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SOCIOMEDICAL FACTORS AFFECTING PARTICIPATION IN SCREENING PROGRAM ON CEREBRO- AND CARDIO- VASCULAR DISEASE

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ABSTRACT

In 1984 the Public Health Bureau of Nagoya City began a new health check-up program to encourage citizens aged 40 years to have a medical examination. The rate of participation was 46.6 % greater than that of the previous program; however, at about 16 %, it was still low. From the survey in Moriyama Ward following results were suggested. Housewives and female part-time workers who had not had a health examination during the previous year showed participation rates of 32.7 % and 42.4 %, respectively. It would seem that the low rate of participation in the health examination program conducted in the metropolitan area by the municipal Public Health Bureau is due to the existence of many medical care facilities, and the fact that 64.6 % of men and 52.6 % of women had undergone a medical examination in the year preceding the program.

Total screening rates became 69.7 % in males and 66.0 % in females. Participation rates of 32.7 % and 42.4 % were achived by unemployed women and by women with part-time employment, respectively, who had no experience of screening in the previous year. Total screening rates were 63.7 % for the unemployed women and 82.1 % for the part-time women.

Key Words: direct mail, participation rate, screening program

INTRODUCTION

Cerebro- and cardio- vascular disease have been a major cause of death during the past forty years[1]. In many patients the disease is not diagnosed as such until it has reached a serious stage. This is because precritical symptoms are often easily overlooked.

However, the early detection of hypertension, diabetes and renal disease is made possible by measures such as blood pressure measurement, urinalysis, and electrocardiography. Such screening measures are generally safe, inexpensive, and efficient, and may be available in Japan at locations such as hospitals, health centers, and workplace clinics.

The Nagoya Public Health Bureau has conducted a health examination program for inhabitants aged 35 year over with the objective of making such screening available to the general population in addition to normal health care facilities. However, the participation rate has been low: a rate of only about 10 % was recorded for 1983.

In order to increase this rate of participation, a new examination program called the Nagoyaka program was created, and direct mail to individuals inviting them to participate in the program was added to the conventional means of informing the population of the program's existence. The effect

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of direct mail on the participation rate of the health check-up program and the characteristics of the participants, however, were not studied systematically.

The goals of the present research are to determine the efficacy of the direct invitation in increasing the rate of participation in the program; to clarify the sociomedical characteristics of those who participated in the program as a result of this encouragement; and to investigate the reasons for the low participation rates in health examination programs conducted in a metropolitan area.

METHODS

The Nagoyaka program was begun in 1984. citizens aged 40 years were encouraged to participate in the program by direct mail sent once yearly. The medical examination consists of investigation for pulmonary diseases by chest XP and acreening for cerebro- and cardio- vascular disease and diabetes by blood pressure measurement, urinalysis, serum GOT, GPT and total cholesterol measurement, ECG and fundoscopy, and are made available at 16 health centers, 800 clinics and, 200 hospitals.

Among all subjects of health check-up program aged 35 and over, citizens aged 41 to 49 and residing in the same area who participated in the ordinary examination program were selected as a control group. Notification and encouragement to attend the ordinary examination program consisted of advertisements in Nagoya's monthly newsletters, circulars delivered door-to-door, and posters displayed on public bulletin boards located every 300 to 500 meters along the street; no individual notice was given. The ordinary program was available at the same locations as the Nagoyaka program, to which were added screening programs performed using mobile units at about 400 locations throughout the city each year, which were also available to anyone. These facilities were made available in 1983. The contents of the examination were similar, except that ECG, serum GOT, GPT and total cholesterol measurement and fundoscopy were performed only for approximately 10 % of participants who showed symptoms such as abnormally high blood pressure. Both the Nagoyaka program and the ordinary program were free of charge and available not only at daytime but also at evening in clinics.

The investigation was carried out in Moriyama, one of Nagoya's 16 wards. In 1984, a questionnaire was sent to 2,295 residents of this ward who were all inhabitants born in 1944, together with a direct-mail invitation encouraging participation in the program. The self-administered questionnaire included questions concerning occupation; kind of health insurance; medical examination history for the previous year; presence of chronic disease requiring therapy; attention given exercise, dietary, smoking and drinking habits in order to promote health; and interest in having a physical examination. The question regarding occupation was included because health examinations are held at least once a year at the workplaces of about 58 % of full-time employees[2,3].

