



Original Article

A Descriptive Study of Occupational Health Services in Self-employed Enterprises (Nanoscale Enterprises), Shiraz, Iran



Mehdi Jahangiri¹, Akbar Rostamabadi^{2,3,*}, Parvaneh Yekzamani³,
Bahare Mahmood Abadi³, Fariborz Behbood³, Seyyedeh Fatemeh Ahmadi³,
Zahra Momeni³

¹ Department of Occupational Health Engineering, School of Health, Shiraz University of Medical Sciences, Shiraz, Iran

² Department of Occupational Health Engineering, Ashtian Health Care Center, Arak University of Medical Sciences, Arak, Iran

³ Department of Occupational Health Engineering, Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran

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ABSTRACT

Background: This study was conducted with aim of providing an overview of the current status of occupational health services and identifying the most common harmful agents at workplaces of Iranian self-employed enterprises (Nano-Scale Enterprises).

Methods: A cross-sectional study was performed among a random sample including 1,758 employees engaging in self-employed enterprises with 5 and less employees.

Results: Coverage of occupational health surveillance was very poor, annual health examinations were been conducted only for 64 (3.64%) of males and 31 (1.76%) of females, and occupational health trainings were not included of the services at all. Personal Protective Equipment were available in 462 (26.3%) of the enterprises, only in 0.4% of the enterprises working processes were been equipped by a local exhaust ventilation system. Difficult postures were the most common (81.5%) adverse working conditions.

Conclusion: This study revealed a poor level of the implementation of occupational health services in Iranian self-employed enterprises. Based on the findings, providing basic training on the occupational health, more enforcing in conduction of health examinations and providing PPE, and taking appropriate strategies aimed at eliminating or minimizing work environment harmful agents are the major factor that should be considered to improve the level of occupational health services among the studied enterprises.

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1. Introduction

In recent decades, safety and health-related problems in microscale enterprises (MSEs) have attracted the attention of many researchers investigating in the field of occupational health (OH). Despite the important role of MSEs in the industrialization process and the economic development of countries, much concern has been noted about the lack of appropriate safety and health resources in these establishments.

Considering MSEs (those with fewer than 10 employees) as informal sectors, where safety and health measures are more likely to be neglected, prevention of work-related accident and diseases has been a major challenge [1–3]. Unhealthy and unsafe working environments including hazardous chemicals and

physical risks, undesirable sanitary facilities, inadequate safety equipment, and unsafe manufacturing methods, all of which are more common in MSEs than the larger-scale ones, have led to a high percent of accidents and disabling diseases occurring in these settings. Nevertheless, in the OH care system of many countries, provision of OH services is not fully implemented for MSEs [4,5]. Data from a recent nationwide survey conducted in Japan [5] revealed that OH activities such as enforced conduction of general/specific health examination, providing OH training about hazardous work, and appointment of a competent person for OH activities in enterprises with one to four or five to nine employees were much poorer than enterprises with 10 or more employees. In Sweden [6], coverage of OH services for enterprises with fewer than 50 employees was between 10% and 55%,

* Corresponding author. Ashtian Health and Treatment Network, Ashtian Health Care Center, P.O. Box 39619-63681, Iran.

E-mail address: rostamia79@gmail.com (A. Rostamabadi).

compared to 75% for large enterprises. According to the International Labour Organization, in the European region, regardless of enterprise size, more than half of the working population (58%) remains uncovered by competent OH services, and in developing regions the coverage by employee health services ranges from 5% to 10% at best, with services being found mainly in manufacturing enterprises, while some sectors of industry, agriculture, the self-employed, small-scale enterprises, and the informal sector are usually not covered at all [7].

During the past few decades, following the rapid industrialization of Iran, issues related to health and safety of the workforce have attracted the attention of health policy makers. Since its establishment within Iran's healthcare system, the OH service has undergone many changes. While it was mainly organized to cover some large industries with high-risk working conditions, over the past 20 years, Iran's OH service has been integrated into public health services and has been extended to almost all industries. Currently, there are approximately 2.5 million work units in Iran and approximately 95% of them have fewer than 50 employees distributed throughout the country [8].

