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# Fall Injuries Prevention among Rural Population, with Contribution of Rural Health Workers

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| ARTICLE INFO | ABSTRACT |
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**Introduction:** Fall injuries are one of the important health problems in worldwide. Knowledge about fall injuries is limited in low and middle-income countries in general and in Iran in particular. This study aims to document the epidemiology of injuries among rural community and to determine how fall injury is controlled and prevented community health workers, known as Behvarzes.

**Methods:** The study was a six-month prospective injury data collection that took place in rural area of Toyserkan County, located in Iran, focused on severe injuries. About 100 subjects were investigated and documented by all Behvarzes using the logbook. At the end of data collection Behvarzes were gathered in a number of group sessions to reflect about injury prevention measures and barriers in the community.

**Results:** A total of 23 severe fall injuries (two fatal) were reported during the follow-up period with an annual estimated incidence rate of 8/10 000 (95% CI: 6-11). The incidence rate of severe falls was significantly higher among males than females (12/10 000 vs. 3/10 000 person-years). Fall injury rate was also higher among people over 65 years (24/10 000 person-years). The injury analyses revealed that Behvarzes often considered that the adoption of safe behaviour/practice could help fall injuries prevention (17 out of 23). Furthermore, barriers or risk factors for fall injury prevention were related mostly to human factors (for all 23 cases) followed by physical environmental factors.

**Conclusion:** It seems community health workers(known as Behvarzes) are aware and can provide the variety of suggestions and can determine several context-relevant countermeasures for fall injury prevention and even highlight potential barriers to be prevented in their areas.

**Keywords:** Community Health Workers, Counter Measures for Prevention, Fall Injuries; Middle-income countries, Rural Communities

## Introduction

The fall injury is an important public health problem associated with morbidity, individual and collective cost of the health care (1, 2). Furthermore, Falls are significant health concerns for adults with intellectual disability of all ages resulting injuries (3). One-third of people older 65 years, experience at least one fall annually (4). Injuries caused by falls such as broken bones or head injury, may result in disability, premature death, or a lower quality of life (5, 6). Falls account for 1% of the total loss of healthy in 2002 (WHO)(1). In low and middle-income countries, it is ranked as number one in Disability-Adjusted

Life Years(DALYs) lost in the age group 5 to 14 years; however, it is negligible as a cause of death in these countries(1).

In middle-income countries there is limited knowledge about fall epidemiology in the general and in the rural areas, in particular. However, different studies show that falls are common among the elderly (5, 7). Considering health transition and increasing life expectancy in such countries it is indicated that fall injuries need more attention.

Fall injuries are preventable just as other injuries (8). Preventive measures could be possible through environmental modifications (in and outdoors), product design and individual behaviour, although the modification of high risk behaviour, as an important factor, could be more difficult to achieve(1).

In Iran, in general and in rural areas, studies about the epidemiology of fall injuries and their prevention are not common(6) and increasing knowledge in this field to develop any context relevant prevention program is essential both in urban and rural areas. Currently, approximately one-third of the total population lives in rural areas (9) where people benefit from a well-established health network, consisting of village-based local "health houses". These houses are run by well-trained community health workers (known as Behvarzes) who are also local residents.

The control and prevention of all kinds of injuries affecting people from rural areas has been put at the agenda of the Ministry of Health and Medical Education of Iran for some time. A number of injury studies have been conducted in recent years in Toyserkan County (10-15) which is the setting of this study. The previous studies showed that falls are the second most frequent cause of severe injuries after road traffic injuries; furthermore, they are more common among adults rather than children under 15 years (13, 15). The data gathered in those prior studies will be revisited in order to better characterize those falls and highlight various manners in which they could be prevented.

**Rural Health Services in Iran:** The Islamic Republic of Iran is a middle-income country located in Middle East (area of 1,648,000 square kilometres). In 2008, Iran had a population of 73 million and the life expectancy at birth was 69 for males and 73 for female (year 2006). Iran has 30 provinces, 336 counties, 1012 cities and approximately 64 000 villages. In 2006 one-third of people was living in rural areas(9).

Rural areas in Iran have a well-established primary health network.The most peripheral and basic unit of service delivery is the health house which covers an average of 1500 people. Health houses are run by the community health worker known as "B*ehvarz"*.

