

Participation rate determines completion rate for specific health guidance as implemented by public health insurers

Ikuyo Fujimaru¹, Norihide Tachi², and Tamie Nakajima¹

¹*Department of Lifelong Sports for Health, College of Life and Health Sciences, Chubu University, Kasugai, Japan*

²*Department of Nursing, College of Life and Health Sciences, Chubu University, Kasugai, Japan*

ABSTRACT

Completion rate for specific health guidance (SHG) based on specific health checkup (SHC) status in Japan is very low. This study aimed to clarify factors affecting the rate using questionnaire survey, which was conducted by mail between December 2016 and January 2017 for insurers in the Tokai Region of Japan. The subjects were 69 insurers and the collection rate was 25.1%. The SHG participation rate was 26.3%, and the SHG completion rate was even lower (23.6%) than the participation rate. The rate was significantly lower in dependents than in insured persons. Multiple regression analysis with SHG completion rate as the dependent variable indicated that only “participation rate in SHG” was positively related to completion rate. With SHG participation rate as the dependent variable, however, having an insurer who “implemented SHG,” “provided a thorough explanation to the subscribers of the objectives and significance of SHC and SHG when the programs were begun,” and “provided health guidance to non-obese individuals” and SHC implementation rate were positively correlated with participation rate. Multiple regression analysis using completion rates for the two types of SHG, i.e., motivational and active support, as the dependent variables indicated that SHG participation rate was a positive factor for each type. Participation rate in each type was positively correlated to “ex-post assessment of the SHG,” and/or insured persons. The primary factor affecting SHG completion rates was the SHG participation rate. It is also important, however, that insurers encourage participation of subscribers, especially dependents, in SHG.

Keywords: completion rate, participation rate, public health insurer, specific health guidance, subscribers

Abbreviations:

FY: fiscal year

HIS: health insurance societies

MAA: mutual aid associations

MCNHI: municipality-controlled national health insurance

NHIS: national health insurance societies

PDCA: plan-do-check-action cycle

SD: standard deviation

SHC: specific health checkups

SHG: specific health guidance

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Corresponding Author: Ikuyo Fujimaru, PhD

Department of Lifelong Sports for Health, College of Life and Health Sciences, Chubu University, 1200 Matsumoto-cho, Kasugai 487-8501, Japan

Tel: +81-568-51-6438, Fax: +81-568-51-5370, E-mail: fujimaru@isc.chubu.ac.jp

INTRODUCTION

The specific health checkups (SHC, tokutei-kenkoshinsa) and specific health guidance (SHG, tokutei-hokenshido) that became obligatory for public health insurers (insurers) in Japan as of fiscal year (FY) 2008 are an important part of lifestyle-related disease prevention with an emphasis on primary prevention measures.¹ Individuals aged between 40 and 74 who are insured by Japanese public health insurers are eligible for these programs. In FY2015 the national average SHC participation rate (percentage of individuals who received SHC) of all subscribers was 50.1%, which did not reach the reference value of 70% that had been established by the national government.^{2,3} The national average SHG completion rate (equivalent to the “implementation rate for SHG of national government” as defined by the Ministry of Health, Labour and Welfare) was 17.5%. Although the SHG completion rate has shown a gradual increase over time, it still falls far short of the reference value of 45%.³ There are two types of SHG, namely, motivational support and active support; the completion rate for the former was 21.4% while that for the latter was 13.9%, indicating that active support has a lower completion rate.² Medical insurance subscribers (subscribers) are broadly divided into two groups: insured persons and their dependents. The completion rate among the former was 18.1% while that among the latter was 6.5%, indicating that the completion rate was lower among dependents.²

The objective of SHG is the improvement of the health-related habits of individuals who are at risk of lifestyle-related diseases, especially cardiovascular diseases. To specifically identify individuals who would benefit from this program, subscribers are screened through SHC, which include inspection items designed to detect signs of metabolic syndrome. First, obese individuals (except those already undergoing treatment) are identified by their waist circumference (criteria: 85 cm for men, 90 cm for women) or BMI (criteria: 25). Next, based on their blood glucose levels, blood pressure, lipid levels, and smoking status (total: four items), they are further recommended for one of the two SHG courses: SHG with motivational support (dokiduke-shien) and that with active support (sekyokuteki-shien).¹

Completely outside this system, “health guidance” is provided to non-obese individuals who are therefore not eligible for SHG but whose high blood glucose levels or hypertension indicates that they are at risk of cardiovascular disease.^{1,4}

Multiple studies of previous versions of SHG have reported that they were effective in the prevention of lifestyle-related diseases. Individuals who have undergone SHG have shown improved waist circumference, body weight, and inspection items at their SHC the following year.⁵⁻¹⁰ In comparison to individuals who did not undergo SHG, individuals who did were more likely to engage in exercise or physical activity and less likely to eat snacks at night or between meals more than three times a week.⁵ Other benefits included reduction of medical costs. For example, those who underwent SHG were able to delay the start of new treatment with drugs,⁷ and the medical costs associated with lifestyle-related diseases were found to have decreased.^{11,12} However, some studies have expressed doubt regarding their effectiveness, claiming, for example, that they were unrelated to the need for drug treatments associated with metabolic syndrome or outpatient medical costs¹³ and that the improvements in inspection items were not maintained.¹⁴

Insurers are making efforts to improve completion rates. Initial SHG interviews are conducted as either individual or group interviews,⁴ Okamura et al reported that initial interviews for SHG provided by municipality-controlled national health insurers (MCNHI) led to increases in the completion rate when the interviews were conducted as individual interviews on a strictly appointment-only basis.¹⁵ The completion rate is still lower compared to that of reference value.³ Thus, there is a need to survey both insurers and subscribers to identify the reasons for failure to complete SHG.

Therefore, we first conducted a survey of insurers. Specifically, we conducted a cross-sectional survey of all insurers located in three prefectures within the Tokai region of Japan (Aichi, Gifu, and Mie Prefectures) to gather information about SHG implementation and to elucidate the factors related to completion rates.

