



# Implementation and Results of a Survey on Safe Community Programs in Gangbuk-gu, Korea: Focusing on Participants at a Local Public Health Center

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**Objectives:** The purpose of this study was to investigate the current status of and problems with the Safe Community Programs in Gangbuk-gu, one of the 25 districts of the capital city of Korea.

**Methods:** The study subjects were 396 individuals who were involved in Safe Community Programs between 2009 and 2011. We examined the effectiveness and willingness of respondents to participate as a safety leader of the Safe Community Program with a questionnaire. We examined the injury death rates of Gangbuk-gu by using of the death certificate data of Korea's National Statistical Office. Descriptive statistics and chi-squared tests were used.

**Results:** The effectiveness of programs did not differ but active participation differed significantly among subjects ( $p < 0.05$ ). The injury death rate of Gangbuk-gu as a whole increased during the implementation period. However, senior safety, in particular, may be a helpful program for reducing injuries in Gangbuk-gu.

**Conclusions:** This study suggests that the lack of active participation may be a major problem of Safe Community Programs in Gangbuk-gu. Therefore, Safe Community Programs should be expanded to the entire district of Gangbuk-gu and more active participation programs should be developed.

**Key words:** Safe Community, Mortality, Active participation

## INTRODUCTION

As injury came to be perceived as a disease, John Gordon, a researcher in public health in the 1940s, proposed that injury, like other types of disease, had epidemic events, seasonal changes,

long-term trends, and high-risk groups in its demographic distribution. Accordingly, an idea began to emerge that properly controlling the three factors related to diseases—the host, agent (or vector), and environment—can prevent injury [1]. In that regard, community-based programs for injury prevention are being considered an essential element in lowering injury rates of communities and improving health and safety [2].

The concept of “Safe Communities” was introduced at the First World Conference on Accident and Injury Prevention held in Stockholm, Sweden in 1989, and a declaration that “All human beings have an equal right to health and safety” was adopted at the conference [3]. Safe Communities refer to municipalities such as counties, cities, or districts of cities that carry out projects for safety promotion; prevention of injury, violence,

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and suicide; and management of damage by natural disasters for all age groups, sexes, and geographical areas. These communities also join international networks according to authorization processes [4].

Since 1989, about 280 communities have been approved to be Safe Communities across the world, including ones in Sweden, Norway, Australia, New Zealand, China, Vietnam, South Africa, the US, and Canada [5]. In Korea, the city of Suwon was first approved to be a Safe Community [6], and Gangbuk-gu was also granted authentication as an International Safe Community in 2012, after forming organizations for Safe Community Programs and conducting fundamental research since 2008.

Similarly, diverse areas across the world are carrying out Safe Communities Programs. Nonetheless, studies on the evaluation of effectiveness of the programs on injury have not yet been widely performed [7]. Furthermore, research on injury in general in Korea is very rare [8]. Against this backdrop, in this study we introduce the contents of the Safe Communities Program implemented in Gangbuk-gu and identify overall results and problems resulting from the program implementation based on the comparisons between the following: injury death rates of Gangbuk-gu before and after the program; trends in injury deaths between Gangbuk-gu and Seoul metropolitan city; and program participants and beneficiaries' satisfaction with the effectiveness of the program, and their intention to voluntarily participate.

## METHODS

### Evaluation Process of the Safe Communities Program in Gangbuk-gu

The overall framework of the process of evaluating the Safe Communities Program of Gangbuk-gu in this study is as follows (Figure 1). First, to identify the changes in health outcomes in Gangbuk-gu after program implementation, based on death certificate data of the Statistics Korea, we analyzed injury death rates of the area between 2006 to 2008 to identify the initial injury rates before program implementation—when preliminary investigation and research was conducted for setting priorities and developing the program—and between 2009 and 2011—when the program was in full swing. Among injury death rates, we analyzed indexes such as the total injury death rate, road traffic injury death rate, child injury death rate, senior injury death rate, fall mortality rates among the elderly, road traffic injury mortality rate among the elderly, and elderly sui-

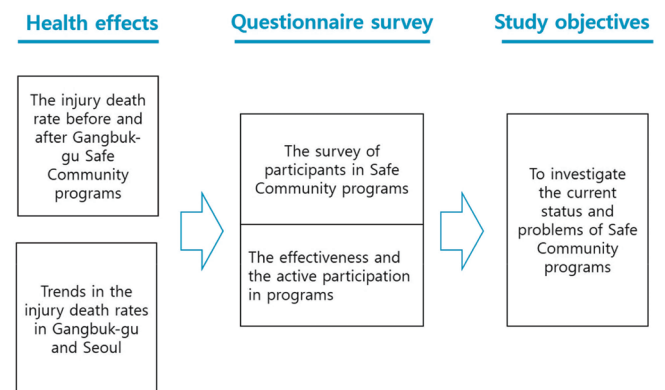


Figure 1. Overview of the study framework.

