A prospective study of farm workers: The perceptible change in health & safety awareness and safety performance

[1]JuYoun Kwon, [1]Kyung-Suk Lee, [1]Hye-Seon Chae, [1]Hyo-Cher Kim, [2]Soo-Jin Lee

[1]Department of Agricultural Engineering, National Academy of Agricultural Science, Suwon, South Korea
[2]Department of Occupational and Environmental Medicine, College of Medicine, Hanyang University, Seoul, South Korea

Background

- Agriculture is a dangerous industry, caused by
  - the combination of equipment
  - extreme weather condition
  - working hours
  - elderly workers etc.
- 'Special Act on Improvement of Public Health and Welfare for Agricultural and Fishing Village Residents' in March, 2004
- A project called 'Safety model for farm work' from 2006 to 2014
- The project about the intervention for improving the health and safety of South Korean farmers in a class of every three-year period from 2006 to 2014.

Aim

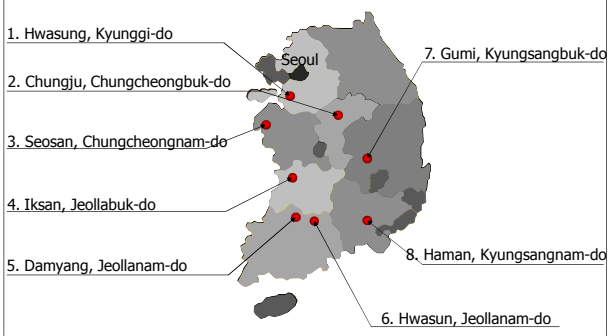
- to investigate the status quo of farm work and find the effect of health education on the farmers' safety behaviour.

Research methods

Experimental design

- The current study about farmers in towns of the 1st class of 'Safety model for farm work'
- A prospective study of Korean farmers living in the eight areas of South Korea once every year from 2006 to 2008
- The questionnaire related to 'Health and safety of town'
  - 'NIOSH criteria'
  - 'Health survey short form-12(SF-12)"
  - 'Awareness of health and safety for occupational injury of farmer'
  - 'The actual conditions of safety handling conditions of agricultural pesticides and machinery'

Map of South Korea



Subject of this study

- 230 respondents: The awareness of health and safety for occupational injury
- 195 households: The actual conditions of safety handling conditions of agricultural pesticides and machinery

Questionnaire design

- Awareness of health and safety for occupational injury
  - dichotomous questions and closed format questions in 2006
  - only dichotomous questions in 2007 and 2008
- The actual states of safety handling conditions of agricultural pesticides and the machinery
  - closed format questions
  - ten surveyors in each region: The shire's agency made the on board training of promotion committee.
  - the committee directly visited each household and checked the place

Questionnaire contents

- Handling of pesticides
  - Storage space
  - Storage container
  - Disposal method of empty containers
  - Doing or not doing wear protective equipments
  - Status of book of the usage and completion of education programme
- The present condition of the safety of agricultural machinery
  - Lighting system and rear-view mirror for the machinery
  - Safety and health behaviour related to using the machinery
  - Driving and operating the machinery
  - Tractors and combines with protection devices and safety belts
- The safety of the green house
  - Safety facilities of the green house and the management of the facilities
  - The facilities for the intermission and the rest

Data analysis

- Awareness of health and safety for occupational injury
  - a percentage of correct answers for the comparison.
  - a comparison of paired questions between 2007 and 2008 using t-tests
- The actual states of safety handling conditions of agricultural pesticides and the machinery
  - differences of average scores among 2006, 2007 & 2008

Survey results

Awareness of health and safety for occupational injury

Table 1. Distribution of participants by age group (N=230) unit: person(%)

Age group	Sex		Total
	Male	Female	
30~39	2 (1.6)	1 (1.0)	3 (1.3)
40~49	12 (9.6)	19 (18.1)	31 (13.5)
50~59	40 (32.0)	26 (24.8)	66 (28.7)
60~69	36 (28.8)	33 (31.4)	69 (30.0)
70~79	34 (27.2)	22 (21.0)	56 (24.3)
70~79	1 (0.8)	4 (3.8)	5 (2.2)
Total	125 (100.0)	154 (100.0)	230 (100.0)