In Iran, OH services within an enterprise are provided by different approaches, depending on the number of workers employed within the enterprise. At the highest level, enterprises with 500 or more employees are obliged to establish a Labour Health Center staffed by an occupational physician, OH nurse, industrial hygienist, and a safety department staffed by safety officers and managers. Enterprises with 50–499 employees must establish a Worker's Health House which is responsible for providing first aid and other OH services, such as evaluation of harmful agents at workplaces and OH screening. Finally, each enterprise with 20–49 employees must be equipped by a Behgar station, which is an OH post providing very basic OH services, staffed by an OH hygienist/technician working part-time or a competent person who is generally one of the enterprise's employees and educated with at least a 6-month course on the OH field, under supervision of the Ministry of Health. Enterprises with less than 20 employees are not legally required to establish a safety and OH unit. However, in recent years a more attention has been given to the enterprises with 6 to 20 employees on monitoring some of their OH problems by government bodies such as the Ministry of Health and the Ministry of Labor and Social Affairs. Under this situation, workers, particularly those in self-employed enterprises (nanoscale enterprises, NSEs), those with five or fewer employees, are not completely covered by OH services and may be exposed to a wide range of harmful agents in their workplaces.

Although organized units, such as Labour Health Center, Worker's Health Houses and Behgar stations, in enterprises with more than 500, 50–499, and 20–49 employees have made it possible to have an almost complete database of the extent of implementation of OH services in these enterprises, there are very few data on implementation of OH activities in microscale enterprises, especially in NSEs.

The aim of this study was to provide an overview of the current status of OH services, and to identify the most common harmful agents in NSE workplaces.

2. Materials and methods

In this cross-sectional study, a random sample of 1,758 employees working in NSEs with five or fewer employees was selected from a list of enterprises that were active in the agriculture, service, and industry sectors in Shiraz, one of the largest cities in southern Iran. Shiraz, capital of Fars Province, has a labor market dominated by small enterprises. Based on a census by Shiraz University of Medical Sciences (2014), while the

number of enterprises with 20 or more employees constituted only a few percent of all enterprises (including 469 enterprises with 20–49 employees, 294 enterprises with 50–499, and 26 enterprises with 500 or more employees), the number of enterprises with 1–2, 3–5, 6–9, and 10–19 employees was 12,473, 4,999, 6,221, and 2,926, respectively: approximately 97.1% of all enterprises.

Of 17,472 enterprises with 1–5 employees, there were 1,573 agriculture, 1,223 services, and 14,676 industry enterprises (including 7,455 automobile repair, 3,654 metal industries, 1,557 wood industries, 1,307 construction industries, 323 electrical industries, 191 chemical industries, and 189 food industries). Among them 1,900 enterprises, about 10% of enterprises with 1–5 employees were randomly selected from the list of enterprises which were active in agriculture, services and industry sector in Shiraz city. After a certain portion of dropout due to non-responses and unpredictable problems to make contact with some of the enterprises, remaining enterprises were visited by a well-trained research team. After informing business managers of the target enterprises about the aims of research, 1758 enterprises survived to be subjects of the study.

A standardized checklist designed by Iran's Ministry of Health for workplace inspections was used to collect required information on the OH activities. The checklist was composed of three sections: (1) demographic details (sex, the number of employees engaging in the enterprises, and type of the enterprise activity); (2) provided primary OH services and equipment, including items on the OH surveillance (annual health examinations), personal protective equipment (PPE) provided, OH training, provided primary sanitary facilities (healthy drinking water, toilet), provided emergency treatment facility (first aid kit), building status of the enterprises (washable floors, walls and ceiling and adequate space, 12 m², for each person), the existence of appropriate ventilation systems (natural and local exhaust ventilation system); and (3) uncontrolled harmful agents in the work environment, including physical agents (noise, vibrations, heat stress, radiation, and illumination), chemical agents (fumes, dust, smoke, vapor, and gases), and ergonomic agents (heavy lifting and working in difficult postures). Items on the provided primary OH services and uncontrolled harmful agents in the work environment were scored as *yes/no*. After informing business managers of enterprises about the aim of the study, required information on the demographic details, OH surveillance (annual health examinations) and OH training was obtained by face-to-face interview with the enterprise's employee(s), and data on other variables, such as provided PPE, provided primary sanitary facilities, provided emergency treatment facilities, building status of the enterprises, the existence of appropriate ventilation systems, and uncontrolled harmful agents in the work environment were collected by the walk-through method. Research approval was obtained from the Ethics Committee of the Shiraz University of Medical Science. Descriptive statistics were used to analyze the data.

