INJURIES IN URBAN FACTORIES OF KETENA ONE

BY

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SUMMARY

A total of 357 accidents occurred to the 4,462 workers exposed during a one year period (from November 1, 1986 upto October 31, 1987), in eleven Ketena One Factories, giving a rate of 80 accidents per 1000 workers year. Of those who sustained industrial accidents, 268 (75%) were male and 89 (25%) female, giving rates of 99.4 accidents per 1000 person years at risk for males and 50 accidents per 1000 person years at risk for females. Young male workers have about twice as much risk of accidents as young female workers.

The highest accident rate occurred in those who had worked 5 or less years and in those who had elementary education. The lowest accident rate was observed in those who with literacy campaign. The highest accident rate occurred in the age group 15 - 19 years, while the lowest rate was in the age group, 50 - 54 years. Wide variation in accident rates was noted between various factories.

Maximum frequency of accidents took place in two of the eleven factories. Where rates were 8.6 times greater than the average.

Hit by or against and fall were the commonest accidents. Hit by object falling from height was the third commonest type of accident. These types together caused more than

62.5% of the accidents. The commonest resultant injuries were contusions in 138 cases while an almost equally large number of cases (97) had lacerations. The two types together accounted for 65.8% of the total.

Of the 357 accidents that occurred over the one year period, only two resulted in partial disablement and no deaths were noted. In general the accidents were of a minor nature.

The highest number of accidents were observed on Mondays 83 (23.3%) and the lowest on Fridays 47 (13%). Peak time for accidents was mid-morning between 9 and 10 AM.

The expenditure estimated for treatment and compensation paid by insurance amounted to an average of 760.85 Ethiopian Birr per accident. The eleven factories paid a total of 250,049.72 Ethiopia Birr, was paid out on claims, which is only 6.5% of the total insurance premiums paid.

The loss of 27,440 man-hours in factories in Ketena One in Addis Ababa has the potential to affect gross domestic production when it is projected to cover factories of the whole country. Besides the cost involved, the labor that would have been used for producing goods and services is wasted due to accidents.

Establishing safety committees by itself does not guarantee success in reducing the injury toll, but active and functioning safety committees in these factories may be

instrumental in raising awareness, decreasing time lost due to accidents and thus ultimately benefiting the country as a whole.

The highest accident rate occurred with those who had worked 5 years and below and with those who had elementary education.

Of the 357 accidents over the one year period two resulted in partial disablement but no death were noted.

The expenditure estimated towards treatment and compensation amounted to 760.85 Ethiopian Birr for each of the accident. The eleven factories paid a total of 250,049.72 Ethiopian Birr for accident insurance during the year while 16,259.72 Ethiopian Birr, which is 6.5% of the insurance was paid out on claims.

Establishing a safety committee by itself does not ensure success in reducing the injury toll, but an active and functioning safety committee may be instrumental in raising awareness and thus ultimately increasing safety in factories.

The loss of 27,440 man-hours in factories in Ketena One in Addis Ababa has the potential to affect gross domestic production when it is projected to cover factories of the whole country in that the labor that would have used for producing goods and services is wasted due to accidents.

INJURIES IN FACTORY WORKERS OF KETENA ONE, ADDIS ABABA

CHAPTER 1

INTRODUCTION

What is accident? An "accident" is regarded as an unforeseen event that may cause a person injury or property damage or both. An occupational accident is concerned with injury and property damage at work.

Accidents and injuries are major contributors to morbidity, mortality and disability in both industrialized countries, where injuries are the leading cause of death during the first half of the life span and in developing countries, where they now appear among the five leading causes of death. Accidents in industry constitute a significant percentage of all accidents, particularly among those in their most productive years, and are a cause of death and disability in both developed and developing countries. In industrialized countries, more potentially productive years of life are lost by death and disability due to accidents than by all major disease groups and accidents represent the commonest causes of hospitalization for the young (1).

As the developing world increases its industrial sector, occupational accidents can be expected to become

increasingly important. It is hoped by providing detailed information about accidents and their resultant injuries to increase awareness of their importance in Ethiopia and to provide better information on which to base prevention and promotion techniques.

At present in Ethiopia there are 144 factories registered under the Ministry of Industry. They are located in four urban centers: Addis Ababa, Dire Dawa, Asmara and Harar. For administrative purposes they are grouped into ten corporations and five share companies. Together these 144 factories employ 77,396 employees according to Department of Manpower and Development reports in 1985. (2)

Ketena One is one of the five ketenas of Addis Ababa, located in the western part of the capital. Of the fifty factories under the Ministry of Industry in Addis Ababa, eleven are located in Ketena One. According to information obtained from the Ethiopian Trade Union, there are 11,420 factory workers in Ketena One, out of which 39% (4462) are working in factories administrated by the Ministry of Industry. The factories in Ketena One thus represent 22% of Ministry of Industry factories in Addis Ababa and 13% of such factories in Ethiopia. A much larger number of workers are employed in cottage industries and are not represented in this study.

All employees who sustained work-related injuries between November 1, 1986 and October 31, 1987 in the 11 factories of Ketema One are included in the study.

All factories except Addis Ketema Candy have a factory clinic. All factory clinics provide free first aid and health service to workers. For those patients who need more extensive care or hospital admission, the factory covers anywhere from 50 to 100% of the medical costs. The activity of the factory first aid clinic is focused on the examination and treatment of cases. Health education is not given although family planning services are provided in two of the factories. Factory inspection is not presently carried out by health personnel, although all but two, Addis Ketema Candy and Addis Ababa Tannery have part-time medical officers. As well as the medical officers there are four nurses and ten health assistants working in clinics in the eleven factories.

None of the factories had an occupational health and safety program during the study period. However in the past six months, several have established safety committees and a few of the committees have even begun functioning.

Although some industry generated information about accidents in Ethiopia has been produced by the Ministry of Industry, detailed data on the occurrence of factory injuries is not available. To fill this gap the present

study was undertaken. It is largely descriptive in nature. Injuries are analyzed by age and sex of accidentee, time of occurrence, relationship to level of education, years of service, level of income and type of factory. As well, the nature of the injury and type of accident are looked at with regard to age and type of factory involved. Although the information presented about injuries and accidents in this study is largely general and descriptive, it forms the basis for a more informed approach to occupational accidents in Ethiopia, as well as assisting health workers in the provision of more effective and appropriate health education messages and safety measures.

The objectives of this study are:

1. To obtain and analyze detailed data on the occurrence of factory accidents in Ketena One in Addis Ababa.
2. To describe the rate of accidents by age, sex, time, level of education, years of service and level of income.
3. To provide information about accidents that will allow more effective and appropriate health education messages and safety measures too reduce and prevent accidents in Ketena One factories.

CHAPTER II

LITERATURE REVIEW

II.1 GENERAL SITUATION

Today every three minutes, somewhere in the world one worker dies of an occupational injury or illness, and for every second that passes at least three workers are injured. It is estimated that each year, 180,000 workers meet their death and 110 million are injured in occupational accidents.(3)

The protection of workers against accidents in their working environment is a serious and growing problem. It is estimated that about 160,000 industrial accidents occur daily, many resulting in permanent disability. Increasing industrialization in the developing countries of the world exposes the work force in these countries to new risks and dangers for which there is little effective protection, either by law or in practice.(4)

In newly industrializing countries, new technologies are continually being adopted and there is usually a rapid and successful search for solutions to new production problems, but this dynamism is not often matched by parallel foresight and commitment towards protecting the safety and health of workers. Without governmental pressure and

jobs are hard to find, is all too often lacking. Without adequate and detailed studies of accidents, neither government pressure and influence nor trade union action is likely to be successful. (4)

In the developing countries, small industries are relatively more numerous and often employ a proportionately greater part of the labour force. Conditions of work in both sectors are often poor and the health of all workers may also be a direct reflection of the lower general level of health of the population (5). A high prevalence of epidemic and endemic disease as well as poor sanitation and overcrowding in slum areas may aggravate working conditions making them more unsafe. Conditions such as a hot climate and high altitude may also add additional problems to the already considerable practical difficulties in the developing world (6). For such reasons, while accident rates in the developed countries have been stable or on a slightly downward trend, in the developing countries they have continued to rise (5).

Actual occupational injuries arising out of work form a relatively small proportion of the total morbidity in an employed population. However, together with other effects on the health of workers, they must be considered important because both employed men and women, particularly in the developing world, are frequently supporting many dependents particularly in the developing world, whose health directly and indirectly depends on them. Industrial accidents and

disabilities receive less attention in the developing world than their effects. The incidence of accidents is often unknown and where known frequency understated or overlooked as evidenced by the wide discrepancies that frequently exist between the number of accidents reported by employers, the number of accidents reported by employees and the number of claims for workmen's compensation (1).

While the indirect costs and even some direct costs are difficult to measure, eg. disabilities and fatalities, nonetheless reported amounts spent on medical care of the injured, and loss of time and salary of workers have been reported as high as Rs371,452 (62,000 Birr) for 230 injuries in Allahabad.(8)

The health of the labour force and safety at work are matters of common concern to all countries and should transcend national boundaries, but there has been little or no cooperation between developing countries in this regard until very recently (3). At least partially this is a result of a lack of information and reported studies. Although such acute events should be easy to count and relatively susceptible to systematic study, to date too little has been done to analyse industrial accidents from the perspective of prevention. Inadequate data thus make it difficult to determine accurately the extent of occupational health problems, to focus prevention effort or to measure the effectiveness of interventions. Another

problem is the lack of reported information about the intensity and duration of certain exposures or the effect of various combinations of exposure (9). Yet there is increasing evidence of the importance of the health of the work force, its effect on the health of the vulnerable groups of society and the effectiveness of basic safety measures.

In the majority of developing countries, although there appears to be growing concern about the problem, facts and figures are not yet available to ensure that the requisite policies and prevention programs receive the attention they deserve. In most developing countries at present, general health services reach only a small portion of the population and occupational health and safety is virtually non-existent, with the rare exception of large factories.

11.2 FACTORS ASSOCIATED WITH ACCIDENT RATES

The injury rate among industrial workers in Addis Ababa in 1985 was given as 294 per 1000 person years by the Ministry of Industry. The commonest agents leading to accidents were machinery (18.02%), hand tools (11.88%), and collision (10.9%) (2).

Among those studies that are available on industrial injuries and accidents in the developing world, the injury rate among Indian railway employees in 1977 was reported as 20.35 per 1000 person years of exposure while the accident

rate among 4000 Allahabad railway employees was 49.35 per 1000 person years of exposure (8).