cide mortality rate. We also analyzed trends in injury death of Gangbuk-gu and Seoul metropolitan city to compare such changes more objectively. Then we identified the level of awareness of the effectiveness of the programs and intention to participate actively by conducting a survey of participants and beneficiaries of the program. We aimed to identify the overall marketability and any problems of the Safe Communities Program in Gangbuk-gu based on the data.

### Study Subjects and Data Collection

The subjects of the survey were 396 community residents who were among participants and beneficiaries of the Safe Communities Program implemented at the Gangbuk-gu Community Health Center. They responded to the survey during a period of about one month (from June 2012 to July 2012). Out of the 396, 50 were participants of the program, that is, "safety leaders," who took leading roles in promoting the projects related to Safe Communities Program in their communities. The rest, 346 out of 396, were beneficiaries, that is, those who benefited by participating in a specific program, but not as a leader.

### Research Instruments

The contents of the survey comprised general characteristics of the study subjects, effectiveness of the Safe Communities Program, and intention to participate as a safety leader. Among the general characteristics of the subjects, we examined factors including sex, age, address, occupation, education level, number of households, and monthly income. To identify the effectiveness of the program and intention to participate as a safety leader, we surveyed if each of the 25 sub-projects under seven major categories (Table 1)—child safety, suicide prevention, road safety, local community safety, fire safety, se-

**Table 1.** The contents of the Safe Community Programs of Gangbuk-gu, Korea

Category	Program contents	Organizer	Subjects (n)	Year	Features
Child safety	1. Children's Health Discovery Hall & Musical on Health	Gangbuk Public Health Center	36 843	2009-2012	Oral health management education, education for nutrition, and for drinking and smoking prevention
	2. Maintaining a school safety guard	Seongbuk Education Office	2572	2011	Life safety guard, traffic safety guard, guard against violence
	3. Subsidize safety insurance for a third or more children	Gangbuk District Office	597	2010-2012	Subsidize insurance for a third or more newborn babies delivered by couples living in Gangbuk district
	4. Improvement of child protection zone	Gangbuk District Office	31	2006-2011	Install traffic safety infrastructure such as sidewalks and speed bumps
	5. Education to prevent children from injury	Gangbuk Public Health Center, National Rehabilitation Center	3162	2010-2012	Teach knowledge required to prevent injury and cultivate good safety practices
Suicide prevention	6. Early detection of people at high risk for suicide	Gangbuk Public Health Center	800	2009-2012	Screen groups at high risk of suicide
	7. Alcoholism prevention for the homeless	Gangbuk District Alcohol Center	1066	2012	Subsidize medical expenses, case control services
	8. Mentoring elders at risk of suicide	Gangbuk Public Health Center	70	2009-2012	Mentoring groups at high risk of suicide & mental health survey
Traffic safety	9. Crackdown on vehicles violating important regulations to prevent road traffic injury	Gangbuk Police Station, Gangbuk District Office, Anti-crime Patrol	27 135	2009-2012	Crackdown on violating important regulations
	10. Campaign and safety education to reduce road traffic injury	Gangbuk Police Station, Green Mom Society	19 304	2009-2012	Safety education for the vulnerable against road traffic, campaign to reduce road traffic injury
	11. Improving traffic facilities	Gangbuk Police Station, Gangbuk District Office	255	2009-2012	Maintenance and improvement of traffic safety infrastructure
Local community safety	12. Day of safety inspection	Gangbuk District Office, Town Residents Center, Village Coordinators Association	9925	2009-2012	Campaign to prevent accidents and respond to natural disasters
	13. Inspection on specific dangerous facilities	Gangbuk District Office	284	2010-2012	Safety control of potentially dangerous facilities
	14. Repair assistive devices of the disabled	Gangbuk District Office, Village Residents Center	336	2010-2012	Subsidize cost to repair motorized wheelchairs and scooters
	15. Development programs for safety leaders for local areas	Gangbuk Fire Station	1518	2011-2012	Safety consultant for the underprivileged
Fire safety	16. Safe mountain climbing campaign and safe mountain climbing class	Mt. Bukhan National Park Office	99 966	2009-2012	Safety rules for mountain climbing, warm up prior to climbing
	17. Safety inspection of firefighting equipment	Gangbuk Fire Department	20 585	2010-2012	Fire safety inspection
	18. Fire and disaster safety training	Gangbuk Fire Department	33 086	2011-2012	Practice reporting a fire, operating a fire extinguisher, and evacuation from a fire
	19. Publicity & education on fire safety and establishment of "fire-free" towns	Gangbuk Fire Department	2358	2010-2011	Mass media and face-to-face fire safety promotion
Senior safety	20. Fall prevention classes	Gangbuk Public Health Center, Gangbuk branch of the Korean Senior Citizens Association	66 514	2009-2012	Improve muscular strength and flexibility by regular exercise
	21. Nutrition and exercise program for physically weak seniors	Gangbuk Public Health Center, Mental Health Center, regional medical care non-governmental organization	663	2009-2012	Prevent physically weak seniors from injury and from advancing into the stage of long-term care
	22. Rental of walking canes to seniors at high risk of a fall	Gangbuk Public Health Center	1330	2010-2012	Confirm whether seniors use a cane or not and provide education on fall prevention
	23. Improve safety of high-risk facilities in senior citizens centers and the dwellings of seniors	Gangbuk District Office, Town Community Center, Gangbuk Self-support Center	29	2009, 2011	Repair safety bars, anti-skid surfaces, lighting fixtures, wallpaper, and kitchen appliances
First aid & emergency medical service	24. Rescue and first aid training	Gangbuk Public Health Center	17 249	2009-2012	Basic life-saving skills training, use of AED, CPR practice
	25. Install automatic defibrillators	Gangbuk Public Health Center	127	2009-2012	Install AEDs in places at high risk of accidents

