reflect to a health policy"

and "Presentation skills". Referring to such respondents' expectations, we decided the program of subsequent seminars.

The population of Japan peaked at 128.08 million in 2008, but it is declining thereafter down to 127.11 million in 2015. It is estimated to become 99.13 million in 2048 and 86.74 million in 2060[1]. The population aging rate of Japan was at the lowest level until 1980s as compared with major countries in America and Europe, but it reached at the highest level in 2005 and the highest level is expected to continue into the future[1]. Aging of population is an important issue that every country will face in future, and the global society is expressing a heightened interest in Japan's healthcare activities.

In such an aging society, it is important to develop the data-based healthcare services and decide a data-based healthcare policy, for the purpose of effective healthcare and health promotion activities in the community. The public health nurses are considered to have an intuitive feel in doing their daily work. It is necessary for the public health nurses to learn how such an intuitive feel can be supported by various health data of residents which they collected and how they can propose a data-based policy. And it is important for them to include statistical evaluation in advance in their healthcare plan, foreseeing the outcome of their healthcare activities.

Okura[6] reported that the ability for utilizing information is indispensable for the public health nurses who are working for administrative agencies, and the capability for using statistics and epidemiology and the ability for implementing researches and surveys are important for them. Hirano et al. [7] reported the policy-related capability needed for the public health nurses includes an ability for conducting a persuasive presentation and for working out a convincing dossier. The authors suggested including "cultivation of insight into the community" in the fundamental education program for public health nurses, so that they can detect changes in public health from health data and analyze the existing health activities of municipalities.

Our seminar program contains not only statistics but also health guidance skills entitled e.g. "Health guidance that strikes a deep chord in people's heart", "Health support based on a behavior change theory", "Communication skills to have people spiritually lighter for the purpose of team-work improvement", etc., as shown in Fig.1.

Figure 1. Schematic diagram of "HIMUKA Health Research Seminar – HIMUKA Health Cloud –

HIMUKA Health Research Seminar
〜HIMUKA Health Cloud〜
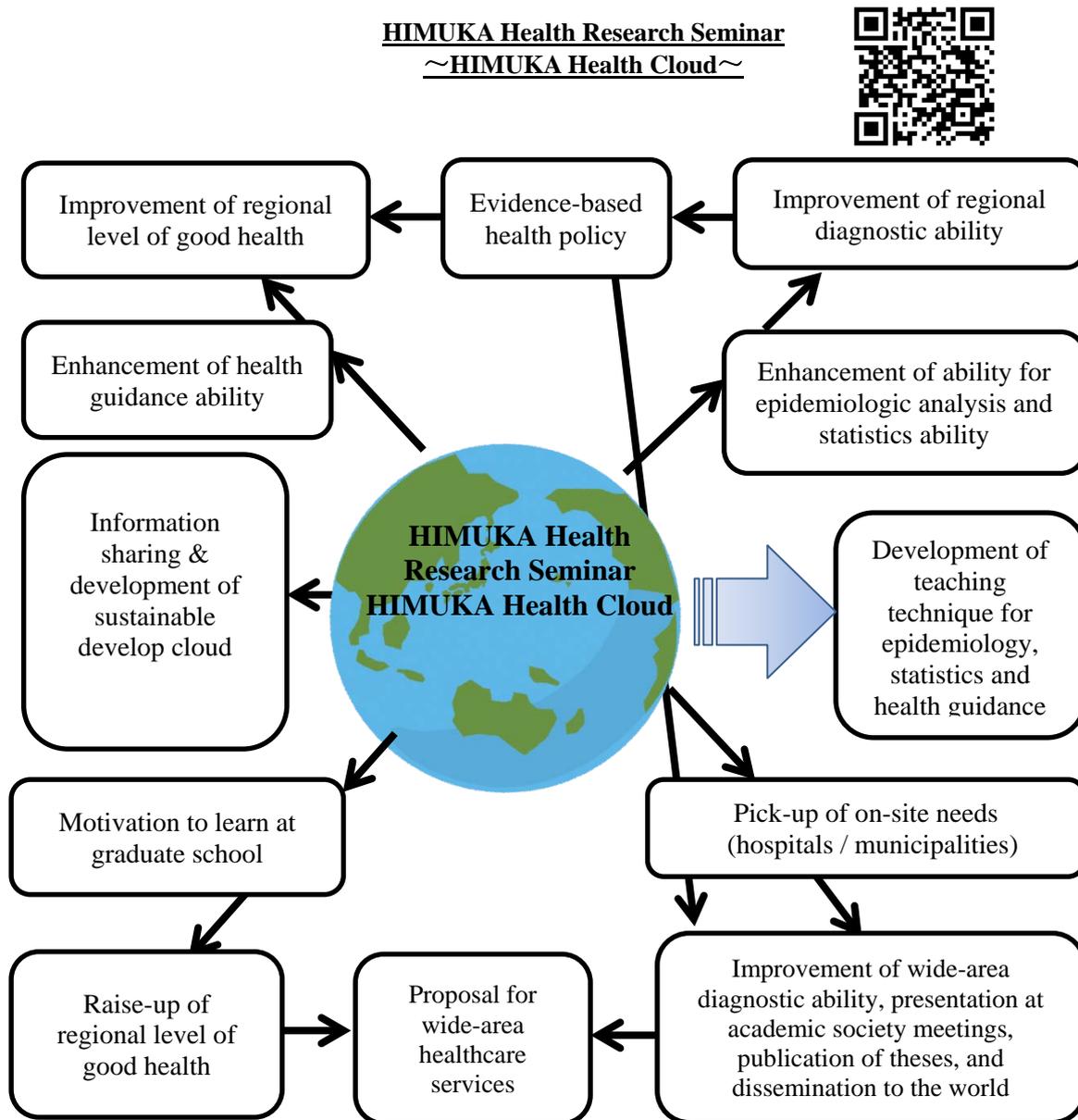
The principal for healthcare is residents of the community, and the healthcare services should eventually be effective for the residents. Therefore, we have constituted the seminar also in consideration of a spreading effect from the job site to the residents in order to "link to the job site".

Conclusions

Eighty-three percent of the participants (public health nurses) in the first seminar on statistics and health guidance had difficulty in statistical analyzes of data. The participants' desire was to learn the "Analytical methods using Excel" and "Visualization of data by creating tables and figures". These results were taken into consideration for the subsequent seminar plans, and the total number of participants successfully increased up to 545 in 2 years. The seminar programs became enriched so that the healthcare

providing people can be satisfied. The seminar is considered to be considerably contributing to the nursing, healthcare, welfare and medical services in the community, such as provision of regional healthcare evidence to the municipalities and conduct of industry-government-academia collaborative studies, etc.

Acknowledgment

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