Early accident studies have demonstrated a high rate in younger age groups, usually greatest under 20 years with decreasing rates as age increases. Most of these studies were done in United States and Europe. A few studies from countries such as India and Malaysia showed a gradual increase in accident rates with age, with a peak accident rate at 36-45 years of age. Watson and White noted that 51.2% of accidents occurring in the United States occurred in the age group 20-30 years, with the rate declining with increasing age (10).

The positive benefits, in terms of lower accident rates, of older workers are not as well known as the negative although they should be stressed. Positive aspects of older workers that have been noted elsewhere are better skills, knowledge and experience, greater sense of responsibility, high capacity to do precision work, low labour turnover and low short term absenteeism (11). Such characteristics have been shown to be related to lower accident rates. (12)

Women have been reported to have a much lower rate of industrial injuries than men. While earlier on this was felt to be due to a difference in exposure and type of activity, more recent analysis controlled for exposure and type of activity have suggested that the lower rates

observed in females may be related to increased carefulness in their work (12).

Workers aged 18-20 made up 2.35% of the work force in the United States recently but suffered 10.62% of the total number of accidents. Younger workers are felt to be burdened as well by inexperience. Recent studies in United States have shown that experience rather than age is the most important determinant. A two years record analysis of coal miners demonstrated that fully 47% of the accidents occurred in those with one or less year of experience, 13.8% with one to two years experience and the accident rate decreased as experience increased (13).

Accident rates are seen to decrease with increasing salary in most studies. Analysis by salary is however complicated by the fact that higher salaries within a factory are generally earned by those with experience and with managerial level jobs and thus may reflect less exposure to risk.

Likewise increasing educational levels have been noted to be associated with decreasing accident rates. Again, however, the same effects seen in analysis of accident rates by salary can also be expected in analysis of accidents by education, with increased education resulting in managerial jobs and a decrease in exposure to risk with a resultant decrease in accidents.(14)

II.3 FACTORS ASSOCIATED WITH NATURE OF INJURIES

Among the type of accidents occurring among Allahabad technical railway personnel, the commonest was hit by or against an object (54.8%) and fall was the second commonest (38.9%) . Observation in an Allahabad army population showed that the commonest type was fall (41.8%), followed by hit by or against an object (37.5%) (15).

The commonest types in the 1985 study in Addis Ababa industries were machinery (18.02%), hand tools (11.88%), and hit by or against an object (10.9%). Type of accident seems to reflect largely the type of factory and type of jobs done (2). Dudley in his study of 2,400,000 disabling injuries in the United States in 1972 showed that the commonest agent factors were fall (20%), struck by falling object (14%), machinery (10%), struck against object (7%) and hand tools (6%) (16).

For US coal miners, the commonest cause of injury was found to be material handling (37.7%), followed by machinery (6.3%), hand tools (5.4%), striking or bumping object (2.4%) and stepping on an object (2.8%).

Injury experience among coal miners in the United States showed the commonest injury to be sprain (42.7%), followed by contusion (25.6%), fracture (11.3%), laceration (5%) and multiple (5.5%). (17)

The commonest parts of the body affected in the Addis study of 1985 were fingers (37.2%), hands (11.6%) and toes

(12.4%) (18). The commonest parts of the body affected among the coal miners were also fingers (10.3%) hands (2.4%) and toes (2.1%) (19).

Distribution of accidents over the days of the week, in most studies reveals that the highest accident rates occurred on Mondays and the lowest on Thursdays and Fridays. The absence of workers after a weekend, is considered as an underlying factor in the above distribution. Absenteeism is higher on Mondays than other days of the week in most industrialized countries, which results in workers having to stand in for absent colleagues and having to undertake unfamiliar jobs on that day (1). Little is known about such behaviour or rates in the developing world.

In four different types of British factories over a period of one to two years, accidents were noted to occur in the morning with the peak time for accidents being in mid-morning. The same effect was observed by Zetterman in his study of conditions in Sweden in the early 1950s (20).

Local accident peaks occurred before breaks in the one study in United Kingdom. It was suggested by the investigator that this could have been due to fatigue or the speeding up of production at these times in an effort to meet a target before break.

Costs of accidents are not easily measured, however a study of 4660 Indian railway technical personnel in 1977 measured

expenditures incurred due to loss in terms of salary, compensation and medical care. They reported a total equivalent to 67,536.70 Ethiopian Birr for 230 injuries, or an average 293.60 Ethiopian Birr per injury sustained per year (21).

Dudley in his study of industrial accidents in the United States of America in 1972 used a somewhat different calculation but reported the cost to industry of accidents per individual worker was the equivalent of 280 Ethiopian Birr. So despite the difficulty in such measurements and comparisons, it is evident that costs of accidents are significant.

An American author estimated in 1953 that each lost time injury (i.e. an injury involving absence from work for a certain time) in industrial employment in the United States cost the employer approximately US$ 1800 (22).

In a representative sample of 1019 accidents in Indian cotton textile factories from 1970 to 1974 a total of 10,609 man-days were lost due to these accidents. This represented an average of slightly more than 10 man-days per accident (23).

The problems of accidents is more acute in developing countries with a marked upward trend in numbers seen where protective laws do not exist or if they do, are rarely enforced. Poverty and ignorance also add to the

problem.(24)

As identified during the Symposium of Occupational AAccidents in 1982, there is overlap and shared responsibility between the Ministry of Labour and Social Affairs and Ministry of Health and the municipalities, with some of there responsibilities converging.

Responsibilities of the ministries of Health and Social Affairs also appear to overwelm in as far as the health of workers is concerned. While the latter is responnsible for the health and safety of workers in Industrial enterprises, the former is responsible for overall public health and environmental hygiene.(25) The scope of the labour and Factory Inspectorate in any country depends on existing legislation and on administrative and traditional practices. Clarification of responsibilities and enforcement procedures would obviously greatly assist curent enforcement practices.

Legislation dealing with such matters as working hours and rest periods, protection of young workers, minimum standards of safety and health, compensation in case of industrial injuries and legislation concerning compulsory occupational health services in places of employment has been enacted in Ethiopia. The Labour and Factory Inspectorate has been established and is operated by the Ministry of Labour and Social Affairs which is responsible for the health and safety of workers in industrial

enterprises, as defined in the Labour Standards Proclamation 232 of 1966. This includes all economic enterprises. The Ministry of Health is responsible for overall public health and environmental hygiene.(26) The power and duties of each ministry is defined in detail in the Negarit Gazeta no.8, 1987.

CHAPTER III

METHODOLOGY

All accidents occurring in the eleven factories of Ketena One under the Ministry of Industry during the period November 1st, 1986 to October 31, 1987 were included in the study. As well as injuries occurring at the place of work, injuries occurring on the way to and from work were also included in the study because all factories had transport services that picked up and delivered employees.

Efforts were made to organize the survey without disrupting production and with collaboration of the factory and clinical staff. Visits were made to the Ministry of Industry to discuss the study and seek their support. A letter of permission was prepared by the Ministry of Industry for all concerned heads of factories. Factory and clinic heads in each factory were also met and the study discussed in detail and their support obtained. Arrangements were made to provide feedback to them on the survey results.

A combination of interviews, record review and collection of worker information was used for studying industrial injuries in this study. Information on accidents, injuries and accidents (those injured) was obtained in four ways:

1. Factory and Worker Form : A form was used to collect demographic information on all workers in the factories as well as the type and level of first aid and health services available. The form was filled in by the head of the clinics, either a nurse or a health assistant. It included name of the factory, number of employees and their category, facilities of the clinics such as x-ray, laboratory, number of patients referred elsewhere, safety provisions and information about other health services available such as family planning, vaccination, maternal and child health, and health education. (Appendix 1).

2. Factory Information Form : A form was used to collect information on all factory workers to supplement the information obtained from the health staff. The form was filled in by the administrator or personnel in each factory. (Appendix 2)

3. Injury Registration Form: There is a standardized injury registration book in all eleven factories that has been provided by the Ministry of Industry since 1985. All health personnel had been given a one week seminar on how to register and report injury cases by the Ministry of Industry at the time the registration books were introduced in 1985. Details of injuries of factory workers for the year 1986-1987 were collected

from the book by nurses prior to interviewing accidents. The variables available from the record book included place where the injury occurred, day, month, year, age of the victim, salary, job title head at the time of injury, part of the body affected, nature and source of injury, lost work days and days of restricted work activities (Appendix 3).

4. Questionnaire for Accidents : As the injury registration books were not kept for the primary purpose of research and were rarely checked, they were often incomplete. To fill in such gaps, all accidentees were interviewed personally. This allowed verification of information already received and the acquisition of additional information such as educational level, section where the injury occurred, what the victim was doing at the time of the injury etc. In the one case where there was no memory about the accident, the worker was provided with available information from the record book and was stimulated to full recall. In all other cases workers answered the questionnaire without reference to the information on the registration book and only minor differences were noted. When differences did occur, the record book, filled at the time of the accident, was used.

All six interviewers, who had at least grade 12 education,

were first trained in the use of the questionnaire. The questionnaire form for acute [illegible] the interviewers one week prior to the onset of the study at two factories of Ketema Two where eighty-two [illegible] ents were interviewed.(Appendix 4)

All, but three of the injured workers who had been subsequently transferred, were interviewed, making for a response rate of 99%.

The ILO classification of industrial accidents was used to categorize the different accidents. In 1962, the Tenth International Conference of Labour Statisticians, convened by the ILO, recommended that for the study of circumstances surrounding industrial accidents, these accidents should be classified as follows: by type, by agency, by nature of injury and by bodily location of injury. The categories are as specified in Appendix 5.

For each separate accident, only one injury was counted. The choice of which injury to count was made by the clinician who selected the most serious of the injuries occurring as a result of any one accident to a worker. The clinicians were in contact with the principal investigator several times per week during the study period.

Workers with more than one accident in the one year period had each accident counted as a separate event. i.e.

Analysis was done of accidents rather than accidentees and each accident was counted as a single event. In calculating the effect of time on accident occurrence however only information from workers with single accidents in the one year period were used. The occurrence of multiple accidents in some individuals was noted (i.e. possible accident-proneness), and the numbers of workers with multiple accidents counted but further analysis was not done.

The number of worker-years of exposure was calculated using the worker population in each factory at the end of the year during the study period, as more accurate employee attendance figures were not available. The work force was relatively stable with low turnover during this time. Demographic data about workers was also obtained on those workers who were working in the end of the period.

Calculation of the rate of accidents in factory workers by age, sex, educational status, length of employment and salary was done by determining the number of workers in each category and calculating rates per thousand workers exposed during the year.

Severity of accidents is calculated on the basis of the total number of days of work lost per accidents per thousand work-hours of exposure.

Cross tabulation of agent factor and nature was done by calculating the number of workers in each category and arranging the data in the form of a simple frequency table.

Analysis of the relationship of time to accidents was done using a simple frequency distribution which did not take into account the number of worker hours of exposure during the time period.

Information concerning the cost of accidents was obtained from factory administration using the premiums paid for insurance, days lost due to accident and claims recovered.

CHAPTER IV

RESULTS

4.1. DESCRIPTION OF WORKERS

The total number of workers in factories in Ketena One was 4462 as calculated from the year-end factory data. The workers are relatively young, with over 60% of the population below 35 years. There were very few workers in the age groups 15-19 years (0.03%) or above 55 years (0.03%). The majority of workers were in the age groups 25-34 years which constituted a little over 50 % of all workers. The median age of workers lies between 30-34 years with a mode of 28 years and a mean of 33.6 years. The range in age was from 18 to 59 years of age.

The overall sex ratio of workers was moderately high, with 153 males to 100 females (1.53:1.00). The male ratio was particularly high at Addis Soft Drink, Awash Wineries, Anbessa Flour and Macaroni and Addis Ababa Tannery being 7.3:1, 4.2:1, 3:1 and 3:1 respectively. Taking all factories together, there was a preponderance of males in all age groups except at 25-29 years, where the number of females was more than one and half times greater than males. (Table 1).

As to length of employment, 33.5% (1493) had less than 5 years of employment, 26% (1160) had 6-10 years of employment and very few, 9.8% (441), had greater than 21 year of employment. (Table 3).

The majority of the work force, 62.6% (2797) were earning between 50 to 150 Birr per month. 18.6% (831) earned 151-250 Birr per month and 18.7% (836) earned more than 251 Birr per month. (Table 4).

48.4% (1935) of the workers had completed literacy campaign, 22.8% (1016) had primary education, 15.9% (707) had secondary education, 7.9% (353) had completed more than grade twelve. Only 0.04% (2) were illiterate (Table 5).

4.2. OVERALL ACCIDENT RATES

The total number of accidents that occurred among Ketena One factory employees was 357, giving a rate of 80.0 accidents per 1000 person years exposed to risk between November 1, 1986 - October 31, 1987. When accident rates were analyzed factory by factory, an extremely high accident rate was observed at Kolfe Household Utensils (474.5 per 1000 person years) and Addis Soft Drinks (210.3 per 1000 person years). The remaining 7 factories had less than 65 accidents per 1000 person years.

Accident rates seem to be unrelated to the size of work force, however the highest rates (474.5 per 1000) were in

Kolfe Household Utensils with a small work force of 137 and low rates were noted in the two largest factories, eg.Anbessa Shoe and Tikur Abay Shoe with 718 and 686 workers respectively and accident rates of 21.1 per 1000 and 30.6 per 1000 respectively (Table 1).

4.3. FACTORS ASSOCIATED WITH INJURED WORKERS

The average accident rate for males was 99.4 per 1000 person years while for females it was 50.3 per 1000 person years, thus giving an overall male rate twice the female rate. The accident rate for males is higher than for females in all factories except Kolfe Household Utensils 446.8 verses 534.9 and Addis Garment 86.5 verses 117.8. There were no female accidentees in Addis Ababa Tannery, Tikur Abay Shoe, Addis Ketema Candy and Anbessa Flour and Macaroni (Table 1).

The age specific accident rate was calculated within each age group. The age specific accident rate was markedly higher (647 per 1000 person years) in the age group 15-19 where 11 accidents occurred in 17 workers. The next highest rate was 197.7 per 1000 person years in the age group 20-24 years. A high rate continued up to the age group 35-39 years and dropped to 38.3 per 1000 person years over age 40. At 55 years and above where there were only 15 workers with no accidents (Table 2, and Figure 1).

The accident rate was highest (142.4 per 1000 person years) with those who had 5 years of service or less. It remained high but decreased slightly to 81.9 per 1000 person years in those with 5-10 years of service and 80.9 per 1000 person years for 11-15 years of service. Only with 16 years of service did it drop to 56 per 1000 person years (Table 3).

Little variation between rate of accidents and salary seen. The highest accidents rate (100.7 per 1000 person years) was noted in the work force earning between 101-150 Birr per month. The next highest rate (88.7 per 1000 person years) was noted with workers earning 151-200 Birr per month. The lowest rate observed was 52 per 1000 person years with those, who earned 301 Birr per month or more (Table 4).

The accident rate was highest among those with primary education and junior secondary education level, 158.5 per 1000 person years and 115.8 per 1000 person years respectively. Very low rates were noted among those who had completed literacy campaign, who constituted the greatest part of the workers (43.4 percent) (Table 5).

4.4. FACTORS ASSOCIATED WITH TYPE AND NATURE

Of the 357 accidents, 62.5 percent were caused by one of the following types : falls, being struck by or against something, including falling object and which each

accounted for 14-33.6% of all the accidents. Exposure to or contacts with electric current. Exposure to or contact with harmful substances or radiations each accounted for a further 6.7-12% of all the accidents. Exposure to or contact with extreme temp. the lowest. accounted for 6.2% of all the accidents (Table 6, and Figure 2).

The highest number of injuries were superficial injuries which accounted for 138 or 38.7% of all injuries, followed by lacerations 97 or 27.2%, burn, fracture, sprain or strain and dislocation which constituted , 36 (10.0%), 30 (8.5%), 28 (7.9%), 17 (4.8%) respectively, Three amputations accounted for only 0.9% of the injuries and all involved loss of fingers. No death occurred during the year of the study. (Table 8, and Figure 3).

Cross tabulation was done by type of injury with age but the number of workers exposed in each category was not determined. Nevertheless some indication of the type of injuries occurring at various ages and by sex can be observed. Types of injury were evenly distributed in the 15-19 year age group. In the age group, 20-34 years, the most common type of injuries were superfiscial injuries 104 (29%), laceration 68 (19.6%) and burn 29 (8.1%). Males were 3 times more likely to have abrasions and lacerations than females. From the age of 35 years onwards the commonest type of injury were superficial injuries, 42

(11.8%), laceration 26 (7.8%), fracture 13 (3.9%), sprain or strain 12 (3.4%) occurred respectively. Here fracture and sprain or strain stood third and fourth respectively. Males suffered 7-17 times as much as female (Table 7).

4.5. FACTORS ASSOCIATED WITH TIME

Distribution of accidents over days of the week indicated that the highest number of accidents were observed on Monday (83 or 23.3%) and the lowest on Fridays (47 or 13%). Accidents on Saturdays and Sundays accounted for (10% or (36)) and (4.5% or (16)) of the total respectively. This is somewhat high as fewer workers were engaged on those days. Exact number of workers exposed on the various days was not however determined.

The distribution of accidents by time of the day showed a slight preponderance of accidents in the morning as opposed to the afternoon. (255 verses 102). Peak time for accidents was mid-morning between 9 and 10 A.M. (Figure 5).

4.6. COST OF ACCIDENTS

The total workers premium paid by all the factories was 250,049.78 Ethiopian Birr per year while the total amount claimed was 16,259.72 Ethiopian Birr, which was 6.5 percent of the total premium paid. The highest premium (48,000.81 Birr) was paid by Tikur Abay Shoe Factory and the highest amount claimed (3546 Birr) was by Addis Garment Factory.

A total of 3,450.5 person days were lost directly result of 357 accidents in the eleven factories average of 0.77 person days per factory. The greatest total time lost in any factory was 1058 days or 5 p years while the lowest days lost (63 days) due to acci was noted by Addis Ababa Tannery (Table 9).

Table 1. Accident Rate Per 1000 Person Years Exposed by Factory and Sex, Ketena One 1986-87.

Factory	Male		Female		Total	
Kelfe Household Utensils	42/94	446.8	23/43	534.9	65/137	474.5
Addis Soft Drinks	115/531	216.6	12/73	164.4	127/601	210.3
Addis Garment	9/104	86.5	43/382	112.8	52/486	107
Gulele Soap	16/134	119.4	2/50	40	18/184	97.8
Anbessa Flour and Macaroni	23/252	91.3	0/83	0	23/335	68.7
Awash Wineries	21/287	73.2	2/68	29.4	23/355	64.8
Addis Ketema Candy	2/21	95.2	0/27	0	2/48	41.7
Tikur Abay Shoe	21/452	46.4	0/234	0	21/686	30.6
Anbessa Shoe	12/473	25.4	4/275	14.5	16/748	21.4
A.A. Tannery	6/260	23.1	0/85	0	6/345	17.4
Gulele Garment	1/86	11.6	3/148	6.7	4/534	7.5
Total	268/2694	99.4	89/1768	50.3	357/4462	80

Figure 1. Age-specific accident rate per 1000 person years by age of workers in Hetena Che Factories, 1986-87

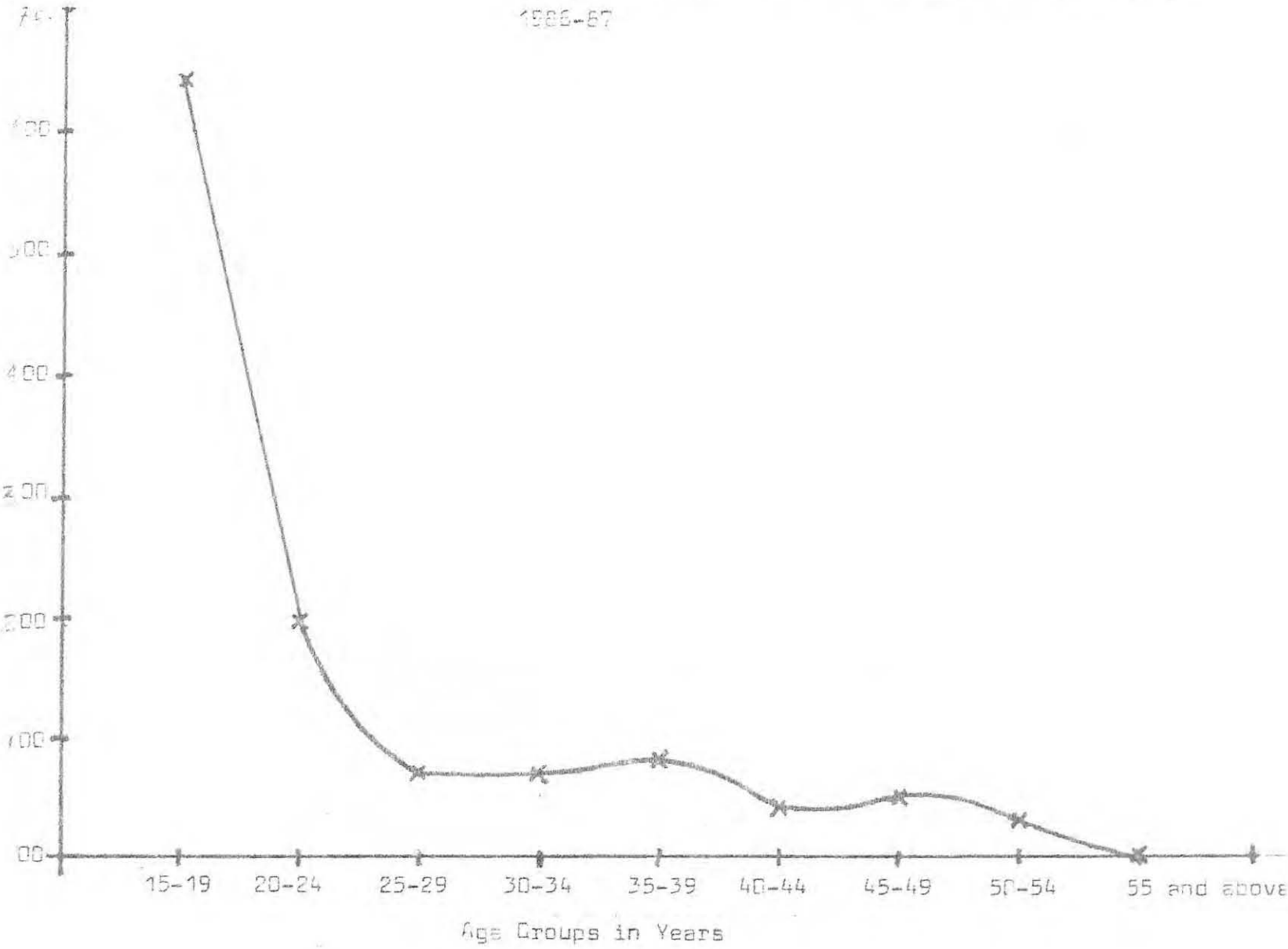


Table 2. Age-Specific Accident Per 1000 Person Years in Ketena One

1986 - 87

	Age Groups In Years									Total
	15-19	2o-24	25-29	3o-34	35-39	4o-44	45-49	5o-54	55 & above	
Workers Exposed	17	43o	1178	1o7o	777	469	275	231	15	4462
Accidents	11	85	88	75	59	18	14	7	o	357
Age-Specific Accident Rate Per 1000 Person Years	647	197.7	74.7	7o.1	75.9	38.4	5o.9	3o.o	o	8o.0

Table 3. Accident Rate by Length of Employment, Kelena One Factories 1986-87.

	Lenght of Employment in Years					Total
	< 5	6-10	11-15	16-20	≥21	
workers Exposed	1493	1160	889	479	441	4462
Accidents	138	95	72	27	25	357
Accident rate by length of employment per 1000 person years	92.4	81.9	80.9	56.4	56.7	80.

Table 4. Accident Rate by Salary Level Ketena One Factories

1986 - 87.

	Monthly Salary In Birr						
	5o-1oo	1o1-15o	151-2oo	2o1-25o	251-3oo	3o1 & above	Total
Workeres	1574	1221	564	267	221	615	4462
Accidents	116	123	5o	18	18	32	357
Accident Rate Per 1000 Person Years by Salary	73.7	1oo.7	88.7	67.4	81.4	52.o	8o.o

Table 5. Accident Rate by Level of Education Ketena 1 Factory

1986 - 87.

Level of Education	Illit-rate	Grades Completed					Total
		Literacy Campaign	1-6	7-8	9-12	12+	
Workers Exposed	2	1935	1016	449	707	353	4462
Accidents	0	45	161	52	68	31	357
Accident Rate by Education Per 1000 Person Years	0	23.3	158.5	115.8	96.2	87.8	80.0

Figure 2. Percentage distribution by type for 357 accidents in Petaling Jaya factories, 1986-87

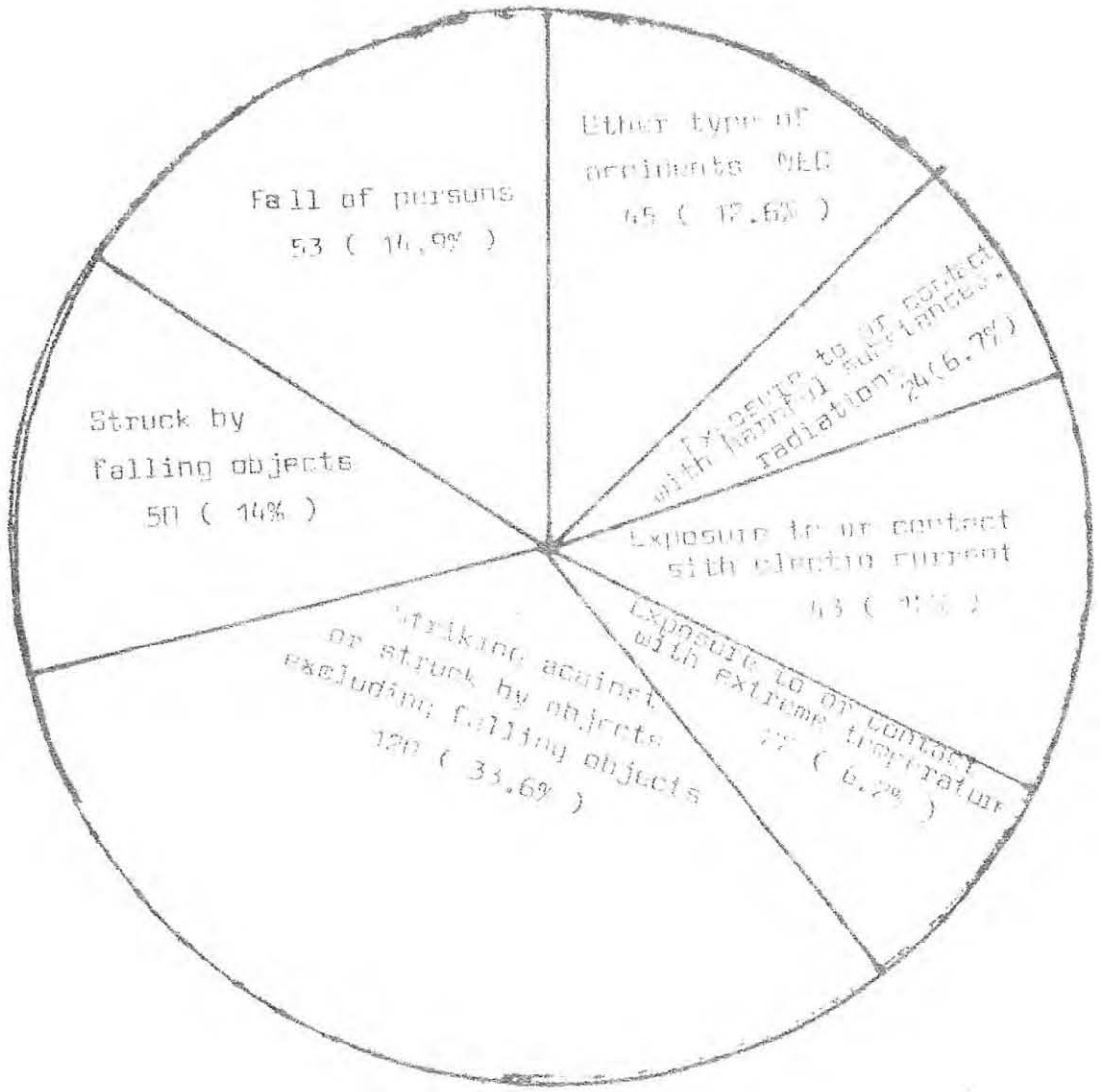


Table 6. Accidents by type and Nature of injury, Ketena One Factories 1986 - 87.

Nature / Type	Superficial injuries	Lacerations	Burns	Foracture	Sprain Strain	Dislac.	Others	Amput.	Total Accident	Per of acc
Falls of persons.	24	8	-	7	6	8	-	-	53	
Struck by falling objects	21	16	-	6	5	2	-	-	50	
Striking against or struck objects excluding falling objects.	49	51	4	9	6	1	-	-	120	
Exposure to or contact with extreme temp.	12	4	6	-	-	-	-	-	22	
Exposure to or contact with electric current.	17	7	4	5	1	4	2	3	43	
Exposure to or contact with harmful substances or rediations	-	1	21	-	-	-	2	-	24	
Other type of accidents, not elsewhere classified, including accidents not classified for lak of sufficient date.	15	10	1	3	10	2	4	-	45	
Total	138	97	36	30	28	17	8	3	357	

Figure 3. Nature of Injuries in 357 Residents in Batena Une Factories, 1986-87

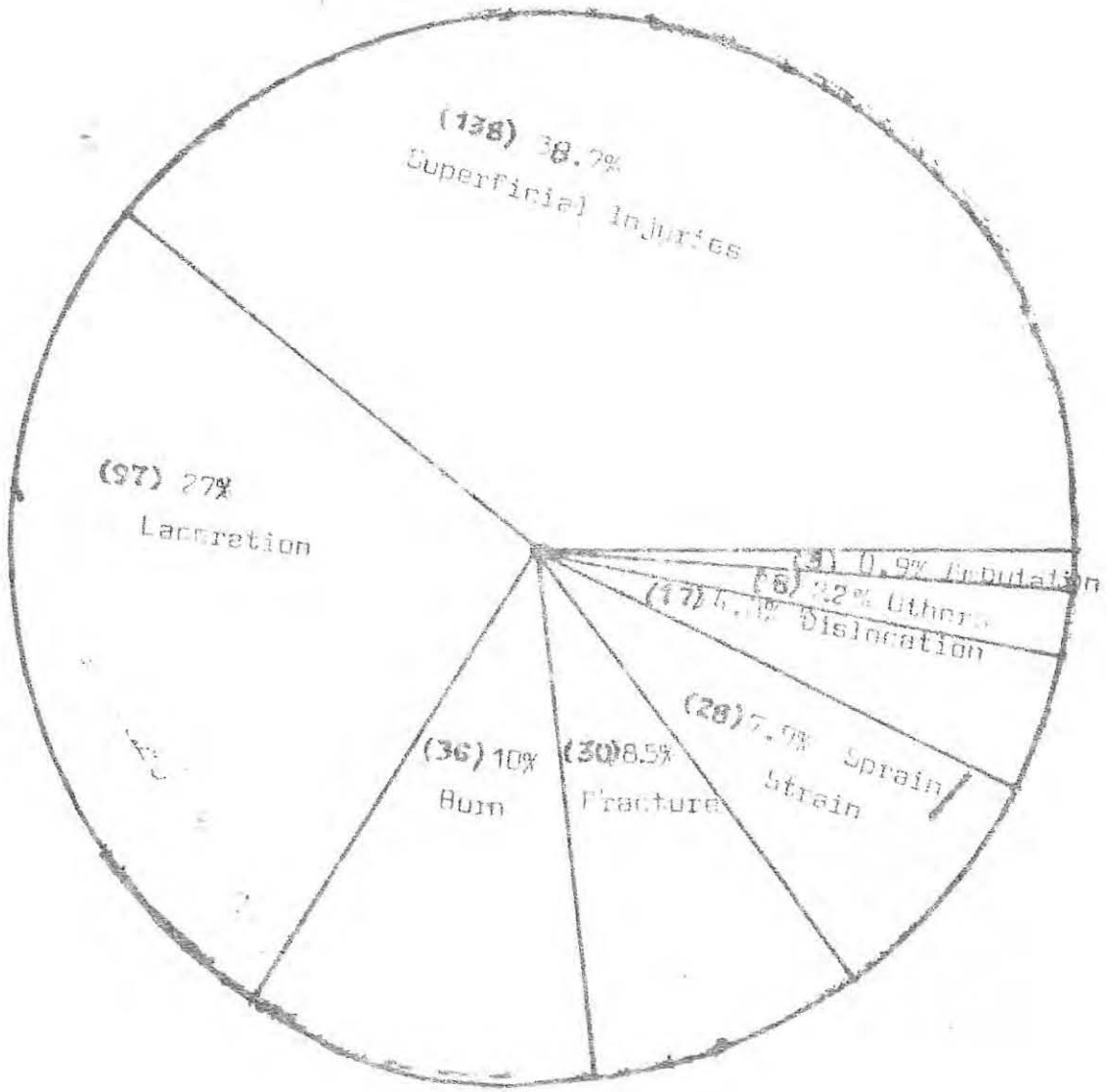


TABLE 7

Accident by Age Group, Sex and Nature, of injury Ketene One Factories

1986 - 87

Age Group / Nature & Sex	Lacerat		Burn		Superfi-cial injuries		Amputat		Dislocat		Fract.		Sprain/ Strain		Others		TOTAL	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
15 - 19	2	1	1	0	2	0	1	0	1	0	1	0	1	0	1	0	10	1
20 - 24	14	3	8	5	23	20	1	0	2	1	2	1	2	2	1	0	53	32
25 - 29	15	9	12	0	21	16	0	0	2	3	3	1	6	0	0	0	59	29
30 - 34	19	8	3	1	14	10	1	0	2	0	7	2	4	1	3	0	53	22
35 - 39	11	1	2	0	21	1	0	0	3	0	7	2	8	0	3	0	55	4
40 - 44	6	0	1	0	4	0	0	0	1	0	3	0	2	0	0	0	17	1
45 - 49	5	0	2	0	4	0	0	0	1	0	1	0	1	0	0	0	14	0
50 - 54	3	0	1	0	2	0	0	0	1	0	0	0	0	0	0	0	7	0
55 and Above	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T O T A L	75	22	30	6	91	47	3	0	13	4	24	6	24	4	8	0	268	89

Table 8. Accidents by Factories and Nature of injury per 1000 person years, Ketema One 1986 - 7

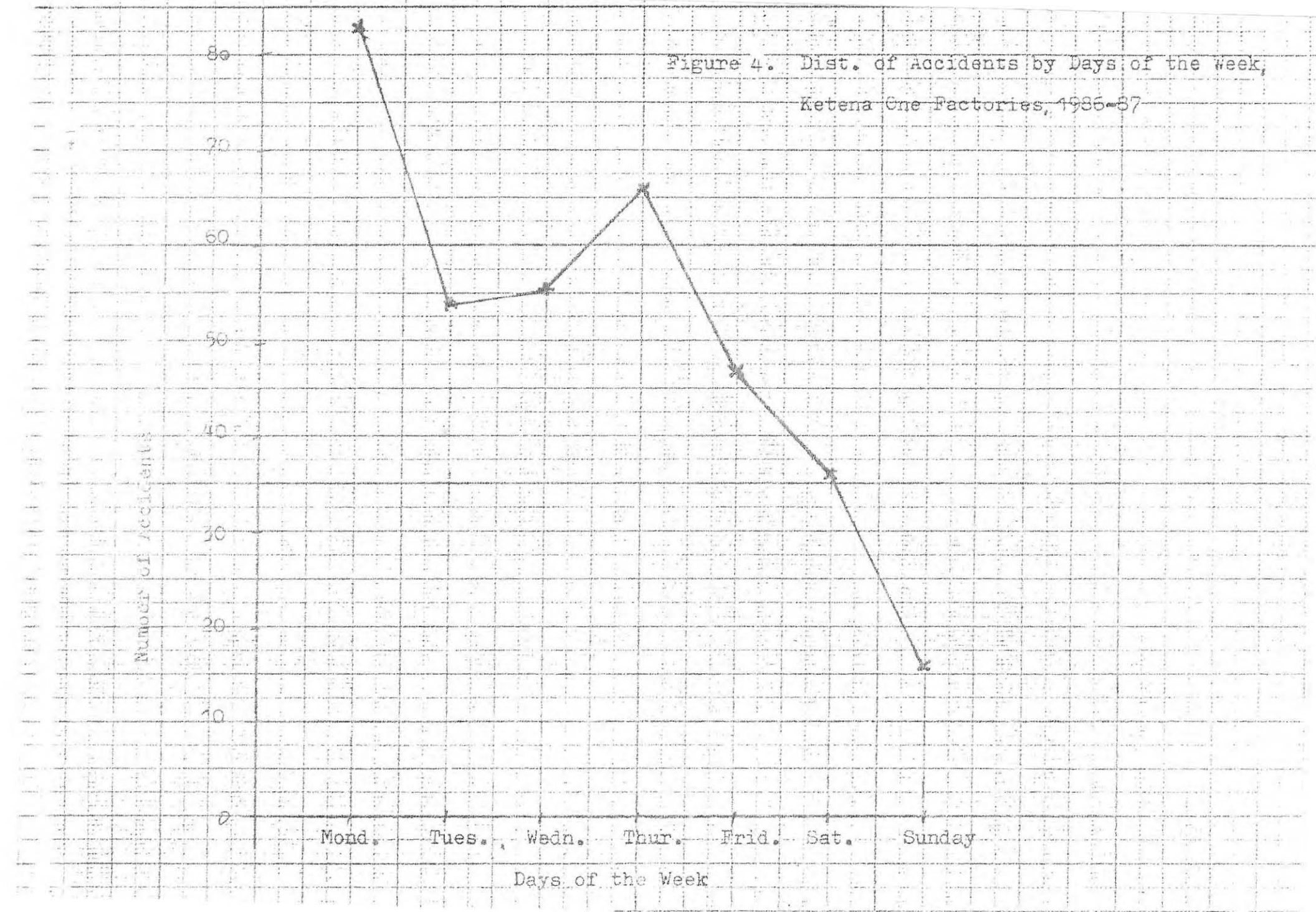
Factory Nature and Sex.	Superficial injuries		Lacerat		Burn		Feracture		Sprain strain		Dialvc.		Others		Amput.		Death		No of accidents			Workers Exposed.	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	T	M	F
Kelfe Household uten	12	12	10	7	8	2	3	1	7	1	2	-	-	-	-	-	-	-	42	23	65	94	43
Addis Soft Drinks	46	5	32	4	5	-	10	-	12	3	5	-	5	-	-	-	-	-	115	12	127	531	73
Addis Garment	7	28	1	7	1	2	-	3	-	-	-	3	-	-	-	-	-	-	9	43	52	104	382
Dukale Soap	2	-	2	-	8	2	1	-	-	-	1	-	1	-	1	-	-	-	16	2	18	134	50
Anbessa F & Mec	8	-	7	-	-	-	4	-	2	-	1	-	-	-	1	-	-	-	23	-	23	252	83
Awash Wineries	4	1	7	-	1	-	4	1	1	-	3	-	1	-	-	-	-	-	21	2	23	287	68
Addis K. Candy	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	21	27
Nkur Abay Shoe	3	-	15	-	1	-	1	-	-	-	-	-	1	-	-	-	-	-	21	-	21	452	234
Anbessa Shoe	5	-	1	3	3	-	-	-	2	-	-	1	-	-	1	-	-	-	12	4	16	473	275
Addis A. Tannery	3	-	-	-	1	-	1	-	-	-	1	-	-	-	-	-	-	-	6	-	6	260	85
Dukale Garment	1	1	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	3	4	86	448
Total	91	47	75	22	30	6	24	6	24	4	13	4	8	0	3	0	0	0	268	89	357	2694	1768

TABLE 6

Costs per Factory in Insurance Premium, Claims and days lost Per factory per year Ketema one 1986 - 7.

Factory / Cost	Insurance Premium Paid in Birr	Claims per Year in Birr	Days lost Per Year	Days lost Per Employee Per Year	No of Employees	Accident Rate per 1000
Kolfe Household Utensils	8500.91	48.50	92	0.67	137	474.5
Addis Soft Drinks	43576.08	1942.21	554	0.92	604	710.5
Addis Garment	22665.00	3546.00	521	1.07	486	107
Gulele Soap	12022.68	1371.69	164	0.89	184	97.8
Ambessa Flour & Macaroni	10527.60	Unknown	256	0.76	335	68.7
Awash Wineries	22896.60	3012.17	477	1.34	355	64.8
Addis Ketema Dandy	4000.00	100.00	-	-	48	41.7
Tikur Abay Shoe	48000.81	3424.00	153.5	0.22	686	30.6
Ambessa Shoe	37057.05	1810.87	1053	1.41	745	21.4
Addis Ataba Tannery	13935.92	1004.28	63	0.18	345	17.4
Gulele Garment	26891.90	Unknown	92	0.17	534	7.5
T O T A L	250,049.78	16,259.72	3430.5	0.77	4462	80.0

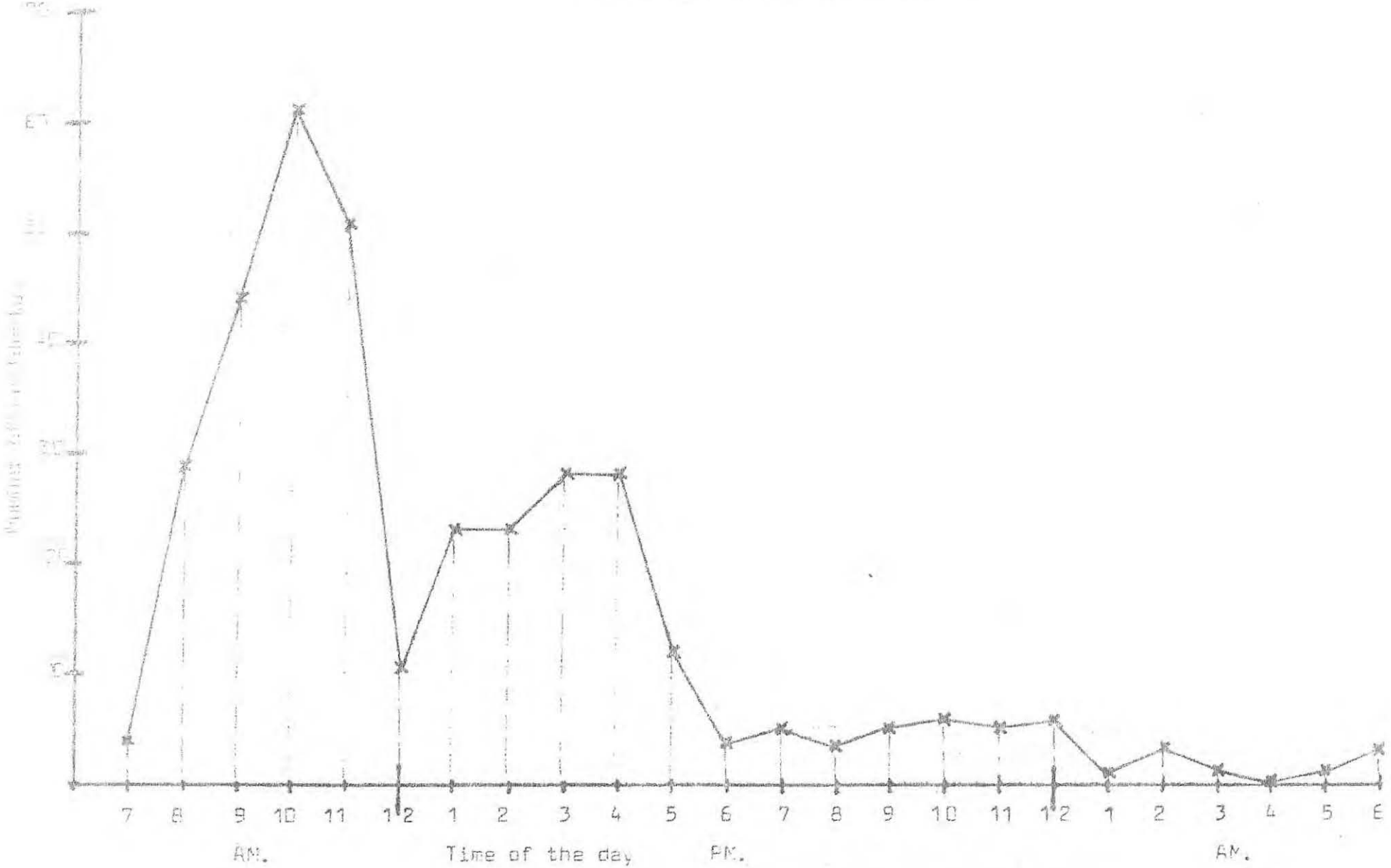
Figure 4. Dist. of Accidents by Days of the Week, Ketena One Factories, 1986-87



ble lo. Distribution of Accidents by days of the week
Ketena One Factories 1986 - 7

Factory / Days of the week	Monday	Tuesday	Wednesd.	Thursday	Friday	Satur d.	Sunday	Total
Kolfe Household Ut.	12	9	12	14	6	7	5	65
Addis Soft drinks	32	22	18	23	19	12	1	127
Addis Garment	5	8	9	13	9	4	4	52
Gulele Soap	4	3	1	4	4	2	0	18
Anbessa Fl & Mac.	9	3	2	2	1	2	4	23
Awash Wineries	6	2	6	3	2	2	0	23
Addis K. Candy	1	1	0	0	0	0	0	2
Tikur Abay Shoe	5	2	4	2	4	3	1	21
Anbessa Shoe	5	3	2	2	1	2	1	16
A.A. Tannery	2	1	0	0	1	2	0	6
Gulele Garment	2	0	1	1	0	0	0	4
TOTAL	83	54	55	66	47	36	16	357

Figure 5. Distribution of Accidents by Time of the Day, Hetena Ore Factories, 1986-87



Months of the Year, Ketena on
Factories, 1986-87

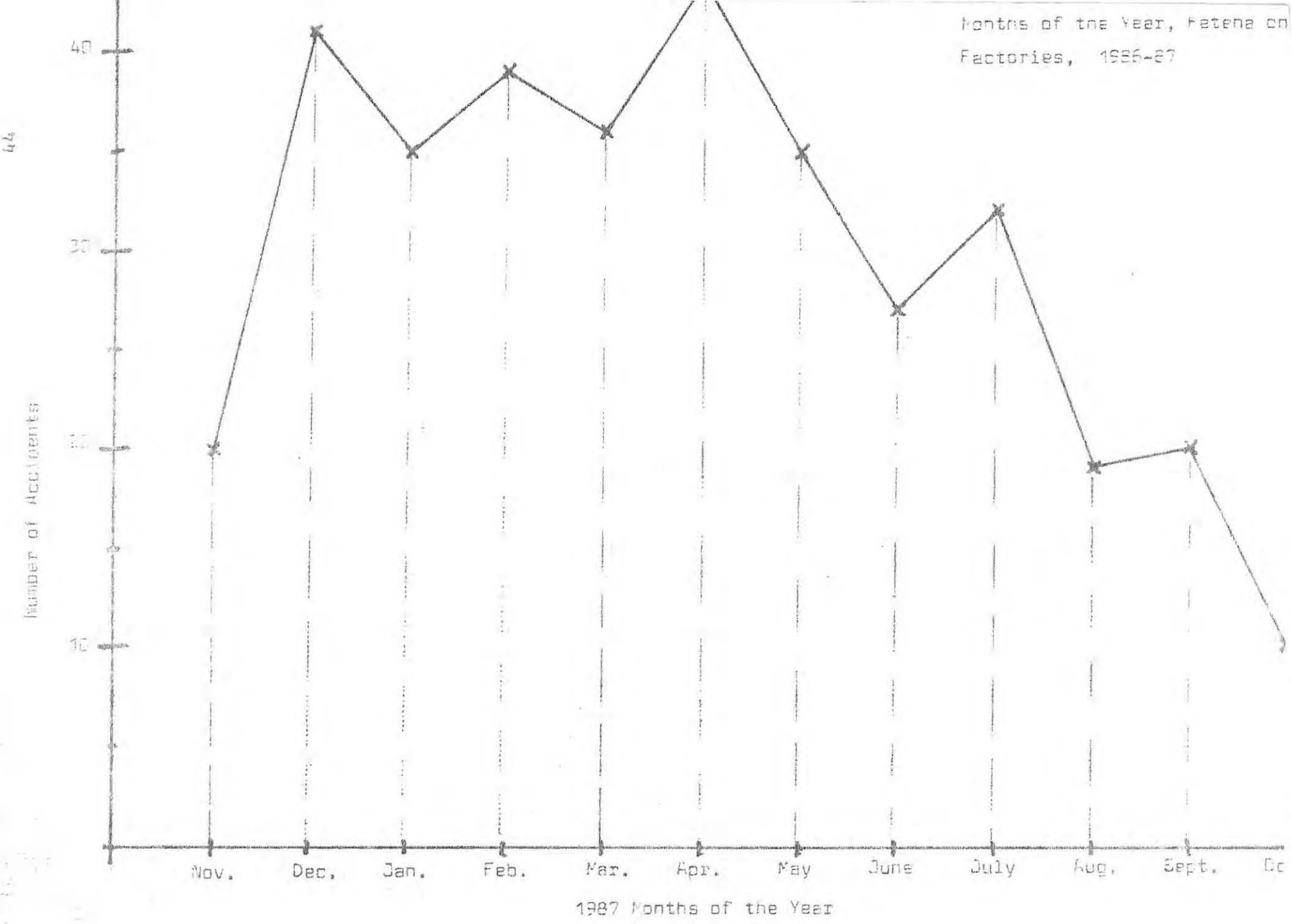
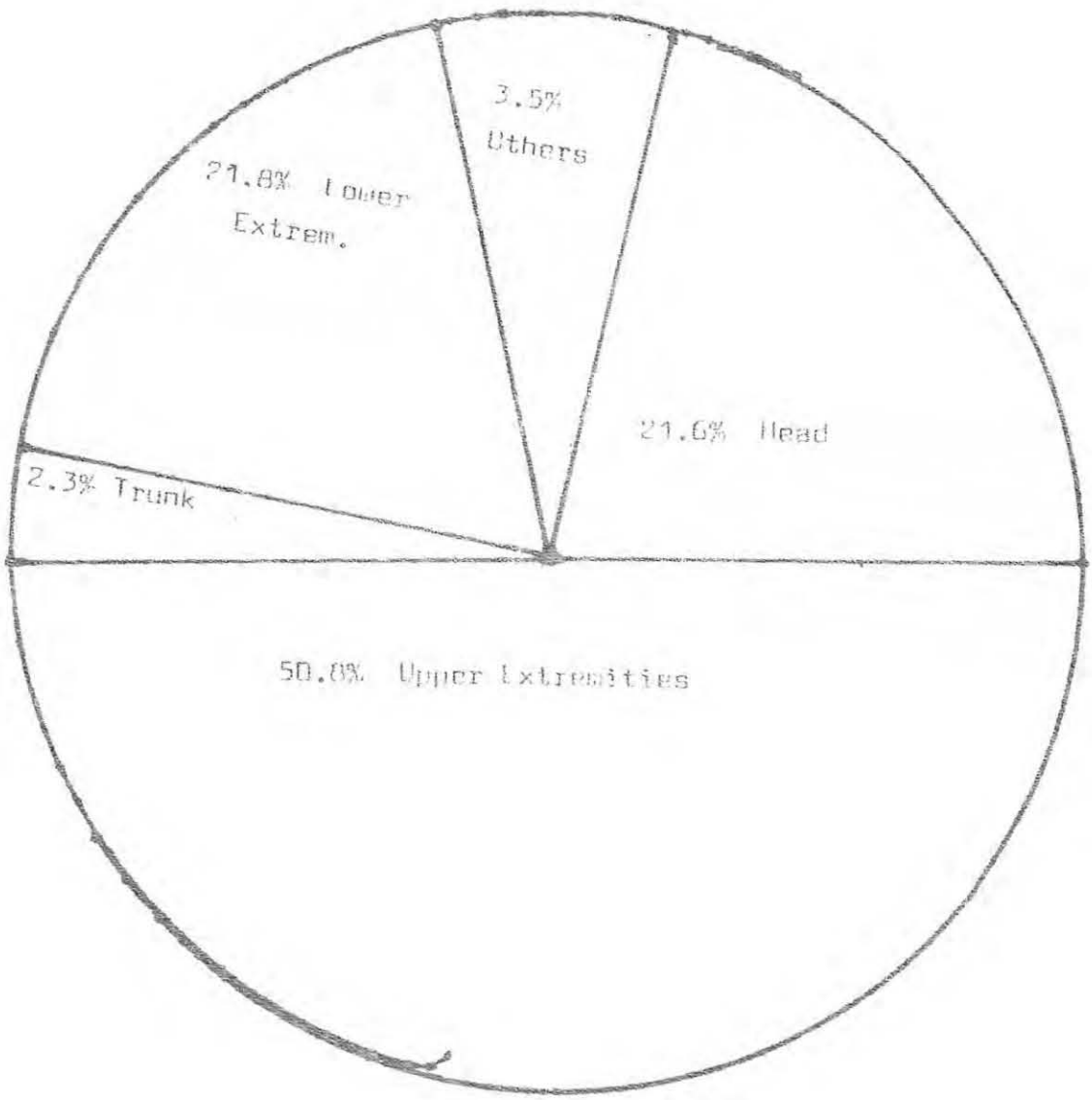


Table 11. Distribution of Accidents by Months of the Year Ketena one factories 1986 - 7.

Factory / Month	November 1986	December	January 1987	February	March	April	May	June	July	August	September	Oct
Kolfe Household Utensils	4	12	7	8	7	7	7	5	4	3	1	
Addis Soft Drinks	4	13	14	17	12	13	13	7	16	7	2	
Addis Garment	6	2	4	6	4	6	7	5	6	3	2	
Gulele Soap	0	2	2	1	3	2	1	3	1	2	1	
Anbessa Flour & Macaroni	3	3	0	2	0	5	0	1	3	0	1	
Awaze Wineries	1	4	1	2	4	1	2	1	2	2	1	
Addis Ketena Candy	0	0	2	0	0	0	0	0	0	0	0	
Tikur Abay Shoe	0	2	1	3	2	4	3	2	0	1	0	
Anbessa Shoe	1	3	3	0	3	1	1	2	0	1	1	
Addis Ababa Tannery	0	0	0	0	0	3	1	1	0	0	1	
Gulele Garment	1	0	1	0	1	1	0	0	0	0	0	
T O T A L	20	41	35	39	36	43	35	27	32	19	20	

Figure 7. Parts of the Body Affected in 357 Accidents, in Fatima Dye Factories, 1986-87



CHAPTER V

DISCUSSION

The overall accident rate of 80 per 1000 person years exposed observed in this study is 4 times higher than the accident rate among technical railway employees in India. It is however a great deal lower than the rate of 294 per 1000 person years reported by the Ministry of Industry in Addis Ababa in 1985.(2)

An extremely high accident rate was observed in Kolfe Household Utensils, almost 3-6 times the average rate. The majority of the accidents sustained in this factory however, were minor and the health facility was easily accessible and available which may have contributed to a higher reporting. In this one factory there were 21 workers who had multiple accidents. Out of the 21 workers with multiple accidents, seven had more than 4 accidents, 7 had 3 accidents and the remaining 7 had two. Although it also had an easily accessible and available health facility, the accident rate was one of the lowest in Gulele Garment Factory. In this factory in contrast to other factories female workers numbered five times greater than male workers. As female workers have been noted to have decreased accident rates, this may account for the somewhat

lower rate seen in this factory.

The overall accident rate for men was 99.4 per 1000 person years while for women it was 50.3 per 1000 person years (Table 1). Males had twice the overall accident rate of females. The reasons for the higher accident rate among men could have been their greater exposure to hazardous operations and their greater activities. However as no determination of actual job and exposure was done, it was not possible to calculate male and female rates for given exposures.(12)

The most serious injury to occur during the study was amputation of fingers which only occurred in males. Particularly high rates of accidents were noted in 15-19 years group although few workers fell into this group, making rate calculation unreliable.

Maximum accident rates were observed in the age group ranging between 20-24 years and in those workers with less than five service years. There was a gradual decrease in the accident rate with increases in both age and service years. Similar results had been observed by Ghosh and Singh in the accidental injuries among technical railway personnel in Allahabad, although other data from the developing world have not shown such a consistent association with age.(8)

The age-specific accident rate was excessively high in the age group 15-19 with only 17 workers. The next highest rate was in the age group 20-24 years. The accident rate stayed high up to 35-39 years dropping to 38.3 per 1000 person years and remained about the same up to 55 years and above. The accident rate at the age group 20-24 years was 197.7 or more than 5 times that of the 40-44 age group. Such high rates in the 20-24 year age group is consistent with figures obtained elsewhere in places such as USA.(24)

The lowest accident rate was observed in those who had completed the literacy campaign but had not formal schooling. In particular, those with just literacy, who constituted the bulk of workers, had a much lower rate of accidents than those with formal schooling. This is in contrast to results from other countries showing that accidents decrease with increasing education.(8)

Older workers are often those who are more experienced and then often have selected the work they are skilled in. They may as well be more careful and are usually among those chosen for supervisory and managerial level work, where they may have a lower risk of exposure.

The lower rate of accident was observed among those without primary school education and with literacy campaign may also be a result of their older age or increased

experience. This does not necessarily indicate increasing level of education also increases accident rate. The lower accident rate was observed in those workers who had completed literacy campaign than in those with primary schooling may be due to the fact that those who have completed literacy campaign are older, more experienced and have selected the type of work they do. The type of work done was not controlled. The older workers who also had more work experience were more likely to have completed literacy campaign and less likely to have primary schooling. Age and experience may have thus confounded the educational finding that increased education brought an increased accident rate.

The accident rate was highest (92.4 per 1000 person years) with those who had 5 service years or below. Only with 16 years of service did it drop to 56 per 1000 person years (Table 3). There is abundant evidence to indicate that the industrial accident rate is higher among workers with less service years.(6)

As younger workers are also those who are less experienced, it was difficult in this study to determine whether age, experience or a combination of the two was more risky.

The "typical" accidentee in this study would be a male, 20-24 years old with primary education but less than 5 years experience.

The injuries sustained were mainly superfiscial injuries, 138 or 38.9% laceration 97 or 27.2% and fracture 30 or 8.4%. Strain or sprain constituted 7.8% (28) and amputation 0.8% (3) of all injuries. Fewer superfiscial injuries were seen than was noted in studies involving government employees, and technical railway workers in Allahabad.(8) However a sizable number of burn injuries (36 or 10.1%) also figured among the severe types. No deaths occurred during the year of the study.

Among the types of accidents involved, maximum injuries (120 or 33.6%) were caused by striking against or being struck by objects (excluding hit by a falling object) as shown in Table 6. Fall, (53, 14.9%), and being hit by falling object (50, 14%), constituted 62.5% of all the types involved. Findings which are similar to those observed in accidental injuries among technical railway personnel at Allahabad, where hit by or against objects constituted 54.8% and falls 38.9% of all accidents.(8) Neither are much different from the observation in an army population in Allahabad where falls (41.8%) and hit by or against an object (37.5%) were the commonest.(15) Among workers, accidents due to falls were felt to be high due to wet and slippery floor especially at Addis Soft Drinks and Addis Ababa Tannery.

It appears that the highest number of accidents (83 or 23.3%) were observed on Mondays. One underlying factor was the absence of workers on Mondays. Absenteeism is often higher on Mondays than on other days of the week. This results in workers having to stand in for absent colleagues and having to undertake unfamiliar jobs on that day.(5) Other factors that may be is a high rate of hangovers or fatigue on Mondays after very active weekends.

Standardization of the rates was not possible as the number of workers on each shift was not determined. Relatively greater number of accidents 83 (23.2%) occurred on Monday. On Saturday with the factories working half a day, the number of workers exposed was considerably lower. The number of accidents on this day was 36 (10.1%) which is almost half of the highest rate observed on Mondays, when workers were working for a whole day. Accidents on Saturdays therefore are relatively common. Exact number of workers exposed on each month, every day and every hour and hence standardized rates however were not determined.

It is difficult to make comparisons between the countries that do publish such rates because of the different methods used to calculate the number of days lost in the event of death and permanent disability, whether it be total or partial.(23) The severity of accident in the eleven factories is 3.009. This means that in one year about 3

days was lost per 1000 work-hours of exposure or 3009 days per million work hours of exposure.

More accidents (255) occur in the morning with fewer (102) occurring in the afternoon. The peak time for accidents was between 9-10 A.M. In this study, it was found that accident peak occurred before break. As has been suggested by authors in other countries, this could be due to fatigue or it could be the result of speeding up production at these times in an effort to meet a target before a break.(5) Most workers usually do not eat their breakfast until break. Although glucose level was not determined, hypoglycemia as a result of delaying their breakfast until 10 A.M. may be a factor causing less concentration at work and had the highest number of accidents between 9-10 AM.

The greatest number of accidents occurred in April and December, 43 and 41 respectively. This was perhaps due to the higher number of holidays in this time such as religious festivals and marriage ceremonies, usually held in these months. Workers often substitute for their colleagues at such times and engage in unfamiliar jobs and in jobs where they may not have adequate knowledge.

Although all months have an almost equal working days, there were more holidays in April and December and a higher number of accidents, 43 (12%) and 41 (11.5%) were observed in those two months respectively. This is relatively high

with less work days and reduced work force.

Even if the accident rate was highest at Kolie Household Utensils Factory, the number of days lost (92 days) and the money claimed for accidents was the lowest in this factory, which suggests that almost all accidents sustained in this factory were minor. The greatest number of days lost (1058 days) was observed at Anbessa Shoe where the accident rate is one of the lowest, suggesting that these were serious accidents which needed longer days of restricted activity in this factory. This factory also claimed the highest amount of money in insurance claims.

The calculated expenditure on all accidents in Ketena One amounted to approximately 16,259.72 Ethiopian Birr or 45.5 Ethiopian Birr per accident. This cost includes only insurance claims and excludes opportunity costs, salary loss, material damage etc.. The cost involved in the eleven factories of Ketena One is almost the same as the cost involved for accidents in army population (which was 46.9 for each accident) and low compared to the cost involved for railway accidents in Allahabad (which was 252.60 for each accident).(21) The cost incurred by the eleven factories was particularly high for a developing country with scarce resources.

Although alcohol consumption was felt to be significant, it

was not possible to analyze its effect due to inadequate information. Although opportunity costs were not calculated they remain important and require more detailed and specific study.

While the need for definative action to improve the safety of workers has been recognized before, the number of ministries involved, the overlapping and convergence of responsibilities that results has somewhat complicated enforcement at present and may require clarification of responsibilities. While the Ministry of Labour is responsible for the health and safety of workers in industrial enterprises, the Ministry of Health is responsible for overall public health and environmental hygiene. The Symposium of Occupational Accidents in 1982 identified some of the overlaps between Ministries of Health and Labour and Social Affairs as well as municipal authorities, but little has been done since then to clarify their roles in practice.

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

The industrial accident rate was higher among male workers in younger age group 15-34 years, among those with less than 5 years experience. Workers without primary schooling but with literacy campaign had a lower rate, of accidents in this study both in absolute and relative frequency (rate per 1000 person years). The highest number of accidents occurred on Mondays and between 9-10 Am.

To minimize the high rate of accidents in young and low service years, proper training, supervision and control is necessary along with improvement in the working environment. The ketena health management team will take this responsibility and will give refresher courses and training to health personnel working in these eleven factories. To those who have no previous experience in industrial work, greater attention should be paid to their training in safe working habits from the beginning of their employment. This responsibility should be taken by the Ketena Health Management Team in collaboration with Ministry of Industry and Ministry of Labor and Social Affairs.

Establishing the safety committee by itself, does not ensure success in reducing the injury toll, unless it is

functional and reporting. They should have regular meeting and should report what they have done at each meeting regularly to the Ministry of Industry and Ketena Management Team and get feedback. Regular joint (i.e. people from Ministry of Industry, Ministry of Labor and Social Affairs and Ketena Health Management Team) supervisory visits are necessary.

The loss of millions of man hours of work affects very greatly the gross domestic products of a country in that the labor that would have been used for producing goods and services is wasted due to accidents. So reducing accidents of the working force can increase productivity and the Gross National Product of the country. Incentives such as "experience rating" to reward employers, who have safe and safety practices in their establishments and penalizing those who do not may also positively affect accident rates.

There are very few studies on industrial accidents in Ethiopia so more studies on this field are really necessary.

Safety committees are useful measure to prevent accidents by increasing the awareness of the workers. The Safety Committees can be appropriately supported and educated by Ketena Health Management Team so that appropriate and continuous health education can be prepared and given to all factory workers of Ketena One and preventive steps taken in the most effective way.

CHAPTER VII

APPENDICES

APPENDIX 1 FACTORY and WORKER DATA FORM

Study number _____

Date _____

Ketena One Industrial Injury Study

1. Name _____

2. Official Position _____ 3. Job category _____

4. Factor clinic _____

5. Number of employees:

Category	Permanent M	Permanent F	Permanent T	Part-time M	Part-time F	Part-time T	Remark
Administration							
Accounting's							
Sales							
Maintenance							
Design and quality control							
Production							
G/Total							

6. Does the factory have the following facilities?

6.1. Laboratory Yes _____ No _____

6.2. X-ray Yes _____ No _____

6.3. Beds Yes _____ No _____

7. Do the workers get free treatment?

Yes _____ No _____

8. Do the workers dependent get free examination and treatment?

Yes _____ No _____

9. Is there any other health facility in the kebele where the factory is located?

Yes _____ No _____

10. Sanitary provisions in the factory.

10.1. Water supply :

Pipe _____ Well _____ River _____ Pond _____

10.2. Industrial waste disposal:

River _____ Septic tank _____ Open canal _____ None _____

10.3. Latrines: Numbers _____ water carriage _____

Pit _____ Vip _____

10.4. It is well ventilated? Yes _____ No _____

11. Number of new and old patients seen monthly _____

12. Number of patients referred elsewhere for better management _____ per month.

13. Safety provisions:

13.1. Is there safety committee? Yes _____ No _____

13.2. Members of the safety committee:

1. _____ 2. _____

3. _____ 4. _____

5. _____ 6. _____

13.3. Functions of the safety committee _____

_____

_____

13.4. What mandates does it have?

_____

_____

13.5. What did they do the last three months?

_____

_____

13.6. Is personal protection equipment provided to the workers?

Yes _____ No _____

13.7. What personal protection equipments (gloves, mask, rain coat, eyeglasses etc _____ .

14. Does the clinic gives any FP service? Yes _____ No _____

- Vaccination session Yes _____ No _____
- MCH Yes No
- HE Yes No _____

If Yes ___ session per month.

If No ____ attendant per month.

APPENDIX 2 FACTORY INFORMATION FORM

1. Name of the factory _____

2. Number of workers with age groups

   15-19 _____

   20-24 _____

   25-29 _____

   30-34 _____

   35-39 _____

   40-44 _____

   45-49 _____

   50-54 _____

   55 and over _____

3. Number of workers getting a salary of

   50-100 _____

   101-150 _____

   151-200 _____

   201-250 _____

   251-300 _____

   301-350 _____

   351 and over _____

4. Number of workers who have served

   5 years and below _____

   6 to 10 years _____

   11 to 15 years _____

   16 to 20 years _____

   21 or more _____

5. Number of worker who are

Illiterate _____

Literacy campaign _____

With primary education (1-6) _____

Junior secondary education (7-8) _____

Secondary education (9-12) _____

Above 12 grade _____

APPENDIX 3 INJURY REGISTRATION FORM

Study number _____

Date _____

Ketona One Industrial Injury Study

(Extraction form from the Record

1. Name _____
2. Address _____(name of industry)
3. Sex
4. Age (in years)
5. Job category _____
6. Day of injury _____
7. Salary per month or per day _____
8. Section - where the injury occurred _____
9. What was the person doing at the time of injury _____
10. Cause of injury? 1. Electric or machinery _____
    2. Chemicals or acid _____
    3. Fire or explosive _____
    4. Fall _____
    5. Flying fragments _____
    6. Hit by falling objects from height _____
    7. Sprains/Strains _____
    8. Drawing _____
    9. Poisoning _____
    10. Death _____

11. Others _____

12. Transport (vehicles) _____

13. Hit by/agains _____

14. Hand tools _____

15. Step on objects _____

16. Others _____

11. Part of the body injured?

1. Head _____ 2. Eye _____

3. Ear _____ 4. Chest _____

5. Abdomen _____ 6. Arm _____

7. Hand _____ 8. Finger _____

9. Hip or thigh _____ 10. Leg _____

11. Toe _____ 12. Toe _____

13. Back _____ 14. Shoulder _____

15. Knee _____ 16. Feet _____

17. Multiple _____ 18. Others _____ .

12. Type of injury?

1. Laceration _____ 2. Burns _____

3. Superfiscial Injury _____ 4. Dislocation _____

5. Fracture _____ 6. Amputation _____

7. Sprains/straine _____ 8. Drawing _____

9. Poisoning _____ 10. Death _____

11. Others _____

APPENDIX 4 QUESTIONNAIRE FOR ACCIDENTEES

Study number _____

Date _____

Kotona one Industrial Injury

1. Name _____
2. Sex
3. Age
4. Home address _____ Ket._____ Kef._____ Keb._____

House No. _____

5. Income _____ per month.
6. What grades have you completed? _____
7. Where did the injury occur? (Section) _____
8. When did the injury occur?
9. What were you doing at the time of the injury? _____
10. How were you hurt? _____
11. What actually caused the injury? _____
12. Did you have specific training in the section you are working? Yes _____ No _____
13. Did you start work after the injury?

Yes _____ No _____

14. If no where did you go to

hospital _____ clinic _____ Home _____

15. Were you hospitalized? Yes _____ No _____
16. If yes did you have surgical intervention?

Yes _____ No _____

17. If Yes how long did you stay in hospital? ___ days.

18. If No what type of treatment did you get? _____ __

19. After discharge were you given some more sick-leave?

Yes _____ No _____

20. How many days _____

21. Were you disabled? Yes _ ___ No _____

22. Were you assigned in the same section? Yes ____ No _____

23. Did you have any more injury prior to the recent one?

Yes _____ No _____

24. If yes how many times? _____

25. What is your religion? Christian _____ Muslim _____

Non-believer _____ Other _____

26. Do you chew chat? Yes _____ No _____

27. How frequently? _____

28. Do you drink alcohol? Yes _____ No _____

29. How often? _____ regularly _____ irregularly _____

APPENDIX 5

In 1962, the Tenth International Conference of Labour Statisticians, convened by the ILO, recommended that, for the study of circumstances surrounding industrial accidents, these accidents should be classified as follows:

A. Classification of Industrial Accidents According to Type of Accident.

1. Falls of persons
2. Struck by falling objects
3. Stepping on, striking against or struck by objects excluding falling objects.
4. Caught in or between objects.
5. Over-exertion or strenuous movements.
6. Exposure to or contact with extreme temperatures.
7. Exposure to or contact with electric current.
8. Exposure to or contact with harmful substances or radiations.
9. Other types of accident, not else where classified, including accidents not classified for lack of sufficient data.

B. Classification of Industrial Accidents According to Agency

10. Machine
11. Prime movers, except motors.
12. Transmission machinery

13. Metal working machines

14. Wood and assimilated machines

15. Agricultural machines

16. Mining machinery

19. Other machines, not else where classified.

2. Means of Transport and Lifting Equipment

21. Lifting machines and appliances

22. Means of rail transport

23. Other wheeled means of transport, excluding rail transport

24. Means of air transport

25. Means of water transport

26. Other means of transport

3. Other equipment

31. Pressure vessels

32. Furnaces,, ovens, Kilns

33. Refrigerating plants

34. Electrical installations, including electric motors, but excluding electric hand tools.

35. Electric hand tools.

36. Tools, implements and appliances, except electric hand tools.

37. Ladders, mobile ramps

38. Scaffolding

39. Other equipment, not elsewhere classified.

40. Materials, substances and radiations

41. Explosives

42. Dust, gases, liquids and chemicals, excluding explosives.

43. Flying fragments

44. Radiations

49. Other materials and substances, not elsewhere classified.

50. Working environment

51. Outdoor

52. Indoor

53. Underground

6. Other agencies not elsewhere classified

61. Animals

69. Other agencies not elsewhere classified

70. Agencies not classified for lack of sufficient data

C. Classification of Industrial Accidents According to the Nature of the Injury:

10. Fractures

20. Dislocations

25. Sprain and strains

30. Concussions and other internal injuries

40. Amputations and inoculations

41. Other wounds

50. Superficial injuries

55. Contusions and crushings

60. Burns

70. Acute poisonings

80. Effects of weather, exposure and related conditions

81. Asphyxia

82. Effects of electric currents

83. Effects of radiations

90. Multiple injuries of different nature

99. Other and unspecified injuries

D. Classification of Industrial Accidents According to the Bodily Location of the Injury

1. Head

2. Neck

3. Trunk

4. Upper limb

5. Lower limb

6. Multiple locations

7. General injuries

9. Unspecified location of injury

CHAPTER VIII

BIBLIOGRAPHY

1. World Health Organization, 187, Evaluation of the Strategy for Health for All by the Year 2000. Seventh Report on the World Health Situation. Vol 1. