

Original article

Survey of occupational safety and sanitary conditions in small scale enterprises in Jimma Southwestern Ethiopia

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Abstract: A total of 37 randomly selected Small Scale Enterprises (SSE) found in Jimma town were surveyed. The objectives of the study were to identify the possible safety and health hazards, sanitary conditions, and health promotion and accident prevention aspects of SSEs. The result showed that 70.8% of the enterprises are located in residential and commercial areas; 45.9% of the buildings are defective; and 21.6% are temporary-looking shades having only corrugated iron roofs supported by wooden poles but no walls on three sides. The SSEs surveyed are found to be sources of problems to health and safety for people who work in them. Noise levels greater than 95 dB among workers in wood works (43%), and metal works (57%); chemicals and toxic hazards in garages, wood work, and soap factory; dust in flour mills, coffee mills, and wood works were noted to be indicators of unhealthy work environment. Although 78.4% of the SSE have risk of fire, only 16.2% have provision for fire protection. Accidents and injuries are not registered. Workers have no health services or safety education and protective devices are inadequate. The work places (70.8%) are unsanitary. Based on the study, recommendations are made. [*Ethiop. J. Health Dev.* 1998;12(3):183-190]

Introduction

Classifying enterprises into small and large scale is not an easy matter. Some classifications are based on the number of workers in the settings or the level of technology and management level at which it is operated (1). Lukindo classified the family owned cottage type industries as informal sectors (2). Wang states that the number of workers in SSEs may vary from as few as five to as many as 500 workers (3). The World Health Organization suggests that any enterprise employing less than 50 workers should be considered as Small Scale Enterprises or Industries (SSEs). (4)

The epidemiology of injuries, morbidity, and mortality patterns of different occupations and work places, large or small, may differ but, in general, there is no job that does not pose some kind of occupational hazard which may result in chronic illness, stress, disability, or death (5). Both Maslow and Mikheev emphasize the importance of work in the attainment of self actualization and development which brings benefits to nations but activities, processes, and operations are often associated with exposure to harmful agents or conditions (6,7). Even common activities such as town cleaning, and farming produce injuries with rates of accidents and injuries increasing from time to time (8, 9).

One of the main areas of employment in developing countries is in SSEs. Koh and Jeyaratnam state that SSEs are responsible for employing large number of workers, often in excess of 50% of the working population and contributing over 90% of all factories in many countries (1). In East

Africa, up to 65% of all industries are SSEs employing less than 100 persons (10). Yet, the smaller the industry the higher the rate of the work place injuries (11, 12). The International Labor

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Organization (ILO), estimates that 220,000 place injuries occur world wide each year in developing countries at the rate of about six fold more than those in developed countries (11).

A one year study which involved 105 manufacturing industries in Ethiopia using a standardized work related injury reporting system revealed an overall work related accident rate of 178/1000 per year (13). Most work place injuries and accidents are basically caused by unsafe work environments and work conditions (14). Occupational diseases occur with greater frequency and much greater severity in developing countries. This is basically because workers in SSE in developing countries are often young, uneducated or poorly educated, unskilled and inexperienced with the tools they are using or the hazards associated with the work process (1). Other factors that may contribute to the problem are workers turnover, lack of legislation or ordinance for SSEs, and employers interest in profit making than worker's health and safety. The annual incidence of occupational diseases in the world is 157 million cases, out of which 30-40 % may lead to chronic diseases, 10% to permanent disability, and about 0.5% to 1% to death(6).

Although this study did not include assessment of community health problems resulting from SSEs, evidence of noise, water, air, and land pollution problems are observed in residential and commercial areas because of the poor locations of the enterprises.

The Ministry of Labor and Social Affairs is responsible to study and document work related hazards and diseases for industries as defined in Labor proclamation of 1958 E.C. (15), but information systems or national occupational safety and health services especially for SSEs are underdeveloped. One of the problems is the complete absence of information on the type and magnitude of health and safety problems of the working population. In view of this the following objectives were drawn:

Identify the possible health and safety hazards, gather and collate information on health promotion (information, education, sanitation) and accident prevention aspects in SSEs in Jimma town

Methods

Study area and population: Jimma, one of the zones in Oromia Region, is located southwest of Addis Ababa at 335 Kilometres and at an altitude of 1760 metres. The town covers an area of 44.8 square kilometres. The total population is estimated to be 95,475 out of which, 43,874 are males and 44,993 are females (16). There are six major ethnic groups, these being: Oromo(42.4%), Amhara(23.7%), and Dawro (13.3%), while the rest (20.6) are Kulo, Yem, and Tigrai (25).