MATERIALS AND METHODS

Subjects

The survey was conducted after review and approval by the Institutional Review Board of Chubu University (No. 280090). The subjects were insurance organizations listed in the June 2016 edition of the *National Insurers Registry*.¹⁶ They included 260 insurers located in Aichi, Mie, and Gifu Prefectures as well as 31 seaman's insurance organizations, national public service mutual aid associations, and Promotion and Mutual Aid Societies of Japan for Private Schools that were located outside of the three above-mentioned prefectures in the Tokai Region of Japan, for a total of 291 organizations. The survey was an anonymous, self-administered questionnaire. It was conducted on a mail-in basis over a two-month period from December 2016 to January 2017. The surveyed insurers were distributed the questionnaire sheet with a written explanation that their private information would be protected and that there were no conflicts of interest.

Survey contents

We surveyed the status of SHC and SHG implementation in FY2015. One insurer provided responses for FY2016. The details of the questionnaire are shown below:

Basic attributes

The following basic attributes were assessed through the survey: role of the responder (the person directly in charge of SHC and SHG) within the insurance organization, the type of insurer, number of subscribers of each type (insured persons and dependents), numbers of individuals eligible for SHC and of those who actually received the checkup, target numbers for SHG and those who actually enrolled in and completed the program, numbers of individuals eligible for motivational and active support, and numbers of those who participated and completed each form of SHG.

Survey questions about legal obligation and initiatives for both SHC and SHG

To elucidate the relationship between the legal obligation of insurers to provide SHC and SHG and the actual completion rates of these programs, we asked all insurers to respond "yes" or "no" to the following four aspects: "Implement SHC and send the results," "Implement SHG," "Evaluate long-term changes related to SHC and SHG," and "Emphasize the importance of SHG."

Next, we asked them to respond "yes" or "no" to the following three questions: "Do you provide a thorough explanation to the subscribers of the objective and significance of SHC and SHG when the program is begun?," "Do you provide awareness-raising explanations to enhance healthy behavior to individuals who are provided only with information post-SHC?," and "Do you implement health guidance for non-obese individuals with risk factors for cardiovascular disease?"

SHG initiatives

We asked respondents to provide their SHG initiations were asked to respond either "yes" or "no" to the following three questions: "Do you provide repeat SHG to subscribers who are targeted for SHG in multiple years?," "Do you encourage individuals who were recommended

for SHG in a previous year but did not enroll in future years?,” and “Do you conduct ex-post assessment of SHG?”

Analytical methods

The SHC consultation rates were calculated by dividing the numbers of people who received SHC (examinees) by the numbers of eligible clients. The SHG target rates were calculated by dividing the number of people who were targeted for SHG by the number of SHC examinees. The participation and completion rates (percentage who received and completed SHG, respectively) were calculated by dividing the numbers of people who enrolled in and completed each program by the numbers of SHC examinees or SHG targets, respectively. All figures were converted to square roots, and the Kolmogorov-Smirnov test was applied to examine the normalized distributions. Then comparisons of the differences among three groups were performed using the Tukey test. The paired *t*-test was used to analyze the difference between the participation rate and the completion rate of SHG, and the Student’s *t*-test was used to perform comparisons between the two groups.

Single regression analysis was performed among numerical data, i.e., implementation rate for SHC, target rate, and participation and completion rates for SHG. Then, multiple regression analysis was performed with either the completion rate or the participation rate as the dependent variable, and the numerical data, basic attributes and initiatives for which there were significant differences or tendencies associated with the completion rates of the SHG as the independent variables. Similarly, multiple regression analysis was also performed for active and motivational support participation and completion rates as dependent variables and the numerical data, SHG initiatives and subscribers as independent variables. In these analyses, the data set was as follows: the Yes group was 1 and the No group was 0, and dependent group was 1 and insured person group was 0. Statistical analysis was performed, using SPSS Version 23.0 (IBM Corp. Armonk, NY). The criterion of significance was set at $p < 0.05$.

RESULTS

Types of insurers and the size of their subscribers

Responses were received from 73 of the insurers (survey response rate: 25.1%). Of these, four were excluded because they did not indicate the number of clients who had completed SHG. The remaining 69 insurers comprised the analytical population (analytical response rate: 94.5%) (Table 1). Of these, the largest proportion was municipality-controller national health insurance (MCNHI) with 47 insurers (68.2%), followed by health insurance societies (HIS) with 15 insurers (21.7%), national service mutual aid associations and local public service mutual aid associations (MAA) with four insurers (5.8%), and national HIS (NHIS) with three insurers (4.3%).

SHC consultation rate among all insurers

Collectively, the insurers reported an SHC participation rate of 52.5% (Table 2). Although this did not reach the reference level of 70%, it was approximately the same as the FY2015 national implementation rate of 50.1%.^{2,3} The rate was significantly higher in insured persons (56.7%) than that in dependents (43.3%). The participation rate among MCNHI clients was 43.2% and among HIS and MAA was 79.2% and 72.2%, respectively, indicating slightly lower rate than that of respective FY2015 reference value. Data for the rate among NHIS clients showed 37.7%, indicating that the SHC participation rate was much lower than the reference value. No difference in the rate between insured persons and dependents in NHIS was found; however,

Importance of participation rate in SHG

Table 1 Type and number of subscribers for each insurer type

Insurer	n	All subscribers			No. of insured persons				No. of dependents			
		Median	Min.	Max.	Median	Min.	Max.	Median	Min.	Max.		
Municipality-controlled												
NHI (MCNHI) ^a	44	11,105	262	560,560	11,105	262	560,560	-	-	-		
National Health Insurance												
Societies (NHIS)	3	14,907	7,543	20,400	6,848	4,977	10,830	8,059	2,566	9,570		
Health Insurance												
Societies (HIS)	15	7,513	1,118	160,000	4,786	681	77,000	3,577	437	83,000		
Mutual Aid Associations												
(MAA) ^b	4	79,044	2,265	163,609	34,900	1,271	78,054	44,144	994	85,555		
Total	66	11,713	262	560,560	9,315	262	560,560	7,232	437	85,555		

Abbreviations are in parentheses. These data show the subscriber status during FY2015 except for one insurer who submitted data from FY2016.

^aThree insurers who did not indicate the numbers of subscribers were excluded.

^bMAA include both those for national public servants and local public servants.