Responders were followed up for one year whether or not they participated in the program. Participants at clinics and hospitals were reported to a health center. And participants at health centers, clinics, and hospitals were compared with the list of respondents.

Statistical analysis of the data in Table 1 was performed using the Z test and others were performed using 2×2 χ^2 test for males and females, independently. Stepwise multiple regression analysis using the F test was performed by SPSS[4] of Nagoya University Computation Center.

RESULTS

Table 1 shows the rates of participation in the screening programs for cerebro- and cardio-vascular disease, hypertension, and diabetes that were conducted in Nagoya City. Participation in the ordinary program in 1983 and earlier was 9 % or 10 %, rising to about 11 % in 1984 to 1988. The proportion of participants who received their examinations at clinics and hospitals rose from about

Table 1. Changes in Participation Rate (%) Before and After Introduction of the Nagoyaka Program

Year	1981	1982	1983	1984	1985	1986	1987	1988
Nagoyaka Program								
at health centers	–	–	–	12.8**	10.3**	11.2**	8.5*	8.0**
at clinics or hospitals	–	–	–	4.3**	3.2**	6.6**	8.0**	7.3**
total	–	–	–	17.1**	13.5**	17.8**	16.5**	15.3**
Ordinary Program								
at health centers or mobile units	9.0	9.6	8.2	8.6	8.5	7.9	8.1	7.4
at clinics or hospitals	–	–	1.5	2.1	2.5	2.8	3.2	3.6
total	9.0	9.6	9.7	10.7	11.0	10.7	11.3	11.0

(*: $P<0.05$, **: $P<0.01$)

Notes: – The Nagoyaka program was begun in 1984.
– The ordinary program became available at clinics and hospitals in 1983.
– The ordinary program was expanded in 1987 to included serum GOT, GPT and total cholesterol measurements for all participants.

Nagoyaka Program:
1. Promotion: direct correspondence
2. Location: 16 health centers, 200 hospitals, 800 clinics
3. Content: chest XP, blood pressure, urinalysis, ECG, fundoscopy serum GOT, GPT and total cholesterol
4. Subjects: approximately 35,000 citizens of Nagoya City, aged 40 years

Ordinary Program:
1. Promotion: advertisement by city newsletters, door-to-door circulars and posters
2. Location: 16 health centers, 200 hospitals, 800 clinics, and mobile units at 400 sites
3. Content: chest XP, blood pressure, urinalysis
(Approximately 10% of participants examined by ECG, fundoscopy serum GOT, GPT and total cholesterol)
4. Subjects: approximately 300,000 citizens of Nagoya City, aged 41 to 49 years

20% to 33% during these five years.

Participation in the Nagoyaka program was high in its first year, at 17.1%. Despite some variations, the rate remained significantly higher, statistically speaking, than that for the ordinary program, in every year since 1984. The rate of participation at clinics and hospitals rose from 4.3% in 1984 to 7.3% in 1988, and the proportion of these participants when compared with overall participation rose from 25% to 48% during this time. This would seem to indicate that it is easier and more convenient in this busy age for participants to visit clinics near their homes or workplaces where they can get the program both in the daytime and at evening.

In 1984 a survey was conducted by a questionnaire that was sent to 2,295 residents (1,159 males, 1,136 females) of Moriyama Ward who were born in 1944, together with a direct-mail invitation encouraging participation in the Nagoyaka program. Responses were received from 1,992 people (998 males, 994 females) for an overall response rate of 86.8% (86.1% of all males, 87.5% of all females).

Table 2 presents the sociomedical conditions of the residents of Moriyama Ward who responded to the questionnaire. About 76% of the male respondents were employed full-time; 20.9% were self-employed, and 3.3% were unemployed. Of the female respondents, 16.4% were employed full-time, 27.5% were employed part-time, 10.4% were self-employed, and 45.7% were unemployed.