Data Collection: The study implemented a cross-sectional design using a structured questionnaire and observation checklists. Although the study questionnaire and checklist were modified to suit the local prevailing conditions, they was designed based on recommended survey formats found in teaching materials and publications (17).

The survey format includes general information about the enterprise (location, construction material and sanitary condition), potential health and safety hazards (physical, chemical, ergonomic), accident control methods or mechanisms (protective equipments, warning signs), and sanitary facilities and conditions (water supply, latrines, cleanliness of floors, walls, ceilings). Using 19 students for the plan of completing data collection in two days, only 37 (40%) of the total SSEs were sampled. In order to ensure representative sampling of the reference SSEs, the simple random sampling method was used. Therefore, to select 37 SSEs from a total of 86 units, listing all the units that are operational was first done and a number given to each. The required number of study units was selected using a lottery method (18).

The enterprises selected were classified into five types: 1)Grain mills, 2)Coffee mills, 3)Garages, 4)wood work, and 5) Metal work.

Data collection was done by post-Basic Environmental Health students who took occupational health and safety courses prior to the study. One student was assigned to one enterprise to fill up the questionnaire and observation checklist by availing himself to the enterprises one hour in the morning and one hour in the afternoon. The principal investigator followed the data collectors to

verify their findings by checking their records with the actual situation. Determination of excessive heat and dust exposure (continuous/intermittent), workers attitude and practice toward the particular job they do etc. were based on observation by the enumerators with a belief that useful information can be gathered even without the use of sophisticated measuring equipments (Annex I).

Light was measured using LUX meter model LX 101 L477800, with Correction factors for different types of lighting “standard light tungsten source of 2856 K”, made in Taiwan; noise was measured using precision sound level meter, type 2232, IEC 651 type 1. All sound measurements were conducted by the principal investigator to insure accuracy. Calibration was performed each time a new measurement is taken using the calibration instruction given by the manufacturer of the particular instruments.

The data collectors were trained on the spot by the investigator in their regular class work and later for the purpose of the survey. The survey and observational format was pre-tested in the field. The subjective parameters of heat wave, irritant conditions, excessive dust, sanitary and unsanitary buildings were carefully demonstrated to minimize subjectivism and possible biases (Annex 1).

This study did not include general medical examination for the permanent or apprentice workers of the enterprises.

Result

Characteristics of the SSEs: This study shows that there are 86 SSEs with 435 permanent and seasonal workers registered in Jimma town. In addition there are 128 apprentices in garages and 28 in wood works. The enterprises are engaged mainly in agricultural product processing (coffee grain, edible oil press), metal works, wood works, soap factory, and garages. The majority of SSEs are grain mills (32.6%) as shown in Table 1.

Table 1: No. of Small Scale Enterprises found in Jimma town, south-western Ethiopia, September 1996.

S.N	Type of enterprises	No.	%	Employee	Family member	Total
1	Coffee mill	5	5.8	41	17	58
2	Grain mill	28	32.6	53	31	84
3	Metal work	21	24.4	-	26	26
4	Garage*	17	19.8	139	43	182
5	Wood work*	12	13.9	32	37	69
6	Soap factory	1	1.2	8	2	10
7	Oil press	2	2.3	4	2	6
	Total	86	100.0	277	158	435

* There are 128 apprentices working in garages and 20 in wood works

Most of the SSEs (70.8%) in Jimma town, are located in residential and commercial areas instead of the industrial zone that has been designated by the town administration.

The SSEs buildings are made of wood and mud plaster (29.7%), or wood and no plaster (21.6%); brick or block (27.0%); and some are corrugated iron sheet walls and roofs (21.6%). Most are old and insanitary (45.9%); some are old but well maintained (32.48); and only 21.6% are new and considered sanitary. All grain mills surveyed (27.0%) and few other SSEs (13.5%) have cement floors while the rest (59.3%) have dirt floors. Inherent with the type of work they do all the floors of grain mills, coffee mills and wood works are untidy with chaffs, saw dust, and other refuse.

Physical hazards: Although not continuous, even in the one hour observation time, 24% of the workers are potentially exposed to high noise level greater than 95 dB; 59% to airborne contaminants such as dust particles and fumes. Workers exposure to unguarded machines, exposed electric wires and other occupational hazards were observed and recorded in metal shops,

wood work, garages, coffee and grain mills (Table 2). Lighting in all SSEs is above 100 foot candles which was sufficient for the type of work they do. (19).

Ergonomic hazards: Workers in the SSEs are also exposed to ergonomic factors such as repeated motion (51%) and static conditions

Table 2: **Extent of workers potential exposure to physical and chemical hazards in the Small Scale Enterprises in Jimma town, South-Western Ethiopia. September 1996**

Sr. No	Type of Hazard	Exposure in all SSE		G.M n=10		C.M n=5		Garages n=8		W.W. n=7		M.W. n=7	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
	A. Physical												
1.	Exe. Heat	5	14	-	-	-	-	2	25	-	-	3	43
2.	Exe. Noise	9	24	-	-	1	20	1	13	3	43	4	47
3.	Exe. Dust	21	57	10	100	3	60	2	25	4	57	2	29
4.	Glare	8	22	-	-	-	-	4	50	-	-	4	57
5.	Rep. Motion	19	51	3	30	5	100	6	75	3	43	2	29
6.	Expo. Wire	12	33	2	20	2	40	4	50	2	29	2	29
7.	Unguarded M.	19	51	6	60	1	20	6	75	4	57	2	29
8.	Static Cond.	21	57	10	100	3	60	2	25	2	29	4	57
9.	Risk of fire	29	78	6	60	4	80	8	100	7	100	4	57
	B. Chemical												
1.	use lead	11	30	-	-	-	-	6	75	-	-	5	71
2.	use nafta	7	9	-	-	-	-	5	63	-	-	2	29
3.	use benzine	4	1	-	-	-	-	4	50	-	-	-	
4.	use turpentine	6	6	-	-	-	-	-	-	6	86	-	
5.	use varnish	6	6	-	-	-	-	-	-	6	86	-	
6.	use glue	5	4	-	-	-	-	-	-	5	-	-	
7.	use grease	20	4	4	40	3	60	8	00	2	29	3	43
8.	use break	8	2	-	-	-	-	8	00	-	-	-	
9.	use S. Acid	1	3	-	-	-	-	1	13	-	-	-	
10.	use solvent	8	2	-	-	-	-	3	38	-	-	5	71
11.	use car paint	5	4	-	-	-	-	2	25	-	-	3	43
12.	use carbon	5	4	-	-	-	-	2	25	-	-	3	43

* percentages are to the nearest whole number

G.M= grain mill; C.M= coffee mill; W.W= wood works; M.W= metal works
 Exc= excessive; Exp.= exposed; Rep. Motion= repeated motion; unguarded M.=
 Unguarded machine; cond.= condition; s.acid= sulfuric acid.

(57%) (Table 2). Seasonal female worker in coffee mills spend the whole day in a sitting position on the floor which is painful to the legs, joints and buttocks. Accident and injury potentials which may be caused by crowded conditions and unorganized materials in work places are also observed.

Chemical hazards: Although concentration levels at breathing zone is not measured, and the health effect of chemicals on the exposed skin was not observed and duration of exposure is not recorded in this study, workers especially in wood works, metal works and garages are potentially exposed to different types of chemicals. Over half (54%) of all SSEs surveyed used grease to lubricate machines; wood works use chemicals such as varnishes (16%), turpentine (16%), and glues (14%); garages and car painters use paint thinners (solvents), car paints, naphtha, gasoline, and sulfuric acid (Table 2).

Accident or injury control mechanism: Protective devices such as ear muffs, goggles, gloves etc. are supplied to only 70 (36.3%) of the workers that need protection (Table 3); but only 28 workers (40.2%) use them when-ever they are engaged in the particular job they are assigned. Fifteen (21.4%) of the workers

Table 3: **Type and number of protective devises provided in Small Scale Enterprises in Jimma town, South-Western Ethiopia, September 1996**

S.No.	Type of Provided Protective devise	not provided		T. Required		n=37
		No.	%	No.	%	
1.	Ear muffs	2	22.2	77.8	9	24.3
2.	Respirators	5	23.8	76.2	1	56.7
3.	Goggles	4	50.0	50.0	8	21.6
4.	Gloves	5	22.7	77.3	2	59.5
5.	Aprons	30	81.1	18.9	7	100.0
6.	Overall	13	35.0	64.9	7	100.0
7.	Exhaust fan	5	22.7	77.3	2	59.5
8.	Fire fighting equip	6	16.2	83.8	7	100.0

* Total required: The requirements indicated here is based on the type of job being performed by the worker at the time of survey.

disclosed that they will not use protective devices, even when provided, because of discomfort associated with weather and inappropriateness (size, suffocating, etc). Although 57% of the workers in all enterprises are potentially exposed to dust particles from grain, wood dust, and metal fumes, only 22.7% of the enterprises have exhaust fans (Table 3). Since enterprises such as wood work, garages, coffee mills have litters every where, the risk for fire is high (78.4%). Yet, only 16.2% are provided with fire figuing equipment. The condition of the fire extinguishers is not evaluated by this study or by a regulating agency.

Workers disclosed that injuries and accidents are happening and yet, no accident, injury or health related registration was available in any of the SSEs, as a result of which this study was unable to quantify the types of occupation-related problems. Concerning health service, it was found that out of the SSEs surveyed only two or (5.4%) have first aid with trained staff, 29.7% have first aid box with little basic medication, and with no trained staff, while the rest (64.8%) have no first Aid or other health services .

Sanitary facilities and conditions: Those enterprises with running and safe water supply and sanitation facilities are 54.1% and 67.6%, respectively. But the majority do not have hand washing, shower, and cloak room facilities (Table 4).

In 62.2% of SSEs the floors are full of dirt and liters. Walls and ceilings are unclean (67.6%). Most SSEs(70.8%) are in poor sanitary condition. There are decomposed and rotten materials, unorganized raw materials, and tools on floors (Table 5).

Discussion

It is a fact that every worker is exposed to some sort of hazard; or every work is associated with hazards that may be obvious and acute, or insidious and slow to manifest. Although occupational hazards do not elicit their devastating results as quickly as a motor vehicle crash, fall, or burn, the common work place hazards identified in this study and that of the Ministry of Industry have the capacity of producing health problems or death (6,12,13). Study conducted by the Ministry of Industry in 1985 (13) found 11.2% of the industrial workers being exposed to dust while this study estimated that 57% are potentially exposed to dust. Mengesha et al, also mentioned that dust concentration in cement and furniture factories in Ethiopia are considerably higher than international standards (20). This study and the study made by Fekadu et.al, are in agreement in the estimation of noise levels in excess of 95 dB in Industries in Ethiopia which were 26.4% and 24%, respectively (13).

Table 4: No. of sanitary facilities available and their sanitary conditions in SSEs in Jimma town, SouthWestern Ethiopia, September 1996.

S.No	Sanitary facility	Available No.				Sanitary		Conditions	
		Yes		No		Satisfactory		Unsatisfactory	
		No.	%	No.	%	No.	%	No.	%
1.	Water supply	20	(54.1)	17	(46.9)	12	(160.0)	8	(40.0)
2.	Excreta Disp	25	(67.6)	12	(32.4)	10	(40.0)	15	(60.0)
3.	Hand washing	7	(18.9)	30	(81.1)	7	(100.0)	-	
4.	Shower	2	(5.4)	35	(94.6)	1	(50.0)	1	(50.0)
5.	Cloak room	4	(10.8)	33	(89.2)	-	-	4	(100.0)
6.	Dust bin	5	(13.5)	32	(86.5)	-	-	5	(100.0)
7.	Municipal coll.	3	(8.1)	34	(91.9)	3	(100.0)	-	
8.	Recycle*	13	(35.1)	(46.9)	(64.9)	13	(100.0)	-	-

* Sawdust, pieces of lumber, and coffee husks are sold for fire wood; chaffs, and other residues from mills are sold for animal feed.

Table 5: General house keeping standard of SSE in Jimma town, South-Western Ethiopia. September 1996.

S.No	Sanitary particulars	No	%
1	Dirty dust floor, litters everywhere	23	62.2
2.	Unclean walls, ceilings	25	67.6
3	Unorganized raw materials on floor	19	51.4
4	Decomposed waste matters	4	10.8
5	roper storage of raw materials and finished goods	4	10.8

As revealed by this study there is no systematized recording of accident, sickness or injuries as is true in Ethiopia (13), and other African countries (21). Lack of information prevent estimation and evaluation of work related accidents and injuries. Tahir’s one year study in the chip wood enterprise in Jimma identified 70% of the workers being involved in one or more accidents such as with noise

(5%), machine (50%), chemicals (20%), and other physical hazard (5%) (22). According to the Ministry of Health, Industries should be located 1000 metres away from residential, schools and recreational areas (23), but most (70.8%), of the SSEs in Jimma town are located in residential and commercial areas.

This study did not include health effects of the occupational problems to the workers but it has identified the following:

1. Workers in SSEs are working under a hazardous condition of dust, chemicals, and poor working environment where sanitation is poor. The majority of the workers in SSE are potentially exposed to all types of physical, chemical and ergonomic hazards. The work places are poorly designed. Studies on SSE in other countries such as Singapore, Philippines and Hong Kong also show that noise, dust, untrained workers, poor design, and location of enterprises are common features that expose workers to occupational hazards (1).

2. In spite of many potential sources of hazards, there is no adequate safety precaution or measures such as protective device, fire fighting equipment, health and safety education programs, posters or safety instructions as desired. Because of lack of awareness of the danger of their occupation,

21.4% of the

workers in SSEs do not use the protective devices. Other studies in SSE and medium level industries (6,15) also revealed that most are operating with no knowledge or awareness of the hazards associated with the particular activities.

3. There are no medical or even First Aid services, important sanitary installations, and sanitary behavior and practice for proper housekeeping.

If the requirement set for industries by the MOH (24), is used to evaluate the enterprises in Jimma, almost all of them would not be allowed to operate.

Based on this study the following recommendations are made:

1. As documented in (Ref. 1), and as has been found in this study the SSEs have been accorded low priority in terms of occupational health and safety. Improvement of the conditions of SSEs is possible if a multi- sectoral approach is used as strategy. The joint effort and cooperation of Ministries of Health and Labor and Social Affairs, and the local government is very important. Such cooperative approach will augment trained manpower shortage to undertake inspection and surveillance, education, and information dissemination.

2. The legislation cited in proclamation No. 232 of 1958 does not include SSEs. Small Scale Enterprises are contributing to the national economy both in production and offering employment. It is mandatory, therefore to have minimum safety and health requirements to protect workers' health from adverse work place conditions, and to promote the health of workers.

3. The data now available represent mostly that of the medium and large scale industries. It should be the responsibility of researchers and responsible government organizations to undertake further studies at a national level for all types of industries. Country-wide information will help formulate legislation and other Information, Education, and communication programs appropriate to industries at all levels.

Annex I: operational definitions

Excessive heat: Heat is recorded as excessive if a worker is found sweating when naked or with light clothing; if the investigator feels a sudden heat wave when entering into the plant; or when the above conditions are observed to be caused by a heat source in the plant and aggravated by poor work design.

Excessive dust: Inert or irritant dust particles (air-borne contaminants) is recorded as excessive if the investigator experiences sudden sneezing upon entering the plant, or if worker's eye brows, hair, nostrils and cloth is observed by the investigators to be covered with dust particles.

Small scale enterprises: Enterprises that manufacture or process raw materials, and maintain machineries using small electrical and other equipment; having as few as five to as many as 50 workers.

Old enterprise: Enterprises with signs of dilapidation (wall or ceiling falling), unmaintained or that which needs major maintenance.

New enterprise: Newly built enterprise located in well drained site built with solid and cleanable wall and floor materials

Sanitary: Enterprises with well organized finished products or raw materials storage; having cleaning facilities and programs; generally with clean working environment.

Unsanitary: Enterprises with rotting chaffs, saw dust or coffee pulp on floors; unclean dust and spider web laden walls and ceilings; and with no cleaning facilities and programs.

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