## Material and Methods

**Study setting:** The study setting was the rural areas of Toyserkan (Twiserkan) county, located in Hamadan province,west of Iran. Toyserkan is about 100Km south of Hamedan city which is the capital city of the province. The total population of the Toyserkan County was about 110 000 inhabitants of which about 58% lived in rural areas at the time of this study. Rural people in Toyserkan County have access to primary health care services, free of charge, as other rural areas of the country. There were 17 health centres and 62 health houses in the county and 113 Behvarzes whose participations were sought.

**Design and procedure:** In the context of the broader research project on injuries in study setting, one study has been initiated in order to assess the epidemiology of injuries among rural communities and also to capture how injury is controlled and prevented by rural health workers, given the role that they are expected to play for local health and safety promotion. In this study Behvarzes were asked to report any severe injury (leading to hospitalization more than 6 hours or death occurring in their community over a six-month follow-up period. This study focuses on results obtained from falls, as the second most common cause reported after road traffic injuries(14).

This study was a six-month prospective injury data collection, using logbooks for registering data

during follow up period as a special assignment for all Behvarzes of the county. They were asked to register all injuries (including fall-related ones) regarded as severe, i.e. leading to hospitalization over six hours or death. Prior to the study, all Behvarzes were trained. They were also invited to answer the questionnaire at the end of the six month period.

**Follow-up and logbook:** During the follow up period, data were gathered only for severe injuries in the population. A common and familiar definition was used – similar to that proposed by the WHO – and no unnecessary extra burden was put on Behvarzes.

At the end of the period, all logbooks were collected and checked by the supervisor/contact person. Thereafter, to make sure, the logbooks were re-checked by one of research team members and the probable questions were answered if necessary.

**Self-administered questionnaire sessions:** At the end of the period and after gathering logbooks all Behvarzes were invited through the letter sent by director of district health centre to participate in a session in main district health center. They were asked to fill in a questionnaire, included essay type questions. In this questionnaire they were asked to give their suggestions/opinion about control and prevention of injuries among rural community. Behvarzes also were asked to identify the barriers of controlling and preventing fall injuries. A total of 87 Behvarzes (76% of all those in the district)

answered to the questionnaire.

**Data treatment**

**Fall injuries registered:** A total of 23 fall injuries were reported and coded using the WHO guidelines for injury community surveys and surveillance(16), the circumstances of the reported falls and the main attributes of injured persons are summarized. In addition, the estimated annual incidence rate of severe falls was compiled both globally and by age and sex of victims. For this estimation the number of falls was multiplied by two (for an annual duration) as the period was six months.

**Ethical considerations:** The data for this study were part of a broader study on different mechanisms of injuries. also It was also part of a PhD project approved by Iranian National Ethics Committee in Medical Research, Ministry of Health and Medical Education of Iran.

## Results

**Fall injuries registered:** A total of 23 people were reported by Behvarzes, who were severely injured during the 6 month period with the annual estimated incidence rate of 8/10 000 (95% CI: 6-11). Two deaths were reported. Table 1 shows the estimated annual incidence rates of severe fall injuriesdevided by age and sex of victims. The rate was significantly higher among males than females (12/10 000 vs. 3/10 000 person-years) and it was much higher among people over 65 years (24/10 000 person-years).

**Table 1:** Estimated severe fall injury incidence rate per 10 000 person-years (95% CI) by sex and age group.

| Injured person | | N | Incidence rate (95% CI) |
|---|---|---|---|
| Sex | Male | 19 | 12 (9 — 16) |
| | female | 4 | 3 (2 — 6) |
| | | | |
| Age group | <15 years | 3 | 4 (2 — 9) |
| | 15 — 64 years | 13 | 6 (4 — 9) |
| | 65+ years | 7 | 24 (14 — 40) |

**(Table 2)** reveals circumstances of injury event registered in the 6 month period. The most frequent nature of single injuries was fracture (15 out of 23) and the most single body region was lower limb (15

out of 23), followed by vertebra/back and also head injuries/concussion. A total number of 19 out of 23 of falls were fall from height, mostly from roof or tree. Most injuries occurred in work place including

farm or inside the home. About half of them were work-related injuries.