AED, automated external defibrillator; CPR, cardiopulmonary resuscitation.

nior safety, and first aid and emergency medical services—was effective in injury prevention in Gangbuk-gu, and whether respondents intended to voluntarily participate in the program as a safety leader.

### Statistical Analysis Methods

SPSS version 12.0 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis of this study's data. Descriptive statistics were used for the analysis of the general characteristics of the study subjects, and the Pearson's chi-squared test was used for the analysis of the effectiveness of the sub-projects and intention to voluntarily participate. We calculated injury death rates per 100 000 with the total population of Gangbuk-gu as the denominator and the number of deaths by injury as the numerator.

## RESULTS

### Injury Incidence Before and After Safe Communities Program Implementation

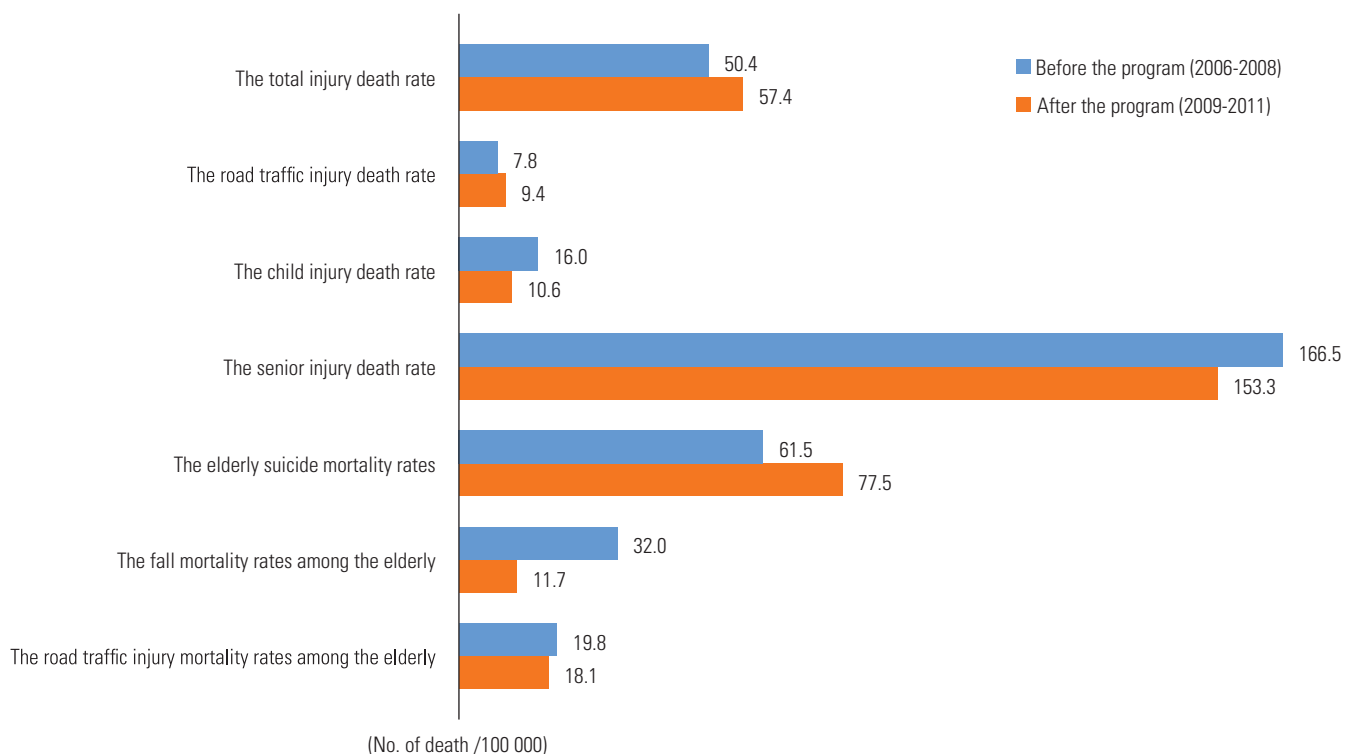
The results of the analysis of injury death rates in Gangbuk-gu between 2006 and 2008 before implementing the program, and 2009 to 2011 after implementing the program, showed that the total injury death rates increased slightly from 50.4