The survey results indicate that 64.6% of the men and 52.6% of the women had undergone an

examination, either at their workplaces, health center, mobile unit, clinic, or hospital, within the previous year. Of the men, 43.4 % were examined at their workplaces, while 18.2 % were examined at clinics or hospitals. In contrast, the percentage of women who had been examined at their

Table 2. Sociomedical Status of Residents of Moriyama Ward Aged 40 Years, from Survey

Items	Male	Female	Total
Status of employment:			
employed full-time	753 (75.5 %)	163 (16.4 %)	916 (45.9 %)
employed part-time	3 (0.3 %)	273 (27.5 %)	276 (13.9 %)
self-employed	209 (20.9 %)	103 (10.4 %)	312 (15.7 %)
unemployed	33 (3.3 %)	455 (45.7 %)	488 (24.5 %)
History of examination during the previous year:			
at workplace	433 (43.4 %)	125 (12.6 %)	558 (28.0 %)
at hospital or clinics	181 (18.2 %)	216 (21.7 %)	397 (19.9 %)
at a health center or mobile unit	30 (3.0 %)	182 (18.3 %)	212 (10.6 %)
no history of examination	354 (35.4 %)	471 (47.4 %)	825 (41.5 %)
Presence of chronic disease requiring therapy:			
yes	93 (9.3 %)	62 (6.2 %)	155 (7.8 %)
no	905 (90.7 %)	932 (93.8 %)	1837 (92.2 %)
Interested in healthy dietary habits:			
yes	243 (24.3 %)	365 (36.7 %)	608 (30.5 %)
no	755 (75.7 %)	629 (63.3 %)	1384 (69.5 %)
Trying to increase exercise time:			
yes	247 (24.7 %)	234 (23.5 %)	481 (24.1 %)
no	751 (75.3 %)	760 (76.5 %)	1511 (75.9 %)
Trying to restrict smoking or drinking:			
yes	123 (12.3 %)	42 (4.2 %)	165 (8.3 %)
no	875 (87.7 %)	952 (95.8 %)	1827 (91.7 %)
Total	998 (100.0 %)	994 (100.0 %)	1992 (100.0 %)

Table 3. The Rate of Respondents Who Expressed an Interest in Participating in the Nagoyaka Program, According to Status of Employment

Items	Male	Female
Status of employment:		
employed full-time	249 (33.1 %)**	56 (34.4 %)**
employed part-time	3 (0.0 %)	173 (63.4 %)
self-employed	134 (64.1 %)**	60 (58.3 %)
unemployed	17 (51.5 %)	330 (72.5 %)**
Total	400 (40.1 %)	619 (62.3 %)

Total number of each cell shown in Table 2 (*: $P<0.05$, **: $P<0.01$)

workplaces was only 12.6 %, less than a third of the figure for men. On the other hand, 18.3 % of the women had received examinations at a health center or mobile unit, which is six times the number for men.

Only 7.8 % of the residents surveyed were under treatment for chronic disease. The proportions of men and women under such treatment were not significantly different.

Many of the respondents gave attention to exercise and dietary, drinking and smoking habits with an eye toward inproving their health. About 31 % (24.3 % of men, 36.7 % of women) admitted to some concern about their dietary habits. About 8 % of the respondents were trying to restrict smoking and drinking, and about 24 % were making positive efforts to exercise in order to promote good health.

The proportion of respondents who expressed an interest in participating in the Nagoyaka program is shown in Table 3, according to occupation. Interest in the program was expressed by a high proportion (about two-thirds) of the men and women in the unemployed, self-employed and

Table 4. Participation Rate in the Nagoyaka Program in Moriyama Ward in 1984, According to Sociomedical Status

Items	Male	Female
Status of employment:		
employed full-time	68 (9.0 %)**	21 (12.9 %)**
employed part-time	0 (0.0 %)	69 (25.3 %)
self-employed	34 (16.3 %)**	16 (15.5 %)**
unemployed	2 (6.1 %)	164 (36.0 %)**
History of examination during the previous year:		
total with history of examination	52 (8.1 %)**	137 (26.2 %)
At workplace	36 (8.3 %)	18 (14.4 %)**
At hospital or clinics	10 (5.5 %)*	46 (21.3 %)*
At a health center or mobile unit	6 (20.0 %)	73 (40.1 %)**
No history of examination	52 (14.7 %)**	133 (28.2 %)
Presence of chronic disease requiring therapy:		
yes	9 (9.7 %)	14 (22.6 %)
no	95 (10.5 %)	256 (27.5 %)
Interested in healthy dietary habits:		
yes	25 (10.3 %)	103 (28.2 %)
no	79 (10.5 %)	167 (26.6 %)
Trying to increase exercise time:		
yes	19 (7.7 %)	67 (28.6 %)
no	85 (11.3 %)	203 (26.7 %)
Trying to restrict smoking or drinking:		
yes	12 (9.8 %)	10 (23.8 %)
no	92 (10.5 %)	260 (27.3 %)
Total	104 (10.4 %)	270 (27.2 %)