**Table 2:** Circumstances of injury event, registered in the logbooks, in six month follow-up period.

| Circumstances of injury event | | N |
|---|---|---|
| **Nature** | | |
| single | Fracture | 15 |
| | Concussion/head injury | 4 |
| | Cut, bit or other open wound | 1 |
| Multiple | Dislocation & Bruise or superficial injury | 1 |
| | Concussion/head injury, Fracture | 2 |
| **Body region** | | |
| single | Lower limb | 6 |
| | Vertebra/back | 5 |
| | Head injury/concussion | 4 |
| | Upper limb | 3 |
| | Ribs | 1 |
| | Pelvis/Hip | 1 |
| Multiple | Head injury, lower limb, ribs | 1 |
| | Ribs, vertebra/back | 1 |
| | Pelvis/hip, lower limb | 1 |
| **Fall from** | | |
| Fall on the same level | | 4 |
| Fall from height | roof | 5 |
| | tree | 5 |
| | stair | 3 |
| | scaffolding | 2 |
| | ladder | 2 |
| | back of animal | 1 |
| | back of pick up | 1 |
| **place of injury** | | |
| | Home | 7 |
| | Work other than farm | 6 |
| | Farm | 5 |
| | Street and alley | 2 |
| | School | 1 |
| | Other | 2 |
| **Work-related** | | |
| | Yes | 11 |
| | No | 12 |
| **Total** | | **23** |

**Suggestions for prevention**

**Injury-specific suggestions for prevention during the follow-up: (Table 3)** represents the Behvarzes' injury-specific suggestions for fall injury prevention classified in two main categories, describing the countermeasures relative to either people or the environment and products. Inspired by Haddon's 10 strategies for prevention,

countermeasures relative to people are divided into four sub-categories, including: their adoption of safe behaviour/practice (17 out of 23), the provision of training, instruction, and equipment (e.g., to put in appropriate shoes, to wear appropriate clothes), and "rescue". The countermeasures relative to the "environment" are divided into three sub-categories including isolation (7 out of 23), (e.g., to make

protection, protection on side of street, protection for roof), product modification (e.g., safer ladder, isogamete for roofs, sufficient light), and elimination. Altogether, the most common suggestion was the adoption of safe behaviour/practice by people, with a focus on "avoiding hard work" for elderly and weak people and be careful in general/more caution.

**Table 3:** Suggestions on what can be done for fall-injury control and prevention, made by Behvarzes in relation to each specific injury in registered in follow-up period (n=23).

| Target for suggestions | N |
|---|---|
| **People** | |
| Adoption behaviour/practice | 17 |
| Not to work hard by elderly and weak person | 6 |
| To be careful in general/more caution | 4 |
| Not to use poor quality scaffolding | 2 |
| On unsafe roof- sleep or go | 2 |
| Other (avoid working outdoors on the bad weather, playing on risky places, to rid on back of animal) | 3 |
| Train and instruct | 5 |
| Equip | 3 |
| Rescue | 1 |
| **Environment** | |
| Isolate | 7 |
| Modify | 3 |
| Elimination | 2 |

**Behvarzes' suggestions for the prevention after follow-up:** As **(Table 4)** shows, the suggestions for prevention after the period are divided in two parts: what Behvarzes themselves can contribute and what they suggest to be done by other (e.g. authorities, the people themselves and police). In total, 80 Behvarzes (92%) commented on this question/ own role for injury control and prevention: 48 (55%) with only one suggestion and 32 (37%) with 2 or more suggestions.

As for themselves, they mentioned education, advocacy and injury treatment. It could be expected most of the Behvarzes (81%) stated that educational activities, can be done by themselves for fall prevention. They suggested even some specific topics (52%) e.g., fencing (the stairs, the roof,

balcony and window), climbing of tree, slippery surface and safety issue. They also mentioned specific target group for education (36%), with focus on education for families and parents and some suggested various educational manners e.g., group education. Behvarzes' suggestions concerning the activities that others could do, were grouped into three categories, and their labelling was also inspired by Haddon's ten strategies: isolation, which was the most common suggestion (29%), followed by elimination (24%), and training, instruction and supervision. Additional categories of suggestions not covered by Haddon's strategies included public cooperation and consultation with other actors (31%) and compliance (7%).