Table 2 Status of SHC

Insurer (n)	Rate & No. of persons undergoing SHC				Reference values (%) ^a
		All subscribers	Insured persons	Dependents	
All insurers (69)	%	52.5 ± 17.4	56.7 ± 23.5	43.3 ± 11.0 ^b	70
	Numbers	9,651 ± 16,467	8,829 ± 15,227	2,579 ± 3,947	
MCNHI(47)	%	43.2 ± 7.7	43.2 ± 7.7	-	60
	Numbers	21,635 ± 50,928	21,635 ± 50,928	-	
NHIS (3)	%	37.7 ± 14.3	41.1 ± 17.9	30.5 ± 8.9	70
	Numbers	7,170 ± 3,034	4,773 ± 1,662	2,396 ± 1,393	
HIS (15)	%	79.2 ± 3.4	94.2 ± 2.9	46.3 ± 10.1 ^b	85,90
	Numbers	13,424 ± 19,040	89,570 ± 12,491	4,468 ± 6,569	
MAA (4)	%	72.2 ± 9.1	86.5 ± 9.1	41.3 ± 10.5 ^b	90
	Numbers	35,978 ± 37,930	23,377 ± 24,471	12,601 ± 13,493	

“%” indicates consultation rates for SHC and “Numbers” indicates the numbers of individuals who received SHC. Figures are shown as mean ± SD.

Figures in parentheses indicate the number of insurers. Boxes with - indicate “no data.”

^aReference values represent completion rates for SHC indicated by the Ministry of Health, Labour and Welfare (FY2013–FY2017).³

^bSignificant differences were observed between insured persons and dependents (p < 0.05).

it was found for insured persons, indicating an extremely low rate for dependents in HIS and MAA ($p = 0.010$ and $p = 0.001$, respectively).

Changes of SHG target, participation, and completion rates

The SHG mean target rate of all insurers was 13.0% (Table 3A), which was even lower than the FY2015 national average of 16.7%.² The rate among dependents was 6.7%, which was significantly lower than that for insured persons ($p < 0.001$). Within each insurer, the target rates of all subscribers shown did not reach the respective reference. The target rate of dependents was significantly lower than insured persons in HIS and MAA; however, no difference was noted in NHIS.

Comparison of the three groups of target, participation, and completion rates (figures in upper row of Table 3A) for SHG, within the all-insurer group, indicated that although there were significant differences between the target and participation rates as well as between the target and completion rates ($p < 0.001$ for both), there was no significant difference between the participation and completion rates. Similarly, significant differences were observed between the target and participation rates as well as between the target and completion rates when MCNHI, NHIS, HIS, and MAA clients were considered separately ($p < 0.001$ for all). The participation and completion rates were different between subscribers: both the rates were significantly lower in dependents than in insured persons, either in all insurers or in HIS.

The participation rate among SHG targets was 26.3% overall, which was determined to be no more than one-quarter of the targets (Table 3A: figures on the lower row). The mean rate of dependents was significantly lower than that of insured persons. Among insurers, this rate was 26.8% in MCNHI, 29.9% in HIS, and 22.2% in MAA, while it was 5.9% in NHIS, which seemed to be much lower compared to the former three insurers. The rate for dependents in HIS was significantly lower than insured persons, while no difference was observed between both in NHIS and MAA.

The mean completion rate among SHG targets (Table 3A: figures on the lower row) was 23.6% overall, which was significantly lower than the participation one. Although this fell short of the 45% reference value, it was higher than the FY2015 national rate of 17.5%.² The completion rate among MCNHI clients was 23.8% (national average: 23.6%), which was also significantly lower than participation rates. No significant difference was observed between participation and completion rates in other insurers. Within HIS and all-insurer group, the completion rate was significantly lower in dependents than in insured persons.

Among the targets for motivational and active support among all insured persons who enrolled in SHG, the target rates were 8.2% and 5.4%, respectively, which indicated a significant difference between the program types (Table 3B). Similar results were also observed in MCNHI. Among dependents, however, these rates were 4.4% and 2.2%, respectively, which also indicated a significant difference ($p < 0.001$). Similar phenomenon was also observed in HIS and MAA clients. Within the NHIS group, no difference was observed in support type or in subscriber type.

Comparisons of the target, participation, and completion rates for motivational support and active support in all insurers (Table 3B: figures on the upper row) indicated that there were significant differences between the target and participation rates, and between the target and completion rates ($p < 0.001$ for both). However, no significant differences were found between the participation and completion rates for either type of support in insured person and dependents. Similarly, although there were significant differences between the target and participation rates, and between the target and completion rates, for both motivational support and active support provided by each insurer ($p < 0.001$ for both), no differences were also found between the participation and completion rates. Difference in the participation and completion rates between

Table 3 Implementation Status of SHG

Insurer	Target rate			Participation rate			Completion rate			Reference values (%) ^a
	All subscribers	Insured persons	Dependents	All subscribers	Insured persons	Dependents	All subscribers	Insured persons	Dependents	
All insurers (69)	13.0 ± 4.1	13.8 ± 5.2	6.7 ± 1.7 ^d	3.3 ± 2.5 ^b 26.3 ± 18.9	3.5 ± 2.8 ^b 26.6 ± 19.2	0.9 ± 0.9 ^{b,d} 14.1 ± 13.6 ^d	2.9 ± 2.4 ^b 23.6 ± 18.5 ^c	3.2 ± 2.8 ^b 23.9 ± 18.8 ^c	0.8 ± 0.8 ^{b,d} 13.4 ± 13.5 ^{c,d}	45
MCNHI (47)	11.0 ± 2.0	11.0 ± 2.0	-	2.9 ± 2.0 ^b 26.8 ± 19.5	2.9 ± 2.0 ^b 26.8 ± 19.5	-	2.5 ± 1.8 ^b 23.8 ± 18.9 ^c	2.5 ± 1.8 ^b 23.8 ± 18.9 ^c	-	60
NHIS (3)	12.9 ± 4.8	15.5 ± 6.6	6.5 ± 2.2	0.9 ± 0.8 ^b 5.9 ± 5.1	1.1 ± 1.0 ^b 5.8 ± 5.0	0.5 ± 0.4 ^b 6.5 ± 6.0	0.9 ± 0.7 ^b 5.5 ± 4.8	1.1 ± 0.9 ^b 5.5 ± 4.8	0.4 ± 0.4 ^b 5.7 ± 5.9	30
HIS (15)	18.4 ± 3.4	21.0 ± 3.9	6.8 ± 1.8 ^d	5.0 ± 3.2 ^b 29.9 ± 17.5	6.0 ± 3.9 ^b 31.0 ± 18.3	1.0 ± 1.0 ^{b,d} 15.9 ± 15.8 ^d	4.7 ± 3.3 ^b 27.6 ± 18.2	5.6 ± 4.1 ^b 28.5 ± 19.1	1.0 ± 1.0 ^{b,d} 15.4 ± 15.5 ^d	30,60
MAA (4)	16.8 ± 3.8	19.2 ± 4.9	6.2 ± 1.7 ^d	3.3 ± 2.3 ^b 22.2 ± 17.3	3.8 ± 2.7 ^b 22.7 ± 18.0	0.7 ± 0.2 ^b 13.1 ± 5.9	2.9 ± 2.2 ^b 19.9 ± 16.9	3.3 ± 2.5 ^b 20.4 ± 17.5	0.6 ± 0.3 ^b 11.7 ± 7.0	40