Table 2. Distribution of respondents by towns(N=230) unit:person(%)

Region	Respondent
Hwasung, Kyunggi-do	16 (7.0)
Chungju, Chungcheongbuk-do	7 (3.0)
Seosan, Chungcheongnam-do	61 (26.5)
Iksan, Jeollabuk-do	23 (10.0)
Damyang, Jeollanam-do	19 (8.3)
Hwasun, Jeollanam-do	13 (5.7)
Gumi, Kyungsangbuk-do	42 (18.3)
Haman, Kyungsangnam-do	49 (21.3)
Total	230 (100.0)

Table 3. Average scores from 2006 to 2008 (N=230)

2006(20 items)	2007(15 items)	2008(15 items)
62.3±11.1	65.3±16.1	70.6±19.3
Increase rate	4.82%	8.12%

Table 4. The rate of correct answers for the awareness of health and safety for occupational injury of farmer

unit: mean, %

A brief explanation of each item	Rate of correct answers		*p*
	07	08	
1. Accident rate for Korean farmers	83.0	83.5	0.898
2. Musculoskeletal disorders(MSDs) for farmers	93.5	94.3	1.000
3. Treatment for the MSDs	58.7	56.5	0.557
4. Appropriate posture for the back	49.6	45.7	0.378
5. General knowledge for MSDs	43.5	39.1	0.341
6. Symptoms for agrichemical poisoning	78.7	97.4	*0.000*
7. Washing for the protective clothing for pesticide	80.9	84.8	0.340
8. Using a mask when crop dusting	56.5	73.0	*0.000*
9. How to prevent agricultural poisoning when crop dusting in the greenhouse	47.4	41.3	0.206
10. Mortality for the agricultural machinery	94.3	93.9	0.533
11. A change of direction when driving a cultivator	42.2	91.3	*0.000*
12. A time zone of agricultural machinery accidents	30.0	37.4	0.131
13. How to go over the ridges when driving a tractor	80.4	75.2	0.092
14. Respiratory diseases caused by dust	95.2	92.6	0.162
15. General knowledge for leptospirosis	37.0	52.6	*0.001*
Total	65.3	70.6	*0.003*

Safety handling conditions of agricultural pesticides and the machinery

- The survey for 195 households from 2006 to 2008
- Respondents: 181 males in households (92.8%)

Table 5. Distribution of participants by age group (N=195)
unit: person(%)

Age group	Sex		Total
	Male	Female	
30~39	3 (1.7)	0 (0.0)	3 (1.5)
40~49	20 (11.0)	1 (7.1)	21 (10.8)
50~59	59 (32.6)	1 (7.1)	60 (30.8)
60~69	53 (29.3)	6 (42.9)	59 (30.3)
70~79	44 (24.3)	5 (35.7)	49 (25.1)
70~79	2 (1.1)	1 (7.1)	3 (1.5)
total	181 (100.0)	14 (100.0)	195 (100.0)

Table 6. Distribution of respondents by regional groups(N=195)
unit: person(%)

Region	Respondent
Hwasung, Kyunggi-do	32 (16.4)
Chungju, Chungcheongbuk-do	7 (3.6)
Seosan, Chungcheongnam-do	40 (20.5)
Iksan, Jeollabuk-do	20 (10.3)
Damyang, Jeollanam-do	21 (10.8)
Hwasun, Jeollanam-do	8 (4.1)
Gumi, Kyungsangbuk-do	27 (13.8)
Haman, Kyungsangnam-do	40 (20.5)
Total	195 (100.0)

Safety for the handling of agricultural pesticides

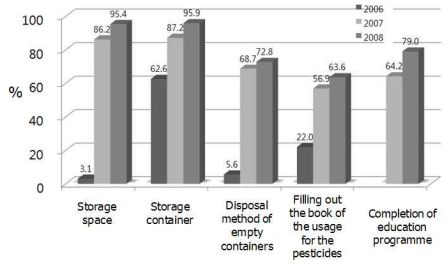


Figure 1 The present condition of the safety for the pesticides (N=195).