Total number of each cell shown in Table 2 (*: $P<0.05$, **: $P<0.01$)

part-time employee groups, which have few daily opportunities to undergo a medical examination. In contrast, only about one third of the full-time employees, who have more opportunities to receive examination at the workplace, expressed an interest in participating; however, actual participation was limited to only about one-fourth of the men and about one-half of the women of those who expressed an interest in participating.

Table 4 analyzes participation in the Nagoyaka program for Moriyama Ward according to sociomedical factors. A high 36.0 % rate of participation was found among unemployed women, who had little opportunity to receive examinations at the workplace. Women with part-time employment followed, with a rate of 25.3 %. The rate for self-employed men was 16.3 %, and that for male full-time employees was 9.0 %.

The 6.1 % rate of participation by unemployed men seems low. This is perhaps due to the fact

Table 5. Participation Rate in the Nagoyaka Program by Those with No History of Examination During the Previous Year, According to Status of Employment

Items	Male	Female
Status of employment:		
employed full-time	25 (13.7 %)	6 (15.0 %)
employed part-time	0 (0.0 %)	36 (42.4 %)
self-employed	25 (17.9 %)	11 (10.9 %)
unemployed	2 (6.9 %)	80 (32.7 %)
Total	52 (14.7 %)	133 (28.2 %)

Total number of each cell was those with no history of examination during the previous year, according to status of employment

Table 6. The Numbers and Rate of Participants in Nagoyaka Program in Moriyama Ward, 1984, by Status of Employment and Place of Screening

	Male		Female	
Status of employment	Health center No. (%)	Hospitals Clinics No. (%)	Health center No. (%)	Hospitals Clinics No. (%)
employed full-time	47 (6.2)	21 (2.8)	10 (6.1)	11 (6.7)
employed part-time	0 (0.0)	0 (0.0)	48 (17.6)	21 (7.7)
self-employed	21 (10.0)	13 (3.0)	8 (7.8)	8 (7.8)
unemployed	1 (3.3)	1 (3.0)	132 (29.0)	32 (7.0)
Total	69 (6.9)	35 (3.5)	198 (19.9)	72 (7.3)

Total number of each cell shown in Table 2

Table 7. Solution of Multiple Regression Analysis of Participation with Regard to Sociomedical Factors (excludes those with history of examination at workplace during the previous year)

that the number of employed men covered by the survey was small.

The rates of participation by those who had had no history of medical examination during the previous year were 14.7 % for men and 28.2 % for women. Participation by those who had been examined at a health center or mobile unit was high, with 40.1 % of women and 20.0 % of men participating. Participation by those who had been examined at hospitals or their workplaces during the previous year was low both for men and women.

Table 5 further analyzes the participation of those who had not undergone any examination during the previous year, according to their status of employment.

Table 6 showed the numbers and rate of participants in Nagoyaka program in Moriyama Ward, 1984, by status of employment and place of screening.

Sixty eight males (9.0 %) and 21 females (12.8 %) of full-time worker were screened at the health center or clinics, although they had an opportunity to get screening every year at their workplace.

Sixty nine males (6.9 %) and 198 females (19.9 %) had visited health center for the screening. This may be due to the improved program with increased number of examination and to the efforts of health center for long.

No relationship was found between examination history during the previous year and either the presence of chronic disease or concern regarding diet, exercise, or drinking and smoking habits.

Because the sociomedical factors studied here are closely interrelated, a multiple regression analysis was performed to exclude these relationships. Table 6 gives the results of this analysis, which uses nine variables to express sociomedical status, but excludes those who had received medical examinations at the workplace during the previous year. The female sex was positively associated with participation in the program. Full-time employment showed a strong negative association, followed by self-employment. The factor that was most associated with participation in the program was status of employment. The unemployed showed the highest rate of participation, followed by those with part-time employment. However, the R^2 of 0.058 accounts for only about 6 % of the variance in the outcome, which is thought to be due to the existence of other factors. It is possible that R^2 was low because of the large number of people who had hoped to participate, but did not.