Continued

(3B)

Insurer	Target rate						Participation rate ^a						Completion rate					
	Insured persons		Dependents		Insured persons		Dependents		Insured persons		Dependents		Insured persons		Dependents			
	Motivational support	Active support	Motivational support	Active support	Motivational support	Active support	Motivational support	Active support	Motivational support	Active support	Motivational support	Active support	Motivational support	Active support	Motivational support	Active support		
All insurers (69)	8.2 ± 1.8	5.4 ± 4.8 ^c	4.4 ± 1.3 ^d	2.2 ± 1.2 ^{d,e}	2.4 ± 1.8 ^b	1.3 ± 1.9 ^{b,c}	0.7 ± 0.8 ^{b,d}	0.2 ± 0.3 ^{b,d,e}	2.1 ± 1.7 ^b	1.0 ± 1.6 ^{b,c}	27.0 ± 21.4	17.0 ± 16.1 ^{c,e}	18.7 ± 27.2 ^d	9.0 ± 12.8 ^d	0.7 ± 0.6 ^{b,d}	0.2 ± 0.3 ^{b,d,e}		
MCNHI (47)	8.4 ± 1.5	2.6 ± 0.8 ^c	-	-	2.5 ± 1.7 ^b	0.5 ± 0.4 ^{b,c}	-	-	2.2 ± 1.6 ^b	0.3 ± 0.3 ^{b,c}	-	-	-	-	-	-		
NHIS (3)	7.6 ± 1.6	7.9 ± 5.0	4.7 ± 0.6	1.8 ± 1.7	0.6 ± 0.6 ^b	0.8 ± 0.7 ^b	0.4 ± 0.5 ^b	0.2 ± 0.2 ^b	0.6 ± 0.5 ^b	0.5 ± 0.4 ^b	7.8 ± 8.5	7.7 ± 6.7	8.9 ± 8.8	8.8 ± 10.2	7.1 ± 6.3	4.3 ± 3.8		
HIS (15)	7.8 ± 2.7 ^e	12.2 ± 4.0	4.3 ± 1.5 ^b	2.4 ± 1.3 ^{b,c}	2.6 ± 2.1 ^b	3.7 ± 2.7 ^b	0.8 ± 0.9 ^{b,d}	0.3 ± 0.3 ^{b,d,e}	2.4 ± 2.1 ^b	3.2 ± 2.1 ^b	36.8 ± 26.3	31.3 ± 20.8	23.8 ± 33.2	12.6 ± 16.5 ^d	33.4 ± 25.2	27.0 ± 16.8		
MAA (4)	8.0 ± 1.4	11.2 ± 3.6	4.5 ± 1.3 ^d	1.8 ± 0.6 ^{d,e}	1.9 ± 1.5 ^b	2.1 ± 1.7 ^b	0.6 ± 0.3 ^b	0.1 ± 0.1 ^{b,c}	1.7 ± 1.2 ^b	1.6 ± 1.3 ^b	26.9 ± 22.5	22.3 ± 19.9	14.9 ± 9.7	4.9 ± 4.5	23.6 ± 18.7	18.1 ± 16.7		

The figures in the upper and lower rows were calculated by dividing numbers of individuals by numbers who underwent SHC and were targeted for SHG, respectively. Each rate was converted to a square root prior to statistical analysis.

Figures are shown as mean ± SD. Figures in parentheses indicate the numbers of insurers. Boxes with – indicate “no data.”

^aReference values represent completion rates for SHG indicated by the Ministry of Health, Labour and Welfare (FY2013–FY2017).³

^bComparison of the three groups of target rate, participation rate, and completion rate for SHG indicated that there was a significant difference between the target and participation rates and between the target and completion rates (Tukey test, $p < 0.05$).

^cSignificant differences were observed between the participation and completion rates for SHG (paired t -test or t -test, $p < 0.05$).

^dSignificant differences were observed between insured persons and dependents (t -test, $p < 0.05$).

^eSignificant differences were observed between motivational and active support SHG (t -test, $p < 0.05$).

^fData of one insurer was not available.

support types were significant in all and MCNHI and those between insured persons and dependents were significant in all insurers and MAA.

Examination of the data (Table 3B: figures on the lower row) on participation and completion rates for individuals targeted for SHG indicated that there was a difference between the overall rates for active support only in insured persons ($p = 0.049$). This indicates that those who enroll in active support programs are less likely to complete these programs. A significant difference was found between the participation and completion rates for both motivational and active support among MCNHI clients ($p = 0.038$). In other insurers, however, we did not observe the same phenomenon. This indicates that there was a significant number of MCNHI clients who enrolled in both supports but did not complete them.

Single regression analysis among numerical data

SHC implementation and SHG participation rates positively correlated SHG completion rate but not with target rate for SHG (Table 4). For insured persons, completion rate positively correlated participation rate alone for motivational support, whereas SHC implementation and SHG participation rates were positively correlated. For dependents, although there were significant correlations among four numerical data for motivational support, only participation rate was positively correlated with completion rate.

Relation between the SHC and SHG legal obligation and initiatives provided by insurers and completion rates

In response to the first question, 64 insurers (92.8%) replied “yes,” indicating that most insurers provide SHC (Table 5); however, no difference was found in the SHG completion rate between insurers who applied “yes” and “no.” In response to the second question, 62 insurers (89.9%) replied “yes”; among these insurers, the SHG completion rate was 25.1%, which was higher than the rate reported by insurers who replied “no” ($p = 0.004$). As for the third question, there was no difference in completion rate between insurers who applied “yes” and “no”. In response to the last question regarding the legal role, 54 insurers (78.3%) responded “yes,” and the completion rate among these insurers was 25.8%, which was higher than that among those who responded “no” ($p = 0.019$).