**Table 4:** Suggestions for what can be done for fall-injury control and prevention in general, made by Behvarzes after follow-up period (n=87).

| Suggestions | | N (%) |
|---|---|---|
| **A- by Behvarzes** | | |
| Education | | 71 (81) |
| | Specific topics e.g., fencing the stairs (22)*, fencing the roof, balcony and window (16),fall and safety issue (11), climbing of tree (6), slippery surface (3) | 45 (52) |
| | Specific target group e.g., families and parents (15), people (14), elderly (2), student (1) | 31 (36) |
| | General | 19 (22) |
| | Form of education e.g., group education (3) | 3 (3) |
| Advocacy | | 9 (10) |
| Treatment | | 8 (9) |
| No answer/unclear | | 9 (10) |
| **B- by other** (e.g. authorities, people themselves, police) Haddon's prevention strategies | | |
| | Isolate/seperate | 26 (30) |
| | Eliminate | 21 (24) |
| | Modify/repair/maintenance | 8 (9) |
| | Train and instruction | 16 (18) |
| | Supervise | 16 (18) |
| | Warn | 3 (3) |
| | Rescue | 1 (1) |
| | Rehabilitate and repair | 1 (1) |
| Cooperation and consultation | | 27 (31) |
| Compliance | | 6 (7) |
| No answer/unclear | | 17 (20) |

*Number in the parenthesis is the number of Behvarzes who mentioned the related code.

**Barriers to prevention of fall injury suggested during and at the end of follow-up: (Table 5)** indicates the barriers of injury prevention suggested both in the logbooks during the period (for 23 registered injured people) and in questionnaires (suggested by 87 Behvarzes). Furthermore, in the table there are two numbers, in the parenthesis, for each code. The first number is about how frequent that code is in the "follow-up logbooks" and second number is about how frequent the code is in the "questionnaires at the end".

The barriers were grouped in different categories with regard to Haddon's matrix, including 1) individual 2) product 3) physical environment, 4) social environment.

Individual related barriers/factors were most common suggested ones in logbooks and second common suggestions in the questionnaire (23 cases and 25 % of Behvarzes who filled in the questionnaire, respectively). They were for instance lack of awareness, carelessness /not to observe safety issues, age and fatigue and other suggestions including climbing the tree, living on upstairs (for elderly-children), lack of experties/experience for their occupation, using inappropriate shoes and cloths.

**Table 5:** Barriers to control and prevention of fall injury, suggested both during and after follow-up period.

| Barriers/risk factors with regard to Haddon's matrix | During follow-up n=23 N | End of follow-up n=87 N (%) |
|---|---|---|
| **Individual** e.g., lack of awareness, carelessness /not to observe safety issue,age and fatigue, other including: to climb of tree, live on the upstairs (elderly-children), lack of skill appropriate/experience for their occupatio, inappropriate shoes and cloths | 23 | 22 (25) |
| **Product** e.g., inappropriate/unsafe ladder, inappropriate/unsafe scaffolding | — | 7 (8) |
| **Physical environment** Lack of fence/fencing, Facilities/modernisation, Slippery surface, Height , Other (Low light, not to observe and safety issue when building, to be bad of way in village, lack of handle in bath and toilet, to use the roof for crossing in rural area and bad weather), No answer | 19 | 44 (51) |
| **Social and legal environment** e.g., lack of enough education or less education, poverty (financial problem of rural people), lack of follow up, lack of cooperation authorities with people, lack of control of precipice and river, cultural, lack of necessary help, lack of occupation, education for persons who have epilepsy | — | 28 (32) |
| No answer | — | 17 (19.5) |

*First written number in parenthesis is related to the "follow-up logbooks" and second one is related to the "questionnaires", for each mentioned code.
"–": No suggestion

Behvarzes also focused on barriers which could be considered as physical environmental factors (21 out of 23 in the logbooks and 51% of whom filled in the questionnaire) e.g., lack of fencing, facilities/modernisation, slippery surface, height.

Behvarzes mentioned barriers related to individual factors, in the logbook more than in questionnaires (100% vs. 25%) and also barriers related to physical environment factors were mentioned in the logbook more than in the questionnaire too (83% vs. 51%). Any barriers related to both social-environmental (32%) and product related factors (8%) were not mentioned in logbooks, whereas they were mentioned in the questionnaire.

## Discussion

**Main findings:** The study indicates that severe fall injuries in rural areas affected males to a greater extent than females. This finding is in line with the results from an earlier facility-based study on severe injuries conducted in this county (15), but differs from the results of a household survey considering different injury severity levels showing that severe and non-severe fall injuries were more frequent among females(13).