Personal protective equipments for handling the pesticides

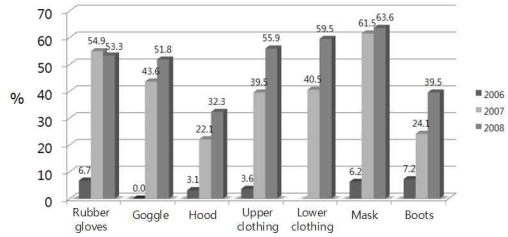


Figure 2 Personal protective equipments (N=195).

The present condition of the safety of agricultural machinery

Table 7 . Lighting system and rear-view mirror -cultivator

unit: household(%)

Part	Year	Not exist	Exist but not working	Working	Respondent
Headlamp	2006	34(19.8)	20(11.6)	118(68.6)	172
	2007	12(9.5)	20(15.9)	94(48.2)	126
	2008	10(6.1)	9(5.5)	146(88.5)	165
Turn signals	2006	143(84.6)	5(3.0)	21(12.4)	169
	2007	56(44.4)	19(15.1)	51(40.5)	126
	2008	83(50.6)	29(17.7)	52(26.7)	164
Front sidelights	2006	141(72.3)	7(4.1)	21(12.4)	169
	2007	59(48.4)	18(9.2)	45(23.1)	122
	2008	79(49.1)	31(49.3)	51(31.7)	161
Reflector on a trailer	2006	-	71(42.3)	97(57.7)	168
	2007	23(18.5)	17(13.7)	84(67.7)	124
	2008	19(11.8)	5(3.1)	137(85.1)	161

Table 8. Lighting system and rear-view mirror -tractor

unit: household(%)

Part	Year	Not exist	Exist but not working	Working	Respondent
Headlamp	2006	4(5.3)	8(10.7)	63(84.0)	75
	2007	2(3.0)	-	64(97.0)	66
	2008	2(2.5)	-	78(97.5)	80
Turn signals	2006	8(10.7)	10(13.3)	57(76.0)	75
	2007	2(3.0)	1(1.5)	64(95.5)	66
	2008	1(1.3)	1(1.3)	77(97.5)	79
Front sidelights	2006	15(20.0)	8(10.7)	52(69.3)	75
	2007	3(4.6)	1(1.5)	61(93.8)	65
	2008	1(1.3)	1(1.3)	76(97.4)	78
Stop lamps	2006	-	-	-	-
	2007	1(1.5)	1(1.5)	63(96.9)	65
	2008	-	1(1.3)	77(98.7)	78
Hazard lights	2006	-	18(24.3)	56(75.7)	74
	2007	2(3.0)	1(1.5)	63(95.5)	66
	2008	1(1.3)	2(2.6)	75(96.2)	78
Rear view mirror	2006	22(30.1)	51(69.9)		73
	2007	6(9.2)	-	59(90.8)	65
	2008	5(6.6)	-	71(93.4)	76

Table 9. Lighting system and rear-view mirror -combine

unit: household(%)

Part	Year	Not exist	Exist but not working	Working	Respondent
Headlamp	2006	-	1(3.7)	26(96.3)	27
	2007	-	2(9.5)	19(90.5)	21
	2008	-	-	23(100.0)	23
Turn signals	2006	-	2(7.4)	25(92.6)	27
	2007	1(4.8)	1(4.8)	19(90.5)	21
	2008	-	2(8.7)	21(91.3)	23
Front sidelights	2006	2(8.7)	1(4.3)	20(87.0)	23
	2007	1(5.0)	1(5.0)	18(90.0)	20
	2008	-	1(4.3)	22(95.7)	23
Hazard lights	2006	-	-	-	-
	2007	1(4.8)	3(14.3)	17(81.0)	21
	2008	-	3(13.0)	20(87.0)	23
Rear view mirror	2006	9(34.6)	17(65.4)		26
	2007	1(4.8)	1(4.8)	19(90.5)	21
	2008	2(9.1)	2(9.1)	18(81.8)	22

Safety and health behaviour related to using the machinery

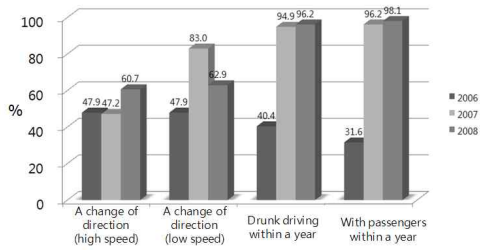


Figure 3 The present condition of the safety for driving a cultivator.