Next, we investigated the relation between the status of initiatives and the completion rates. Overall, 62 insurers (89.9%) responded “yes” to the question about the first initiative; among these insurers, the completion rate was high, at 24.9% ($p = 0.016$). The question regarding the second initiative was found to be unrelated to the completion rates. 17 insurers responded “yes” to the last initiative question. Among clients who responded “yes,” the SHG completion rate was 32.0%, which was tended to be higher than the completion rate of 21.0% among clients who responded “no” ($p = 0.062$).

Relation between the initiatives of insurers for motivational/active support and completion rates

Insurers were asked whether clients who were repeatedly targeted for SHG every year were likewise repeatedly offered SHG every year. The completion rates for motivational and active support were not different among those who responded “no,” both insured persons and dependents (Table 6). Many insurer organizations recommended participation in motivational and active support to their clients, but these attempts at persuasion were not reflected in the completion rate. Insurers were also asked about ex-post assessment of SHG. The completion rates for the two types of support among insured persons of insurers who did implement this assessment were significantly higher than those among those of insurers who did not ($p = 0.005$ and $p = 0.027$, respectively). Similar results were observed with regard to motivational support for dependents

($p = 0.024$) but not for active support.

Table 4 Single regression analysis among four numerical data

Subscribers	Four numerical data	Target rate for SHG	Participation rate for SHG	Completion rate for SHG	
All insurers	Implementation rate of SHC(69)	0.669**	0.230*	0.232*	
	Target rate for SHG(69)		-0.096	-0.116	
	Participation rate for SHG(69)			0.945**	
Insured persons	Motivational support	Implementation rate of SHC(69)	-0.114	0.197	0.180
		Target rate for SHG(69)		-0.193	-0.192
		Participation rate for SHG(68)			0.949**
	Active support	Implementation rate of SHC(69)	0.815**	0.295**	0.386**
		Target rate for SHG(69)		0.163	0.142
		Participation rate for SHG(68)			0.795**
Dependents	Motivational support	Implementation rate of SHC(22)	-0.259	0.388*	0.392*
		Target rate for SHG(22)		-0.332	-0.407*
		Participation rate for SHG(21)			0.984**
	Active support	Implementation rate of SHC(22)	0.196	0.048	0.256
		Target rate for SHG(22)		0.100	0.180
		Participation rate for SHG(21)			0.835**

Figures in parentheses are numbers of insures.

Figures are shown as Pearson's product moment correlation coefficient of each rate.

* $p < 0.1$ ** $p < 0.05$

Importance of participation rate in SHG

Table 5 Relationship between legal obligation and initiatives related to SHC and SHG programs and completion rates

Program contents	All subscribers		p
	n	Mean \pm SD	
Legal obligation			
Implement the SHC and send the results			
Yes	64	23.8 \pm 19.0	0.951
No	5	20.9 \pm 10.1	
Implement SHG			
Yes	62	25.1 \pm 18.7 ^a	0.004
No	7	9.9 \pm 8.8	
Evaluate long-term changes in SHC and SHG			
Yes	39	26.0 \pm 19.9	0.125
No	30	20.6 \pm 16.3	
Emphasize the importance of SHG			
Yes	54	25.8 \pm 19.3 ^a	0.019
No	15	15.7 \pm 12.9	
Initiatives			
Do you provide a thorough explanation to the subscribers of the objective and significance of SHC and SHG when the program is begun?			
Yes	62	24.9 \pm 18.7 ^a	0.016
No	7	12.1 \pm 12.2	
Do you provide awareness-raising explanations to enhance healthy behavior to individuals who are provided only with information post-SHC?			
Yes	44	26.2 \pm 20.3	0.108
No	25	19.2 \pm 13.8	
Do you implement health guidance for non-obese individuals with risk factors for cardiovascular disease?			
Yes	17	32.0 \pm 26.8	0.062
No	49	21.0 \pm 14.4	

Completion rates were calculated by dividing the numbers of individuals who completed SHG by the numbers of those targeted. Each rate was converted to a square root prior to statistical analysis.

^aSignificant differences were observed between “Yes” and “No” (*t*-test, *p* < 0.05).

Table 6 Relationship between initiatives related to SHG programs and completion rates

Type of support	SHG initiatives	Insured persons			Dependents		
		n	Mean \pm SD	p	n	Mean \pm SD	p
Do you repeatedly offer SHG to subscribers who are repeatedly targeted for SHG?							
Motivational support	Yes	57	29.0 \pm 22.5	0.125	13	24.3 \pm 33.7	0.302
	No	12	17.0 \pm 11.6		9	10.9 \pm 10.9	
Active support	Yes	57	17.4 \pm 16.9	0.833	13	13.0 \pm 15.1	0.075
	No	12	15.2 \pm 13.1		9	3.3 \pm 5.3	
Do you recommend SHG to individuals who were previously targeted for SHG but did not enroll?							
Motivational support	Yes	46	27.4 \pm 22.0	0.316	6	35.0 \pm 45.1	0.094
	No	22	24.7 \pm 20.4		13	14.0 \pm 15.3	
Active support	Yes	46	15.1 \pm 15.0	0.575	6	14.7 \pm 16.6	0.457
	No	22	19.6 \pm 17.8		13	8.5 \pm 11.6	
Do you perform ex-post assessment of SHG?							
Motivational support	Yes	37	30.9 \pm 20.6 ^a	0.005	10	29.5 \pm 36.2 ^a	0.024
	No	25	17.3 \pm 10.3		10	9.1 \pm 11.9	
Active support	Yes	37	18.3 \pm 15.5 ^a	0.027	10	10.5 \pm 14.8	0.559
	No	24	10.4 \pm 7.3		10	6.6 \pm 10.5	

Completion rates were calculated by dividing the number of individuals who completed SHG by the targets. Each rate was converted to a square root prior to statistical analysis.

^aSignificant differences were observed between “Yes” and “No” (*t*-test, *p* < 0.05).