Fall injuries identified in profiles of health houses, prior to the study occurred over a one year period and amounted to 35 cases. A total of 18 severe falls out of 35 occurred during the same period with the current study. It is quite in line with the current study.

In all three studies, an important number of falls affect adults and older people(14, 15). An additional Iranian study showed that falls from standing height, falls while walking and falls on stairs were important risk factors for hip fracture for older patients (6).

As other studies, this study also shows that fracture is a frequent consequence of falling(6),

and also have several possible outcomes.

The results of this study showed severe falls from height which were more frequent than falls on the same level. One national earlier study on home-related injuries in Iran(17), showed that fall from a height are about two times in rural areas of Iran rather than urban areas. Height can be an important risk factor for fall injuries.

Since among falls from height, those from roof and tree were higher both in current study and in earlier studies in this setting(15), it seems that this kind of fall should be drawn more attention in any prevention program in future. Falls from trees occurs among adults and males during their work activities. This is common in rural areas of Toyserkan, in particular during the walnut harvest which is done in a traditional and non-technical manner. Every year some people picking up walnuts, fall from large trees and are injured(15). One study in Iran on safety assessment of agricultural machinery, showed that in 60% of cases agricultural injuries were severe(18). Another study on falls from tree in rural Melanesians shows the importance of the injuries due to fall from trees in rural community. The latter study suggested using safety helmet and specific ladder as strategies for decreasing falls from trees(2).

In this study about one-third of fall injuries occurred inside and around the house and about half were work-related, which shows the importance of prevention and safety programs in these two areas.

**Suggestions for prevention:** Behvarzes made many suggestions both in logbooks for specific injury cases and at the end of follow-up period in general. Several of them had more than one suggestion. Most of suggestions in the logbook and for specific cases were about adoption of safe behaviour/practice. They were mainly about "human errors" which are not surprising. However the identifying these items could be helpful to use their education for the community.

In addition to environmental improvements, changes in health behaviours are important in order to prevent fall injury among people. Furthermore,

isolation was one of important suggestions made by Behvarzes about the environment.

At the end of follow-up period, Behvarzes mostly focused on education as their role for prevention of fall injuries. Interestingly, they specified some topics, target groups and even manner of education. Fencing was also focused by Behvarzes which could be important to prevent falls. Education of families as target groups was also focused by Behvarzes. In earlier studies, people who had severe fall injuries focused the importance of education by Behvarzes for the community (Rezapur-Shahkolai 2008). It shows that Behvarzes are important among the community in line of people expectation. Behvarzes have currently some safety education for people but it could be expanded to cover different target groups of rural community.

Behvarzes also had different suggestions about fall injury prevention which were mainly about isolation, mainly fencing, elimination of risk factors, instruction and better supervision in the Haddon's ten strategies framework. Furthermore, other that this framework they focused on cooperation and consultation as an important item to injury prevention among the community. It can be among people themselves, between people and Behvarzes and even between authorities and people or Behvarzes. Cooperation also was focused by severe injured people in earlier studies(15).

**Barriers to prevention:** Considering Behvarzes in a close relation with the community and their key role in rural health system, they identified the barriers and risk factors to injury prevention among their community both in the logbook for each injury case and at the end of the follow-up period in general. In the logbook they focused on individual risk factors (proposed for all reported injury cases) and again human related errors and "victim blaming"; however, in the questionnaire, they could see more barriers and in broader terms and focused on physical and social and legal environmental risk factors. Regarding social environmental barriers or risk factors, there was nothing mentioned in logbooks for specific cases;

however there were different barriers mentioned in the questionnaire in general. There was educational and financial problem for rural people, for example for better housing and fencing. Although some loans are specified for rural people to build standard houses, some families do not use it because paying back the installment is difficult for them.

**Strengths and limitations:** For any prevention program increasing knowledge about injury epidemiology could be the prime importance. Furthermore, using community health workers, among other health providers, who are most familiar with rural community, as well as the most key persons among rural health system could be considered as one of the strengths of the study.

The first limitation of the study is its relatively short period that can have implied some seasonal bias in the type of falls reported as well as in their age and sex distribution. It is worth mentioning that the period was conducted in both summer and winter.