DISCUSSION

Nagoya City is located in the central region of Japan. As of 1985 it was Japan's fourth largest city, with a population of 2,211,345 inhabitants and an area of 327.9 km^2. Moriyama is one of the sixteen wards which make up the city. In 1985 it had a population of 137,207 people, and an area of 33.8 km^2. The ward has 32 clinics and 12 hospitals in addition to its health center, which is located in the southern area.

According to the results of the National Census of 1985[5] in Moriyama Ward, the rate of employed residents aged 40 was 78.9 % among men and 47.3 % among women. The rate of respondents who were employed was 75.8 % for men and 43.9 % for women; therefore, there was not much bias according to status of employment.

Forty-year-old individuals were chosen as the focus of the Nagoyaka program because this is the mid-point of life in Japan, where average life expectancy is 80 or more years. The name of the Nagoyaka program of course includes the name of Nagoya City; but it also means "peaceful" in Japanese. The program was so named to inspire those contacted to take steps toward a healthy and happy life by participating in the program.

The Nagoyaka program succeeded in increasing the rate of participation by an average of 46.6 % over the rate of the ordinary examination program after 1984. Two reasons can be given for this. First, direct mail may be more effective in encouraging participation than the newsletters, posters, and circulars used to promote the ordinary program. Second, the expanded contents of the

Nagoyaka examination may be more attractive.

It is thought that the promotion by direct mail had a great impact on participation. And also the improved program with increased number of examinations might be attractive to the inhabitants. Full-time workers who have had opportunity of screening every year at their workplaces, visited haelth center for participating in the new program in the daytime. Participation at health centers or mobile units has tended to decrease since 1986. This drop has been compensated by increased participation at clinics and hospitals, which may be considered to result from the availability of the examinations in a variety of locations.

As Table 1 shows, participation in both programs has been decreasing at health centers and increasing at clinics and hospitals. It has been reported that people tend to participate in examination programs at locations where they have received an examination in the past[6-10]. The familiarity of the health centers is attributable in many cases to examinations conducted at health centers as part of some government program. Women, in particular, seek vaccinations and examinations for their children through such programs, and so their aquaintance with the health centers may have led them to participate in the examination programs there. However, this study shows that the use of hospitals and clinics is increasing even among women. As people become more accustomed to going to nearby clinics and hospitals for examinations, they will find them more convenient. This will accordingly increase the chance that they will participate at these locations.

This study investigated the idea that concern for health as expressed through attention to dietary, exercise, drinking and smoking habits, was a reason for participation in the program. Contrary to previous reports[7,8], the results of our study did not indicate such a relationship, possibly because participants had decided to participate for reasons other than concern for health.

It has been reported in the past that people with chronic disease are more likely to participate than healthy persons[7,8,11]. This trend was not confirmed in the present study. This may be attributable to the fact that in Nagoya City there are many medical facilities such as clinics and hospitals which are easy to use and offer services no different from the program.

A close relationship was found to exist between participation in the program, status of employment, and past history of medical examination. The rate at which people with jobs were examined at their workplaces was high, and their participation in the program was correspondingly low. The rate of participation among the self-employed and housewives was high, since they do not have the employed person's opportunity to obtain examinations. However, the rate of participation by self-employed women was extremely low; and although it was raised by this program, it did not reach the same level as overall participation by women.

The relationship between kind of health insurance and other sociomedical factors was examinend, but the result was almost same as status of employment.

The Nagoyaka program, which was the subject of this study, succeeded in achieving an raised level of participation; nonetheless, the average participation rate of 16 % was relatively low. This is probably due to the fact that a large number of the people surveyed (64.6 % of men, 52.6 % of women) had already undergone some sort of examination during the previous year and the majority of the participants had already been examined as well.

Total screening rates in Moriyama Ward became 69.7 % in males and 66.0 % in females. Participation rates of 32.7 % and 42.4 % were achived by unemployed women and by women with part-time employment, respectively, who had no experience of screening in the previous year.

Total screening rates were 63.7 % for the unemployed women and 82.1 % for the part-time women.

Given that participation did not achieve the potential indicated by the level of interest expressed in the program, it would seem advisable to continue the Nagoyaka program without changes in the methods currently in use.

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