Multiple regression analysis of factors related to the completion and participation rates of SHG

We performed multiple regression analysis with completion rate as the dependent variable and participation rate, SHC implementation rate, and four initiatives related to or tending to related to SHC and SHG completion rates as the independent variables (Table 7). We were able to extract only “participation rate” as a positive factor (Model 1). We then repeated multiple regression analysis without the use of “participation rate” (Model 2). SHC implementation rate, “Implementing SHG as legal obligation,” and “Providing health guidance to non-obese subscribers who have risk factors” were positively correlated with completion. Thus, there was consistency in the three factors that showed a strong relation between completion and participation rates.

Next, since the participation rate was found to be strongly related to completion rate, we performed multiple regression analysis with participation rate as the dependent variable and the factors used in Model 1 of completion rate analysis as the independent variables. The three aforementioned factors and “Providing thorough explanations of the objectives and significance of SHG prior to the start of the program” were observed to be positively correlated (Model 1).

Table 7 Multiple regression analysis of factors that influence the completion and participation rates for SHG

Dependent variable	Independent variable	Model 1			Model 2				
		B	(95% CI)	β	p	B	(95% CI)	β	p
Completion rate	Participation rate	0.942	(0.836, 1.048)	0.940	< 0.001				
	Completion rate for SHC	0.026	(-0.114, 0.167)	0.017	0.711	0.411	(0.016, 0.078)	0.263	0.016
	Implement SHG	0.110	(-0.452, 0.673)	0.018	0.696	2.064	(0.772, 3.357)	0.344	0.002
	Emphasize the importance of SHG	0.076	(-0.328, 0.479)	0.017	0.709	0.642	(-0.352, 1.636)	0.146	0.201
	Provide a thorough explanation to the subscribers of the objective and significance of SHC and SHG when the program is begun	-0.090	(-0.642, 0.462)	-0.015	0.745	1.250	(-0.075, 2.574)	0.208	0.064
Participation rate	Completion rate for SHC	-0.087	(-0.469, 0.294)	-0.021	0.649	0.921	(0.012, 1.829)	0.218	0.047
	Implement SHG	0.409	(0.084, 0.734)	0.262	0.015				
	Emphasize the importance of SHG	2.075	(0.815, 3.335)	0.346	0.002				
	Provide a thorough explanation to the subscribers of the objective and significance of SHC and SHG when the program is begun	0.602	(-0.367, 1.570)	0.137	0.219				
	Provide health guidance to non-obese individuals with risk factors for cardiovascular diseases	1.423	(0.131, 2.714)	0.237	0.031				
		1.070	(0.185, 1.956)	0.253	0.019				

B is the partial regression coefficient. β is the standardized partial regression coefficient.

The completion rate for SHC was used figures divided individuals who completed by SHC targets. The completion and participation rates were used figures divided individuals who participated and completed by SHG targets, respectively. Each rate was converted to their square roots prior to statistical analysis. When the dependent variable was the completion rate, the R^2 (coefficient of determination) for Model 1 was 0.894, and for Model 2 was 0.332. For models using the participation rate as the dependent variable, $R^2 = 0.363$. In multiple regression analysis: "Yes" was 1 and "No" was 0.

Table 8 Multiple regression analysis of the completion and participation rates for motivational and active support

Dependent variable	Independent variable	Model 1			Model 2				
		B	(95% CI)	β	p	B	(95% CI)	β	p
Completion rate of motivational support	Participation rate of motivational support	0.951	(0.873, 1.028)	0.958	<0.001				
	Completion rate of SHC	-0.042	(-0.161, 0.077)	-0.026	0.484	0.262	(-0.079, 0.603)	0.168	0.129
	Target rate	-0.280	(-0.710, 0.151)	-0.060	0.200	-1.207	(-2.464, 0.051)	-0.266	0.060
	Insured persons/Dependents	-0.278	(-0.798, 0.242)	-0.053	0.291	-1.687	(-2.114, 0.009)	-0.331	0.029
	Provide SHG to subscribers who repeatedly undergo SHG every year	-0.353	(-0.744, 0.038)	-0.065	0.076	0.740	(-0.088, 2.133)	0.142	0.186
Participation rate of motivational support	Ex-post assessment of SHG	0.150	(-0.177, 0.476)	0.033	0.364	1.495	(0.776, 2.583)	0.337	0.001
	Completion rate of SHC	0.304	(-0.044, 0.652)	0.188	0.086				
	Target rate	-0.936	(-2.200, 0.328)	-0.201	0.144				
	Insured persons/Dependents	-1.515	(-3.025, -0.004)	-0.288	0.049				
	Provide SHG to subscribers who repeatedly undergo SHG every year	1.249	(0.121, 2.377)	0.228	0.030				
Completion rate of active support	Ex-post assessment of SHG	1.479	(0.568, 2.390)	0.325	0.002				
	Participation rate of motivational support	0.652	(0.503, 0.800)	0.699	<0.001				
	Completion rate of SHC	0.334	(0.109, 0.560)	0.232	0.004	0.545	(0.240, 0.850)	0.387	0.001
	Insured persons/Dependents	0.116	(-0.615, 0.846)	0.025	0.753	-0.801	(-1.768, 0.167)	-0.175	0.103
	Provide SHG to subscribers who repeatedly undergo SHG every year	0.468	(-0.279, 1.215)	0.094	0.216	0.766	(-0.255, 1.788)	0.162	0.139
Participation rate of active support	Ex-post assessment of SHG	0.036	(-0.561, 0.634)	0.009	0.903	0.589	(-0.216, 1.388)	0.147	0.149
	Completion rate of SHC	0.319	(-0.025, 0.664)	0.206	0.069				
	Insured persons/Dependents	-1.462	(-2.552, -0.373)	-0.292	0.009				
	Provide SHG to subscribers who repeatedly undergo SHG every year	0.512	(-0.648, 1.673)	0.096	0.382				

Ex-post assessment of SHG

0.880	(-0.030, 1.789)	0.202	0.058
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B is the partial regression coefficient. β is the standardized partial regression coefficient. Completion rate of SHC and target rate were calculated by dividing the numbers of individuals who completed by dividing the numbers of individuals who completed in SHC, completion and participation rates for motivational and active support were calculated by dividing the numbers of individuals who completed and participated in SHG, respectively, by the targets. Each figure was converted to a square root prior to statistical analysis. When the dependent variable was motivational support completion rate, the R^2 (coefficient of determination) for Model 1 was 0.922 and that for Model 2 was 0.287. For models using the participation rate as the dependent variable, $R^2 = 0.316$. When the dependent variable was active support completion rate, the R^2 (coefficient of determination) for Model 1 was 0.648 and that for Model 2 was 0.278. For models using the participation rate as the dependent variable, $R^2 = 0.244$. In multiple regression analysis: Insured persons was 0 and dependent was 1, "Yes" was 1 and "No" was 0.