## Conclusion

The case-by-case injury analysis leads to the identification of human errors to a far greater

extent than the post-follow up questionnaire session. It seems that Behvarzes are aware and can provide variety of suggestions and can determine several context- relevant countermeasures for fall injury prevention and even highlight potential barriers to be prevented in their areas. In each community, to increase knowledge about epidemiology of injury and also context-relevant measures, considering the experiences of involved persons can be helpful to design and implement any more efficient injury prevention and safety promotion program in future.

## Conflict of interest

The author does not have any conflict of interest.

## Authors' contribution

This study has single author.

## References

1. Lindstrand A, Bergstrom S, Rosling H,. Global Health: An introductory textbook. Studentlitteratur. 2006.
2. Barss P, Dakulala P, Doolan M. Falls from trees and tree associated injuries in rural Melanesians. Br Med J (Clin Res Ed). 1984;289(6460):1717-20.
3. Cox C, Clemson L, Stancliffe R, Durvasula S, Sherrington C. Incidence of and risk factors for falls among adults with an intellectual disability. Journal of Intellectual Disability Research. 2010;54(12):1045-57.
4. Mazharizad F, Dadipoor S, Madani A, Moradabadi AS. Investigating the prevalence and causes of events leading to falls among the elderly hospitalized in Bandar Abbas hospitals. Journal of Education and Health Promotion. 2015;4(11):61-66.
5. Sydenham E. Systematic reviews on preventing fall-related injuries in older people. Injury Prevention. 2008;14(4):274-.
6. Abolhassani F, Moayyeri A, Naghavi M, Soltani A, Larijani B, Shalmani HT. Incidence and characteristics of falls leading to hip fracture in Iranian population. Bone. 2006;39(2):408-13.
7. Lin MR, Wolf SL, Hwang HF, Gong SY, Chen CY. A randomized, controlled trial of fall prevention programs and quality of life in older fallers. Journal of the American Geriatrics Society. 2007;55(4):499-506.
8. Laflamme L, Svanström L, Schelp L. Safety Promotion Research. A Public Health Approach to Accident and Injury Prevention. Division of Social Medicien, Department of Public Health Services, Karolinska Institutet, Stockholm.1999.
9. Statistical Centre of Iran, Retrieved on 22 April 2018 from: Available At [https://www.amar.org.ir /english. 2018].
10. Rezapur-Shahkolai F, Afshari M, Moghimbeigi A, Hazavehei SMM. Home-related injuries among under-five-year children and mothers' care regarding

injury prevention in rural areas. International journal of injury control and safety promotion. 2017;24(3):354-62.

11. Rezapur-Shahkolai F, Naghavi M, Shokouhi M, Laflamme L. The contribution of an injury data registry system to injury surveillance in rural Iran: community health workers and health authorities views and concerns. Injury Prevention. 2010;16(Suppl 1):A261-A.

12. Rezapur-Shahkolai F, Naghavi M, Shokouhi M, Laflamme L. The prevention and control of road traffic injuries in rural communities: input from community health workers in rural Twiserkan, Iran. Injury Prevention. 2010;16(Suppl 1):A118-A.

13. Rezapur-Shahkolai F, Naghavi M, Vaez M, Shokouhi M, Laflamme L. Injury incidence, healthcare consumption and avenues for prevention: a household survey on injury in rural Twiserkan, Iran. Public Health. 2009;123(5):384-9.

14. Rezapur Shahkolai F. Injury prevention and safety promotion in rural communities: Contribution of community health workers and an injury data registry system in Iran. Institutionen för folkhälsovetenskap /Department of Public Health Sciences; 2009

15. Rezapur-Shahkolai F, Naghavi M, Shokouhi M, Laflamme L. Unintentional injuries in the rural population of Twiserkan, Iran: a cross-sectional study on their incidence, characteristics and preventability. BMC public health. 2008;8(1):269.

16. Sethi D. Guidelines for conducting community surveys on injuries and violence: World Health Organization; 2004. Available At [http://apps.who.int/iris/handle/10665/42975].

17. Mohammadi R, Ekman R, Svanström L, Gooya M. Unintentional home-related injuries in the Islamic Republic of Iran: findings from the first year of a national programme. Public health. 2005;119(10):919-24.

18. Javadi A, Rostami M. Safety assessments of agricultural machinery in Iran. Journal of agricultural safety and health. 2007;13(3):275-84.