3. Results

There were 1,481 (84.4%) enterprises with 1–2 employees, and 277 (15.7%) enterprises with 3–5 employees. Men worked in most of the studied enterprises (92%) while women worked in 8% of the enterprises. Of the enterprises studied, 108 (6.14%) were engaged in agriculture and the rest (93.85%) were involved in various branches of the industrial sector, including 573 in automobile repair (32.6%), 173 in the electrical industry (9.8%), 282 in the metal industry (16%), 136 in the wood industry (7.7%), 97 in the construction industry

Table 1
Demographic characteristics of the study population (N = 1,758)

Demographic characteristics	n	%
Enterprise by size of no. of employees		
1–2	1,481	84.43
3–5	277	15.7
Enterprise by sex of employees		
Men only	1,617	92
Including female	141	8
Enterprise by type of activity		
Automobile repair	573	32.6
Electrical industry	173	9.8
Metal industry	282	16.0
Wood industry	136	7.7
Construction industry	97	5.5
Chemical industry	347	19.7
Food industry	42	2.4
Agriculture	108	6.1

(5.5%), 347 in the chemical industry (19.7), and 42 in the food industry (2.4%; Table 1).

Tables 2 and 3 present show OH services and equipment in all of the studied enterprises and in the studied industry type, respectively. Coverage of OH surveillance was very poor among the enterprises, of the 1,758 enterprises only 95 (5.4%) enterprises had conducted annual health examinations, and none of them had passed any education on OH (Table 2). Also, similar status was found for items related to provided PPE, which was available in only 462 (26.3%) of the enterprises (Table 2). Of items related to sanitary facilities, most of the enterprises were equipped with healthy drinking water (91.5%) and a toilet (58.2%). Emergency treatment facilities, such as a first-aid kit, were available in 29.1% of the cases. Furthermore, of items related to building status, 78.4% of the enterprises surveyed had a building characterized by washable floors, walls, and ceiling and had adequate space (12 m² for each person). Finally, while more than half (55.2%) of the enterprises had good natural ventilation (adequate numbers of windows, doors, and electric fans), only 0.4% of them had equipped the working processes with a local exhaust ventilation system in order to control produced airborne pollutants in the work environment.

Table 4 shows that difficult postures (ergonomically harmful agents) were the most common (81.5%) adverse working conditions. Moreover, noise (32.2%) and dust and smoke (26.2%) were the most common physical and chemical harmful agents, respectively, in the work environment.

Table 2
Distribution of the provided primary occupational health services and equipment in the studied enterprises (N = 1,758)

Provided occupational health services and equipment	n	%
Occupational health surveillance (annual health examinations)	95	5.4
Occupational health training	0	0
Provided personal protective equipment		
Face mask	258	14.7
Ear plugs/muff	146	8.3
Protective face shields and goggles	58	3.3
Provided primary sanitary facilities		
Toilet	1,024	58.2
Healthy drinking water	1,609	91.5
Emergency treatment facility		
First aid kit	511	29.1
Building status of the enterprise		
Floor, walls, and ceiling are washable and building have adequate space (12 m ² for each person)	1,378	78.4
Ventilation systems		
Natural ventilation	970	55.2
Local exhaust ventilation	7	0.4

4. Discussion

OH services are an important resource for improving the work environment and the health and safety of workers, even in the smallest enterprises [6].