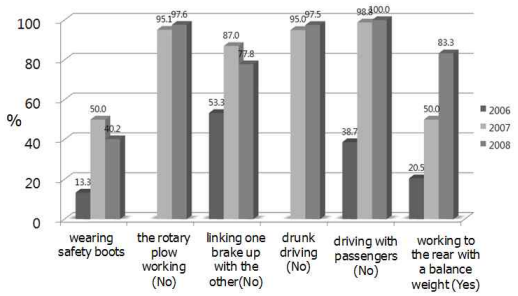


Figure 4 The present condition of the safety for driving a tractor.

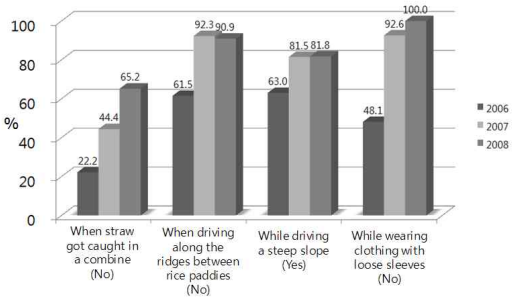


Figure 5 The present condition of the safety for driving a combine.

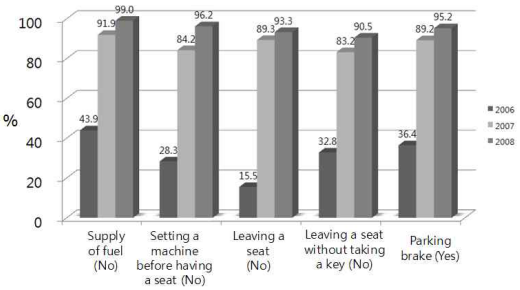


Figure 6 The present condition of the safety for general farm machinery.

The present condition of the safety in the green house

Table 10. Forced ventilation system in the green house

unit: household(%)

	Exist	Not exist	Respondent
2006	41(37.3)	69(62.7)	110
2007	47(57.3)	35(42.7)	113
2008	59(57.3)	44(42.7)	92

Table 11. Times of operating forced ventilation systems

unit: household(%)

	Regularly in a day	After crop dusting	When necessary	Other	Total
2006	11(15.1)	6(8.2)	55(75.3)	1(1.4)	73
2007	10(19.2)	1(1.9)	41(78.8)	-	52
2008	39(56.5)	1(1.4)	29(42.0)	-	69

Table 12. Times of using natural ventilation

unit: household(%)

	Regularly in a day	After crop dusting	When necessary	Other	Total
2006	33(32.4)	3(2.9)	66(64.7)	-	102
2007	33(45.2)	2(2.7)	37(50.7)	1(1.4)	73
2008	45(47.4)	5(5.3)	45(47.4)	-	95

Table 13. Thermometers kept in the greenhouse

unit: household(%)

	Exist	Not exist	Respondent
2006	53(46.1)	62(53.9)	80
2007	60(60.6)	39(39.4)	99
2008	72(69.9)	31(30.1)	103

Table 14. Average working hour and the interval between the rests in the greenhouse

unit: hour±SD

	2006	2007	2008
Average working hour in a day	8.3±3.1	6.9±2.5	7.2±2.4
The interval between the rests	3.3±1.0	1.8±1.4	1.4±0.9

Table 15. The method of the relaxation during intermissions

unit: household(%)

	Sit-down	Massage	Stretching	Other	Total
2006	81(77.9)	9(8.7)	13(12.5)	1(1.0)	104
2007	39(39.4)	12(12.1)	46(46.5)	2(2.0)	99
2008	27(27.0)	16(16.0)	55(55.0)	2(2.0)	100

Discussion & conclusions

- The awareness of health and safety for occupational injury positively increased.
- The actual states of safety handling conditions of agricultural pesticides and machinery dramatically increased from 2006 to 2007 and the actual states slightly increased from 2007 to 2008.
- The intervention through 'Safety model for farm work' would be to reduce the rate of injury by maximizing following safety guide and to improve the present condition of farmers' health.
- This study could be useful to improve the 2nd and 3rd classes of 'Safety model for farm work'.

Thank you for your attention!