Multiple regression analysis of factors that are related to the completion and participation rates for motivational and active support

We performed multiple regression analysis on the relation between the completion and participation rates among clients who enrolled in motivational and active support and the initiatives by insurers (Table 8). We were able to extract participation rates alone for motivational support and participation rates and SHC implementation rates for active support as positive factors (Model 1). We then repeated multiple regression analysis, separately for each support type, after removing participation rate from the independent variables (Model 2). As a result, we found that “Ex-post assessment of SHG” had a positive, and dependents had a negative correlation for motivational support. However, for active support, dependents had negative correlation.

We then performed multiple regression analysis with participation rate as the dependent variable, as we had done for motivational and active support, and initiatives that were related to completion rate as the independent variables (Model 1). The results indicated that “Ex-post assessment of SHG,” dependents and “Provide SHG to subscribers who repeatedly undergo SHG every year” were the factors related to participation rate in motivational support, though in active support, dependents alone were the factor.

DISCUSSION

The present study indicated that the primary factor influencing the completion rate of SHG was participation rate in SHG (degree of contribution: 89.4%). The participation rate was positively correlated to the following factors: “implementing SHG and SHC as the obligation of insurers,” “providing health guidance to non-obese individuals who had risk factors,” and “providing thorough explanations of the objectives and significance of SHC and SHG prior to the start of the program.” (Fig. 1). Although low completion rates have been reported to be related to the low participation rate in the past,^{17,18} the fact that participation rate is a definitive factor affecting completion rate has not been previously analyzed. We also found that participation rate was the primary factor related to completion rates of both motivational and/or active support SHG. In both SHG types, the factor other than participation rate with the greatest impact was “dependents” as a negative factor and “Ex-post assessment of SHG” as a positive factor. As for the former factor, insurers should especially encourage dependent individuals to participate not only SHG but also SHC. In addition, as there were significant differences between the participation and the completion rates for all insurers, this study identified the need to focus on the fact that a portion of participants drop out of SHG programs prior to completion.

As indicated above, the primary factor identified as helping to raise the participation rate was “implementation of SHG as the role of insurers.” The provision of SHG is a legal obligation of insurers.¹⁹ The present study found that 90% of the insurers claim the important implementation of such programs, which indicates that 10% do not think so. Our study also found that the SHG completion rate was higher among clients of implementing insurers than among those of non-implementing insurers. This makes it clear that the implementation of SHG as insurer obligation is the definitive influential factor affecting both participation and completion rates. Those targeted for SHG are individuals who have metabolic syndrome or are susceptible to metabolic syndrome and, as such, have a higher risk of developing cardiovascular disease if they do not improve their unfavorable habits. In other words, SHG is a risk-related approach that targets only individuals determined to be at high risk.^{20,21}

Targeted individuals have reported many reasons for declining to participate in SHG, including: “If I participate once in SHG, I don’t have to do it again,” “the SHG intervention is an

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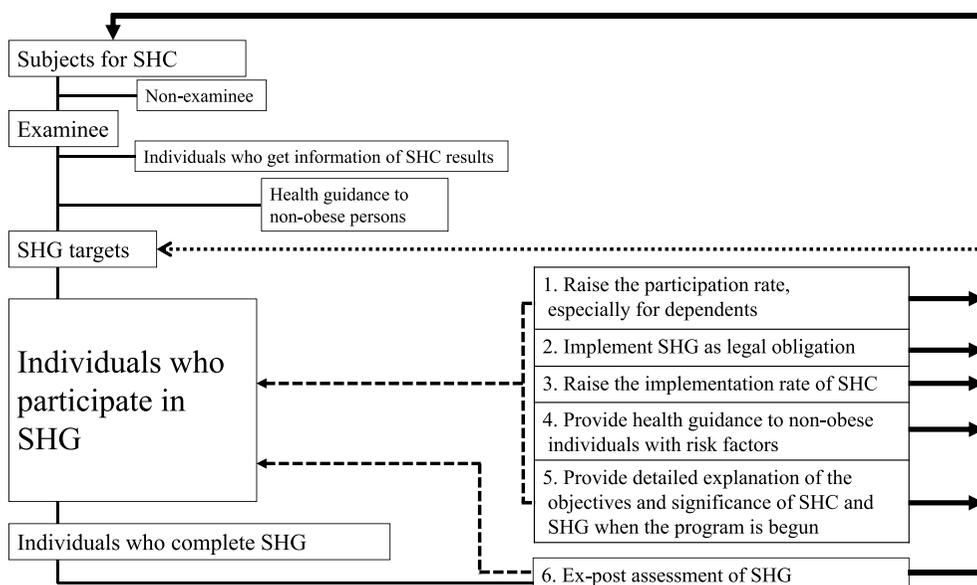


Fig. 1 Factors related to raising the SHG participation rates

Five factors; namely, 1) raising participation rates for dependents, 2) implementing SHG as a legal obligation, 3) raising SHC implementation rates, 4) implementing health guidance for non-obese individuals with risk factors, 5) providing a sufficient explanation of the objective and significance of undergoing SHC and SHG to targeted individuals prior to the start of the SHC program, are shown in order of their standardized partial regression coefficients, which were obtained through multiple regression analysis using completion/participation rate as the dependent variable. Furthermore, “Insured persons/Dependents” or “ex-post assessment of SHG were found to be independently related when the completion/participation rate for motivational and active support. The dashed arrows represent the respective related initiative. The dotted arrow shows the PDCA for SHG that is currently recommended⁴, whereas the solid arrows indicate the PDCA obtained in the present study.

interference,”²² and “targeted individuals are not aware of the necessity of SHG.”²³ Okamura et al reported that 37% and 44% of people who were targeted for motivational support and active support, respectively, did not want to participate in SHG in the future.⁴ These results showed that approximately 40% of the people surveyed did not want to participate. Thus, it is clear that encouraging people to participate in SHG is no easy task. However, Fukuda pointed that among insurers, the system in place for implementing SHG is insufficient,²⁴ and that this may be related to low participation and completion rates. The initial interviews conducted as part of SHG are either individual interviews that take at least 20 minutes or group interviews that take at least 80 minutes.⁴ When group guidance was replaced by individual, appointment-only guidance sessions lasting 45 minutes, the participation rate rose from 19% to 46%.¹⁵ Since we did not ask any questions regarding this point in the present study, we are unable to discuss this particular matter. However, the use of individual interviews in insurers may increase the participation rate.

In a survey of reasons why some individuals did not complete SHG even after they had enrolled, the following explanations were commonly given: users had low awareness of how they could use the SHG system, and the insurance organization employees in charge of the programs were unable to contact the users by telephone or visit them at home.²⁵ These findings indicate the difficulty of promoting continued participation – i.e., reducing the number of drop-outs – and underscore the need for an initiative to this end to be implemented in the future.

Second, this study found that providing health guidance to non-obese individuals with fac-

tors indicating risk of cardiovascular disease was related to SHG participation and completion rates. This program is one approach to caring for high-risk non-obese individuals who are not normally targeted for SHG. The issue of why this service, provided separately as a risk-related approach, would affect the participation and completion rates for SHG is interesting. Many health insurance clients who are not targeted for SHG and are not obese nevertheless have high blood glucose levels, hypertension, and high lipid levels and, therefore, exceed the health guidance criteria. Some insurers are implementing two courses—one for high blood glucose and one for hypertension—for this type of client. These programs are referred to with the umbrella term “Health-Up College.”²⁶ The completion rate among clients of this type whose insurers offer these programs is over 40%, and the availability of such programs is linked to and may be reflected in those insurers’ SHG completion rates. Our study also found that the SHG completion rate among clients of insurers who also implemented health guidance for non-obese individuals was 32.0%, which was tended to higher than the 21.0% completion rate among clients of insurers who did not. Disease prevention programs other than SHG are implemented when there is a need to improve the health of subscribers. Legally, insurers are required to make efforts in this area.²⁷ As it has been demonstrated that such programs other than SHG might be linked to higher completion rates for SHG, it is desirable that insurers continue to put effort into disease prevention programs other than SHG.

Third, the importance of providing explanations of the purpose and benefits of SHG prior to the start of the program, i.e., SHC, and the positive correlation between such explanations and SHG participation and completion rates, are intriguing findings. In the present study, “emphasizing participation in SHG” was not correlated with participation or completion rates for either active or motivational support SHG, however, SHC implementation rate was positively related. When explanations of the contents and importance of SHG were provided to the targeted individuals after they had been targeted for SHG, the explanations did not lead to modifications in their behavior regarding the program. This suggests that such explanations must be provided before the individuals are targeted. In fact, individuals targeted for SHG prefer to be provided with easily understandable explanations of the SHG program contents prior to the SHC.²¹

Our investigation of the implementation status of motivational and active support SHG indicated that the SHG completion rates were higher among clients of insurers who implemented ex-post assessments than among clients of insurers who did not. The ex-post assessment allows the insurer to ascertain whether the targeted individuals’ undesirable lifestyle habits have improved as a result of SHG. This in turn clarifies the significance of SHC and SHG and provides the insurer with knowledge regarding SHG programs that can be put to future use. The implementation of ex-post assessments and the communication of the information thus obtained to all individuals prior to SHC may lead to increased completion rates. Currently, the recommended approach to SHG is a risk-based approach structured according to a plan-do-check-action (PDCA) cycle, which is directly applied to the behavior of individuals targeted for SHG as per the program plans, including plans for ex-post assessments.²⁰ Our results indicated that the creation of an overall plan for SHC and SHG, including “ex-post assessment of SHG” and “health guidance for non-obese individuals,” along with population-approach PDCA that is applied to all targeted individuals prior to the start of the SHC, could increase both participation and completion rates for SHG. Many health guidance results have been obtained through population-approach methods.²⁸⁻³⁰ To raise the completion rate of SHG, this same approach is likely to prove fruitful.

It is also considerably important that low participation of dependents in SHG had a negative impact on the increasing participation and completion rate for motivational and active supports. This has been pointed out in the past;^{3,31} however, we still observed same phenomenon in the program. As no differences were observed between insured persons and dependents regarding the

SHG initiative, as shown in Table 6, the lowered participation rate for dependents might not be due to difference in insurer program. It is notable that no dependent completed active support in NHIS group, suggesting that insurer type might affect the completion rate. Thus, our present study could not answer why participation rate for dependents was apparently lower than that for insured persons. This should be addressed by future studies.

Finally, the completion rate for SHG's active support is generally lower than that for motivational support SHG. In this study, we found similar results. In the multiple regression analysis, several SHG initiatives were positively related to the participation rate, i.e., completion one, for motivational support, whereas it did not show any relation to the participation rate for active support, suggesting that current obligatory initiatives for insurers might not be appropriate or effective to increase the completion rate. As current analysis was conducted under low data collection rate, further study to clarify the reason of the lower completion rate of active support should be warranted. In 2018, Ministry of Health, Labour and Welfare made the duration of active support not only for 6 months but also 3 months.³² It is of interest whether this new re-examination will affect the increase in completion rate for active support.

The subjects of this study were all insurers located mainly in three prefectures in the Tokai Region of Japan, and the response rate was low, at only 25.1%. Therefore, selection bias may not be controlled though the completion rates for motivational and active supports are consistent with surveys conducted at the national level.² The responders to the questionnaires were nearly all persons directly in charge of the SHC and SHG programs (94.2%). Therefore, we believe that there was no data bias in this study. In addition, we did not include gender and age structure in this survey; therefore, we could not investigate how these factors influence the SHG implementation. Finally, as we conducted a survey of insurers in this study, we were unable to ascertain directly from the insured persons or dependents their level of awareness, behavior modifications, and other factors related to SHG. In particular, we were unable to identify the reasons why some of those who enrolled failed to continue until completion. Further research into these issues is required.

CONCLUSION

The results of this study indicated that the primary factor that has the highest degree of influence on SHG completion rate is participation rate. In addition, this study found that if the insurers are working hard on their initiatives, completion rate might increase. However, initiatives for active support might not be enough functioned, and therefore, those are re-examined future.

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CONFLICTS OF INTEREST

The authors declare that have no competing interests.

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