This study was conducted with the aim of providing an overview of the current status of OH activities among Iranian NSEs, those with five or fewer employees. Results show that the rate of provided OH services was not satisfactory in most of the surveyed enterprises. Difficult postures, exposure to a high level of noise, and dust were the most common harmful agents in the work environment.

So far, most research that addressed OH and safety issues, both in Iran and in other developing countries, focused on prevention of occupational accidents or disease. Activities related to OH services have been less well investigated, especially in MSEs. In the only study conducted on 595 MSEs in Iran [9], a significant number of enterprises suffered from the lack of basic OH services, such as training on job safety and OH, a desirable chemical and physical work environment, and adequate access to PPE. However, findings from other countries show poorer and lower quality OH services in MSEs when compared with large enterprises. For instance, in a study of 2,000 Japanese establishments, Furuki et al [5] found that OH activities in small-scale enterprises (SSEs) with one to four employees were not clarified sufficiently and indicators of OH activities (such as OH education, enforcement of special and general health examinations, selection of an OH competent person, and enforcement of OH guidelines for computer work) in enterprises with one to four and five to nine employees were worse than those with 10 or more employees.

The previous studies have found a linear relationship between poor rates of implementation of various OH services with decreasing enterprise size [5,10]. In this research, coverage of OH examinations was 5.4%, which is much poorer than those reported in other countries. In Furuki et al's study [5], while the rate of enforcement of a periodic general health examination was 59.4% in NSEs with 1–4 employees and 73.2% in SSEs with 5–9 employees, it was 85.9%, 98%, and 98.3% in enterprises with 10–49, 50–99, and 100 employees, respectively. Furthermore, among 4,432 Japanese manufacturing companies, while the rate of implementing health checkups was 100% in the companies employing 100 or more workers, it was 37.7% in companies with one to three workers [10].

In this study, OH training was not included in any of the services. In Furuki et al's study [5], OH education was performed only among 74.4% of enterprises with 1–4 employees, 56.6% of enterprises with 5–9 employees and 40.4% of enterprises with 10–49 employees.

In a systematic review on occupational safety and health services, Tu and Anh [11] concluded that implementation of OH and safety education, information and communication was very low among Vietnamese enterprises, regardless of the enterprise size.

PPE has an important role in protecting workers from occupational injuries and diseases [12]. The use of PPE was poor in the studied enterprises of the current study, which is consistent with findings of Zungu and Gabe's study [13] conducted among small-scale garment enterprises in Gaborone, Botswana and findings of Rongo et al's study [14] performed among informal small-scale industries in Dar Es Salaam, Tanzania. The lack of PPE or insufficient use of them was the cause of 64% of occurred injuries among small scale industries welders in Ugandan [15] and 45% of occurred injuries among small-scale sawmilling industries in Ghana [16]. Factors such as high cost, lack of awareness and training on how to use PPE, and the discomfort in use of PPE have been reported in literature to be as a barrier in availability and using this equipment in small-scale enterprises [15,17].

Table 3
Provided occupational health services and equipment by industry type

Industry type	n	Annual health examinations	Personal protective equipment			Sanitary facilities		First aid kit	Standard building status*	Ventilation	
			Face mask	Hearing protector	Face shields / goggles	Toilet	Drinking water			Natural	Local exhaust
Automobile repair	573	10 (1.74)	18 (3.14)	24 (47.6)	4 (0.7)	324 (56.5)	516 (90.1)	165 (28.8)	485 (84.6)	281 (49)	2 (0.3)
Electrical industry	173	8 (4.62)	7 (4.62)	17 (9.8)	6 (3.5)	83 (48)	159 (91.9)	51 (29.5)	137 (79.2)	71 (41)	5 (2.89)
Metal industry	282	12 (4.25)	58 (20.56)	64 (22.7)	22 (7.8)	147 (52.1)	270 (95.7)	105 (37.2)	199 (70.6)	236 (83.7)	0
Wood industry	136	6 (4.41)	6 (4.41)	18 (13.2)	3 (2.2)	74 (54.4)	132 (97.1)	42 (30.9)	107 (78.8)	70 (51.5)	0
Construction industry	97	11 (11.23)	5 (5.15)	7 (7.2)	2 (2.1)	58 (59.8)	94 (96.9)	36 (37.1)	74 (76.3)	53 (54.6)	0
Chemical industry	347	19 (5.47)	92 (25.51)	14 (4)	3 (0.9)	244 (70.3)	336 (96.8)	107 (30.8)	312 (89.9)	178 (51.3)	0
Food industry	42	24 (57.14)	33 (75.57)	1 (2.4)	1 (2.4)	37 (88.1)	38 (90.5)	0	28 (66.7)	26 (61.9)	0
Agriculture	108	5 (4.6)	39 (26.11)	1 (2.4)	17 (15.7)	57 (52.8)	64 (59.3)	5 (4.6)	45 (41.7)	55 (50.9)	0

Data are presented as n (%).

* Floor, walls, and ceiling are washable and building has adequate space (12 m² for each person).

Considering MSEs as sectors that have not been organized to manage and control the risk of occupational accident and injuries, providing first aid and emergency treatment in these establishments is crucial. Results of a survey on occupational safety and health services in Pakistan [17] revealed that 75% of small-scale paint industries did not have first aid boxes in their workplaces. Similarly, in the current study only 29.1% of the enterprises were equipped with emergency treatment facilities such as first aid kits. Furthermore, none of the African small-scale garment enterprises had a first aid kit or first aider available on site [13].

Literature review shows that in most countries, including both developed and developing countries, provision of industrial hygiene and engineering controls has not been well integrated within OH services, particularly for MSEs. In the current study, only very few (0.4%) of the enterprises had equipped the working process with a local exhaust ventilation system to control produced airborne pollutants in their working environment, which is in line with the study by Pasha et al [17] that reported most small-scale factories in Pakistan did not have adequate local exhaust, of forced or natural ventilation.

Ergonomically harmful agents such as difficult postures are an important risk factor in the occurrence of a wide range of work-related musculoskeletal disorders in working populations. It has been stated that awareness and knowledge about occupational ergonomics principles in small-scale industries is low [18]. According to the current study findings, difficult postures (ergonomically harmful agents) were the most common adverse working conditions. This finding is similar to the results of a recent study conducted in Iran [19] that reported 82.7% of workers in MSEs working under poor ergonomics conditions. However, the prevalence of poor working posture in Iranian

larger-scale enterprises was 34.4% [19], which is less than half of that found (81.5%) among the surveyed NSEs in the present study.

In agreement with findings of previous research [20], the results of the current study showed a poor physical and chemical working environment in NSEs. Of the surveyed harmful physical and chemical agents in the present study, noise (27.4%) and dust and smoke (26.2%) were the most common uncontrolled agents. In a cross-sectional study conducted in Iran [19] the level of noise in 26% of MSEs was higher than maximum permissible levels (85 dB) and exposure to a high level of dust was reported in 16% of MSEs. Moreover, a high level of exposure to noise, dust, and fumes was reported by Rongo et al [14] among small-scale industries in Tanzania.

Although the current study addressed some of the OH services in a relatively large sample of self-employed enterprises, it was not representative of all Iranian enterprises. It is suggested that future research considers OH services in more detail for a wider range of enterprises of different sizes.

5. Conclusion

This study showed that the implementation of OH services in self-employed enterprises was very poor. Based on the current research findings, the following intervention strategies are recommended to improve the level of OH services within the studied enterprises:

1. Provide basic training on OH aimed at the promotion of knowledge and awareness of employees about health and safety hazards in the working environment.
2. Increase the frequency of workplace inspections with a more special focus on enforcement in providing PPE and the conduction of annual health examinations.
3. Take appropriate strategies aimed at eliminating or minimizing harmful work environment agents such as poor working postures, excessive noise, and dust and smoke.

Conflicts of interest

The authors declare that they have no competing interests.

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Table 4
Distribution of uncontrolled physical, chemical, and ergonomics harmful agents in the studied enterprises (N = 1,758)

Harmful agents	n	%
Physical		
Noise	567	32.2
Vibrations	306	17.4
Heat stress	401	22.8
Radiation	341	19.4
Illumination	95	5.4
Chemical		
Fumes	422	24
Dust and smoke	460	26.2
Gases and vapors	314	17.9
Ergonomics		
Heavy lifting	283	16.1
Unsuitable postures	1,432	81.5

References

- [1] Theuri C. Small-scale enterprises and the informal sector in Kenya. *Afr Newslett* 2012;22:32–4.
- [2] Forastieri V. Improvement of working conditions and environment in the informal sector through safety and health measures. Occupational Safety and Health Branch Working Paper, OH/9907/08. Geneva (Switzerland): International Labour Office. 1999.
- [3] Menya D, Walekhwa C, Koskei P, Too R, Carel RS. Occupational risk factors in the Jua Kali industry, Eldoret, Kenya. *Afr Newslett* 2012;22:46–50.
- [4] Kim H, Park DU. Selecting high-risk micro-scale enterprises using a qualitative risk assessment method. *Ind Health* 2006;44:75–82.
- [5] Furuki K, Hirata M, Kage A. Nationwide survey of occupational health activities in small-scale enterprises in Japan. *Ind Health* 2006;44:150–4.
- [6] Gunnarsson K, Andersson M, Josephson M. Swedish entrepreneurs' use of occupational health services. *AAOHN J* 2011;59:437–45.
- [7] Vigh M, Mazaheri M. Occupational medicine in Iran. *Occup Med* 2009;59:66.
- [8] Sadeghi F, Bahrami A, Fatemi F. The effects of prioritize inspections on occupational health hazards control in workplaces in Iran. *J Res Health Sci* 2014;14:282–6.
- [9] Jahangiri M, Rostamabadi A, Malekzadeh G, Fahandeh Sadi A, Hamzavi G, Rasooli J, Momeni Z, Ghaem H. Occupational safety and health measures in micro-scale enterprises (MSEs), Shiraz, Iran. *J Occup Health* 2016;58:201–8.
- [10] Yamataki H, Suwazono Y, Okubo Y, Miyamoto T, Uetani M, Kobayashi E, Nogawa K. Health status of workers in small and medium-sized companies as compared to large companies in Japan. *J Occup Health* 2006;48:166–74.
- [11] Tu NTH, Anh LM. Occupational health services in Vietnam. *Asian Pac Newslett Occup Health Saf* 2009;16:33–7.
- [12] Korkut DS, Gedik T. A research of occupational safety in forest products industry in Turkey. *Afr J Business Manag* 2010;4:1423–30.
- [13] Zungu LI, Gabe SG. A survey of work, health and safety conditions in small-scale garment enterprises in Gaborone, Botswana. *Occup Health S Afr* 2011;17:13–9.
- [14] Rongo L, Barten F, Msamanga G, Heederik D, Dolmans W. Occupational exposure and health problems in small-scale industry workers in Dar es Salaam, Tanzania: a situation analysis. *Occup Med* 2004;54:42–6.
- [15] Okuga M, Mayega R, Bazeyo W. Small-scale industrial welders in Jinja Municipality, Uganda. *Afr Newslett* 2012;22:35–7.
- [16] Kwame OB, Kusi E, Lawer E. Occupational hazards and safety practices: a concern among small scale sawmilling industries in Tamale Metropolis, Ghana. *Int J Sci Technol Res* 2014;3:234–6.
- [17] Pasha TS, Liesivuori J, Finland K. Country Profile on Occupational Safety and Health in Pakistan. Kuopio (Finland): Finnish Institute of Occupational Health; 2003.
- [18] Rongo L. Are workers in small-scale industries in Dar es Salaam aware of occupational ergonomics principles? *Afr Newslett Occup Health Saf* 2005;15:14–6.
- [19] Taheri Namoghi M. Surveying the condition of occupational safety and hygiene in manufacturing and technical trade units in Sabzevar. *Med Sci* 2006;16:113–8.
- [20] Hasle P, Limborg HJ. A review of the literature on preventive occupational health and safety activities in small enterprises. *Ind Health* 2006;44:6–12.