before the program to 57.4 per 100 000 after the program. More specifically, road traffic injury death rates increased from 7.8 to 9.4 people. However, child injury mortality rates and seniors' injury death rates went down from 16.0 to 10.6 and 166.5 to 153.3 people, respectively. A closer look into the injury of the elderly showed that elderly suicide mortality rates went up from 61.5 to 77.5, while fall mortality rates among the elderly dropped from 32.0 to 11.7, and road traffic injury mortality rates among the elderly went down from 19.8 to 18.1 people (Figure 2).

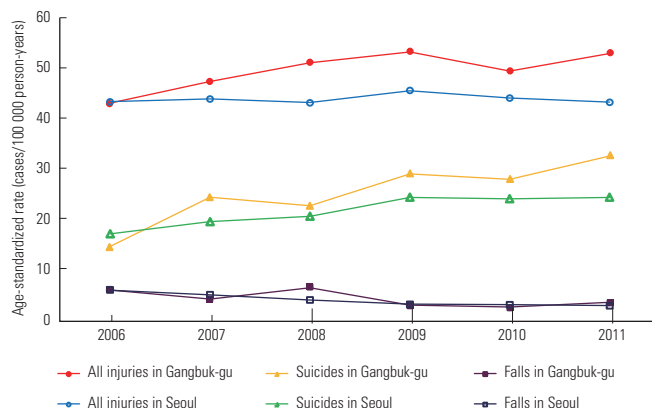
Analysis of the age-standardized injury death rate trends between 2006 and 2011 in both the entire Seoul metropolitan city and Gangbuk-gu demonstrated that there was no significant difference between the injury mortality trend of the two areas before (2006 to 2008) and after (2009 to 2011) the program. Gangbuk-gu showed higher fall-induced mortality rates than Seoul in 2008, before the program (Figure 3).

### General Characteristics of Study Subjects

We identified the general characteristics of the 396 subjects of the survey based on the five categories of sex, age, occupation, education level, and income level, and the findings were as follows: The number of women (268, 67.7%) was twice that



**Figure 2.** The current injury status before and after Gangbuk-gu Safe Community Programs, 2006-2011.



**Figure 3.** Age-standardized rates of the injury deaths in Gangbuk-gu and Seoul between 2006 and 2011.

of men (128, 32.3%); those who were between 50 to 59 years old (135, 34.1%) were the majority of the subjects, followed by those who were between 60 and 69 (72, 18.2%) and 40 and 49 (66, 16.7%). By occupation, 135 (34.1%) were non-manual and 31 (7.8%) were manual workers. The majority belonged to the “other” group, including students, homemakers, and the unemployed (217, 54.8%). By education level, the largest group, 163 (41.2%), had a college education or more, 145 (36.6%) had a high school degree, and 84 (21.2%) had a junior high school education or less. Income brackets were categorized by the number of households, and the total monthly income level of the number of households. High income earners were the largest group, with 130 subjects (32.8%), followed by 128 (32.3%) who belonged to moderate earners, and 60 (15.2%) who belonged to low earners (Table 2).

### Survey on Program Effectiveness and Participants and Beneficiaries’ Intent to Volunteer as a Leader

When we surveyed the effectiveness of the program and participants and beneficiaries’ intention to voluntarily participate in the program, the respondents reported that all of the sub-projects of the Safe Communities Program were effective. For the beneficiaries, the project to improve child protection zones was found to be the most effective project (272 respondents, 78.6%), while rental of walking canes to the seniors at high risk of a fall was the most effective project for participants (39 respondents, 78.0%). There was no statistical difference between participants and beneficiaries in the satisfaction level with the effect of all of the sub-projects of the Safe Communities Program. Intention to voluntarily participate in the program as a safety leader showed a low intention of nearly 30% over-

**Table 2.** Distribution of demographic characteristics of the study subjects

	n (%)
Sex	
Male	128 (32.3)
Female	268 (67.7)
Age (y)	
20-29	46 (11.6)
30-39	42 (10.6)
40-49	66 (16.7)
50-59	135 (34.1)
60-69	72 (18.2)
≥ 70	31 (7.8)
Occupation	
Non-manual	135 (34.1)
Manual	31 (7.8)
Other	217 (54.8)
Highest level of education completed	
College	163 (41.2)
High school	145 (36.6)
Elementary/middle	84 (21.2)
Family income	
High	130 (32.8)
Moderate	128 (32.3)
Low	60 (15.2)

all. The project for rescue and first-aid training was found to be the one in which beneficiaries showed the highest intention to voluntarily participate (133 respondents, 38.4%), whereas participants showed the highest intention to voluntarily participate in Children’s Health Discovery Hall & Musical on Health and the project for maintaining a school safety guards (24 respondents each, 48.0%). Intention to voluntarily participate was statistically significantly lower among the beneficiaries than the participants in the following projects ( $p < 0.05$ ) (Table 3): Children’s Health Discovery Hall & Musical on Health; maintaining a school safety guards; improving traffic facilities; inspection on specific dangerous facilities; fire and disaster safety training; fall prevention classes; and rental of walking canes to seniors at high risk of a fall.

## DISCUSSION

When implementing safety promotion programs in communities, long-term programs, rather than short-term ones, are essential because effectiveness of the program in the broader community is difficult to achieve in programs with short spans

**Table 3.** Beneficiaries and participants' satisfaction with the Safe Community Programs and their intent to participate

Contents of the programs	Effectiveness of the programs			Active participation				
		Beneficia- ries	Participants	p-value <sup>1</sup>	Beneficia- ries	Participants	p-value <sup>1</sup>	
1. Children's Health Discovery Hall & Musical on Health	Yes	226 (65.3)	34 (68.0)	0.71	Yes	99 (28.6)	24 (48.0)	0.006
	No	120 (34.7)	16 (32.0)		No	247 (71.4)	26 (52.0)	
2. Maintaining a school safety guard	Yes	245 (70.8)	37 (74.0)	0.64	Yes	114 (32.9)	24 (48.0)	0.04
	No	101 (29.2)	13 (26.0)		No	232 (67.1)	26 (52.0)	
3. Subsidize safety insurance for a third or more children	Yes	168 (48.6)	25 (50.0)	0.85	Yes	88 (25.4)	14 (28.0)	0.70
	No	178 (51.4)	25 (50.0)		No	258 (74.6)	36 (72.0)	
4. Improvement of child protection zone	Yes	272 (78.6)	36 (72.0)	0.29	Yes	112 (32.4)	20 (40.0)	0.28
	No	74 (21.4)	14 (28.0)		No	234 (67.6)	30 (60.0)	
5. Education to prevent children from injury	Yes	239 (69.1)	35 (70.0)	0.89	Yes	102 (29.5)	19 (38.0)	0.22
	No	107 (30.9)	15 (30.0)		No	244 (70.5)	31 (62.0)	
6. Early detection of people at high risk for suicide	Yes	221 (63.9)	27 (54.0)	0.18	Yes	108 (31.2)	22 (44.0)	0.07
	No	125 (36.1)	23 (46.0)		No	238 (68.8)	28 (56.0)	
7. Alcoholism prevention for the homeless	Yes	232 (67.1)	32 (64.0)	0.67	Yes	98 (28.3)	19 (38.0)	0.16
	No	114 (32.9)	18 (36.0)		No	248 (71.7)	31 (62.0)	
8. Mentoring elders at risk of suicide	Yes	239 (69.1)	31 (62.0)	0.31	Yes	107 (30.9)	20 (40.0)	0.12
	No	107 (30.9)	19 (38.0)		No	239 (69.1)	30 (60.0)	
9. Crackdown on vehicles violating important regulations to prevent road traffic injury	Yes	267 (77.2)	38 (76.0)	0.85	Yes	109 (31.5)	22 (44.0)	0.08
	No	79 (22.8)	12 (24.0)		No	237 (68.5)	28 (56.0)	
10. Campaign and safety education to reduce road traffic injury	Yes	252 (72.8)	35 (70.0)	0.67	Yes	111 (32.1)	20 (40.0)	0.27
	No	94 (27.2)	15 (30.0)		No	235 (67.9)	30 (60.0)	
11. Improving traffic facilities	Yes	262 (75.7)	37 (74.0)	0.79	Yes	107 (30.9)	24 (48.0)	0.02
	No	84 (24.3)	13 (26.0)		No	239 (69.1)	26 (52.0)	
12. Day of safety inspection	Yes	211 (61.0)	32 (64.0)	0.68	Yes	103 (29.8)	20 (40.0)	0.14
	No	135 (39.0)	18 (36.0)		No	243 (70.2)	30 (60.0)	
13. Inspection on specific dangerous facilities	Yes	256 (74.0)	36 (72.0)	0.76	Yes	92 (26.6)	22 (44.0)	0.01
	No	90 (26.0)	14 (28.0)		No	254 (73.4)	28 (56.0)	
14. Repair assistive devices of the disabled	Yes	254 (73.4)	36 (72.0)	0.83	Yes	98 (28.3)	20 (40.0)	0.09
	No	92 (26.6)	14 (28.0)		No	248 (71.7)	30 (60.0)	
15. Development programs for safety leaders for local areas	Yes	226 (65.3)	33 (66.0)	0.92	Yes	107 (30.9)	20 (40.0)	0.12
	No	120 (34.7)	17 (34.0)		No	239 (69.1)	30 (60.0)	
16. Safe mountain climbing campaign and safe mountain climbing class	Yes	239 (69.1)	37 (74.0)	0.48	Yes	92 (26.6)	19 (38.0)	0.09
	No	107 (30.9)	13 (26.0)		No	254 (73.4)	31 (62.0)	
17. Safety inspection of firefighting equipment	Yes	256 (74.0)	35 (70.0)	0.55	Yes	109 (31.5)	19 (38.0)	0.36
	No	90 (26.0)	15 (30.0)		No	237 (68.5)	31 (62.0)	
18. Fire and disaster safety training	Yes	258 (74.6)	36 (72.0)	0.70	Yes	112 (32.4)	24 (48.0)	0.03
	No	88 (25.4)	14 (28.0)		No	234 (67.6)	26 (52.0)	
19. Publicity & education on fire safety and establishment of "fire-free" towns	Yes	226 (65.3)	32 (64.0)	0.85	Yes	93 (26.9)	20 (40.0)	0.05
	No	120 (34.7)	18 (36.0)		No	253 (73.1)	30 (60.0)	
20. Fall prevention classes	Yes	223 (64.5)	34 (68.0)	0.62	Yes	89 (25.7)	21 (42.0)	0.02
	No	123 (35.5)	16 (32.0)		No	257 (74.3)	29 (58.0)	
21. Nutrition and exercise program for physically weak seniors	Yes	231 (66.8)	36 (72.0)	0.46	Yes	100 (28.9)	21 (42.0)	0.06
	No	115 (33.2)	14 (28.0)		No	246 (71.1)	29 (58.0)	
22. Rental of walking canes to seniors at high risk of a fall	Yes	240 (69.4)	39 (78.0)	0.21	Yes	111 (32.1)	24 (48.0)	0.03
	No	106 (30.6)	11 (22.0)		No	235 (67.9)	26 (52.0)	
23. Improve safety of high-risk facilities at senior citizens centers and the dwellings of seniors	Yes	251 (72.5)	37 (74.0)	0.82	Yes	106 (30.6)	22 (44.0)	0.06
	No	95 (27.5)	13 (26.0)		No	240 (69.4)	28 (56.0)	
24. Rescue and first aid training	Yes	260 (75.1)	36 (72.0)	0.63	Yes	133 (38.4)	23 (46.0)	0.31
	No	86 (24.9)	14 (28.0)		No	213 (61.6)	27 (54.0)	
25. Install automatic defibrillators	Yes	235 (67.9)	32 (64.0)	0.58	Yes	118 (34.1)	20 (40.0)	0.41
	No	111 (32.1)	18 (36.0)		No	228 (65.9)	30 (60.0)	

Values are presented as n (%).

<sup>1</sup>Chi-squared test.

owing to limitations in the scope and focus of the programs. Continuous operation of programs leads to increased awareness of community residents regarding injury prevention and safety and encourages their active participation in the initial stage. Short-term results of the programs, such as changing individuals' risk behaviors, along with achieving the targets of sub-projects can be anticipated. Ultimately, changes in health status such as the reduction in injury incidence rates and mortality due to injury can be expected. In implementing such continuous and long-term programs, management of processes are of the paramount importance. To that end, management of the program takes places in different phases from the analysis of the current status at the planning stage—when feasibility of the program is evaluated—to the process evaluation stage during the implementation of the program, and then to the outcome evaluation stage, in order to determine ways to improve the programs and decide whether to renew them after completion [9]. To develop the Safe Communities Program, in 2008, before launching the program, Gangbuk-gu conducted a survey of 1866 community residents on the level of awareness of the Safe Communities program and priorities for sub-projects. The results showed the need for projects in seven categories: child safety, suicide prevention, road safety, local community safety, fire safety, senior safety, and first aid and emergency medical services. Gangbuk-gu selected 25 sub-projects as priority projects, consulting the contents of the Safe Communities Program and evaluation criteria of another district, Songpa-gu [10], which was authorized as a Safe Community by the World Health Organization before Gangbuk-gu started the program, and had been running the program since 2009.

In this study, we analyzed the injury mortality rates of Gangbuk-gu before and after the program, using death certificate data. The results showed that total injury death rates increased slightly while child injury death rates and seniors' injury death rates decreased, demonstrating that the Safe Communities Program of Gangbuk-gu did not reduce injury deaths significantly. Internationally, a systematic review evaluated whether Safe Communities Programs were effective in lowering injury morbidity and mortality of the total population of 21 communities of countries such as Austria, Sweden, and New Zealand. However, the findings of the survey were inconsistent: Some countries succeeded in reducing injuries in the total population but others did not show any changes [7]: specifically, injury fatalities decreased after the program in Vorarlberg, Austria [11], and the incidences of total injury [12] and injury in chil-

dren [13] and the elderly [14] decreased in Motala, Sweden. In contrast, no difference was seen in the number of hospitalizations due to injury before and after the program in Waitakere, New Zealand [15]. The reason behind the inconsistent findings on the effects of Safe Communities programs on injury among different areas is thought to be attributable to the following: the heterogeneity of program implementation approaches; diversity in efficacy of activities and strategies and intensity of implementation; and methodological limits inherent to community-based evaluations [7]. A closer investigation of international studies appraising the effects of Safe Communities Programs reveals that in the case of Motala, Sweden, no change was seen in severe or fatal traffic-related injuries, while non-fatal injuries decreased by nearly 50% [16]. In addition, the total child injury incidence declined by 25% after the program compared to the rate before the program, and while severe injuries did not show any changes, non-fatal injuries decreased by about 50% [13]. In the meantime, in Kashmar, Iran, fatality rates fell significantly after the program compared to the control group. However, the overall injury incidence trend increased slightly, compared to the trend before the program [17]. The reason behind such trends seems to be the fact that countries that are in their early days of Safe Communities Program implementation, including Iran, have more reports about minor injuries in the early stage of the program because they build an injury registration system specifically for the program. That, in turn, may have made the program seem to have no preventive effects on injury or show reports of even higher total injury incidence. This is a contrast to the situation in countries including Sweden that have a long history of Safe Communities Programs and effectively provide interventions. In such countries, the programs yield more effective outcomes in reducing minor injuries than severe injuries. In countries where Safe Communities Programs are still fledgling—for example, Korea, South Africa, Bangladesh, China, and Vietnam, the effectiveness of the programs has not yet been evaluated concretely [7]. Therefore, collecting data such as the incidence of injury and death longitudinally and conducting studies on the effectiveness of the programs is necessary.

Cho and Park [9] noted that it is important to shift Safe Communities Programs from a practitioner-driven to client-oriented approach in order to induce voluntary participation of members of communities, the clients of the programs, and to disseminate the contents of the programs to others around them as major agents. Therefore, in order to evaluate the satis-

faction level of the participants and identify the problems that have occurred during implementation, we studied the effectiveness of the Safe Communities Program and the degree of voluntary dissemination by participants—those who actively engaged in the program—and beneficiaries—those who only benefited passively from the program—after running the program. The comparison and analysis between the participants and beneficiaries' views on the effectiveness of the program and intention to voluntarily participate in sub-projects of the Safe Communities Program demonstrated the following: There was no significant difference between participants and beneficiaries in the effectiveness of the program. However, beneficiaries' intention to voluntarily participate was significantly lower than that of the participants in some projects. Therefore, we estimate that the dissemination of the injury prevention measures by participants of the program to the people around them as well as the influence of preventive effects may have been weak.

The result of this study also showed that Gangbuk-gu had a very high injury death rate of the elderly, making them a vulnerable group to injury. Worldwide, 28% to 35% of those aged over 65 and 32% to 42% of those aged over 70 experience falls annually [18]. In particular, serious falls are considered a "gateway event" that is, an event that ends the healthy and independent life of an elderly person. Thus, fall prevention is set as a priority agenda among various projects of the Safe Communities Programs for the safety of older adults [19]. For example, Japan, where the health of the elderly has become a major social issue owing to its aged population, offers various programs in communities to prevent accidents among senior citizens. Among various health issues, falls have a major impact on older people's mortality rates: Falls are the second leading cause of injury-caused death by accidents. Therefore, the Japanese government is carrying out fall prevention projects under Safe Community Programs in six regions of Japan [19]. In addition, Shanghai has implemented a Safe Communities Program to prevent falls for adults aged over 60. After the project, the participants' knowledge, attitude, and practice regarding falls was found to have improved [20]. However, changes in patterns of injury incidence in the total population were not evaluated in the Japanese and Shanghai studies.

Furthermore, this study demonstrated that seniors' suicide rates, among various injury death rates of the elderly, increased after the program, which signifies the importance of prevention of seniors' suicide. Recent studies show that lack of social

relationships—besides depression—is the most common risk factor for suicide in the elderly [21–23], highlighting the need for community-based interventions for this issue. In Japan, implementing a community-based suicide prevention program—including mental health workshops, group activity programs, and self-assessment for depression—for people aged over 65 over eight years reduced the suicide incidence rates of the female elderly by 76% [24]. Also, after offering community-based interventions focusing on the empowerment of residents of six rural areas with large geriatric populations in Japan, suicide rates declined to a statistically significant extent [25]. Therefore, communities' continuous efforts to avert elderly suicides through programs like the Safe Communities Program are deemed necessary.

Gangbuk-gu carried out sub-projects under a Safe Communities Program, including projects on education for prevention of child injury and maintaining school safety guards for children's safety. The city of Busan developed a web-based children's safety education program to raise public awareness of the importance of injury prevention and safety promotion for children in an attempt to prevent children's injury. The city is now evaluating the program participants' changes in knowledge, attitudes, and behavior regarding child safety [26].

The limitations of this study include that the total injury incidence, including minor injury incidence, could not be identified, because we used only injury mortality in the evaluation of the Safe Communities Program. In addition, the study did not make direct appraisals as to whether the activities performed by safety leaders and beneficiaries who joined the program influenced injury death rates of the entire Gangbuk-gu district. Hence, it is important to identify the impact of Safe Communities Programs through the analysis of social networks in the future [27,28] to understand how relationships between safety leaders and beneficiaries and the degree of their participation influence injury and death rates in their communities.

Conclusively, the study results showed that beneficiaries of the Safe Communities Program had a relatively low intention to voluntarily participate in the program. Therefore, we can estimate that such a factor can serve as a challenge in implementing the program in terms of disseminating the effects of injury prevention among all of the residents of Gangbuk-gu. Furthermore, it is deemed necessary to carry out programs focusing on the elderly—who have been found to be a group particularly vulnerable to injury—and to maintain intervention programs consistently for the entire elderly population in com-



munities to prevent elderly suicide. In Korea, as Safe Communities Programs have not been implemented extensively, it is difficult to obtain data on changes in injury incidents after implementing the programs. Therefore, in the short and mid-term, it would be necessary to analyze changes in knowledge, attitudes, and behaviors to evaluate individuals' changes in risk behaviors related to accidents in order to determine the effects of Safe Communities Programs. In the long run, conducting longitudinal assessments observing the trends of injury incidence and death or comparing injury incidence between communities that had Safe Communities Programs and control communities will be needed. In Gangbuk-gu, since the Safe Communities Program was implemented mainly through the Community Health Center focusing on vulnerable groups such as older adults, young children, and pregnant women, the program had a limitation in demonstrating its effects on injury prevention in the entire population. Therefore, it is necessary for governmental administrative agencies to take a major role in the implementation of Safe Communities Programs when expanding the programs nationwide because they have the ability to exert a broader influence on communities and the entire population.

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## CONFLICT OF INTEREST

The authors have no conflicts of interest with the material presented in this paper.

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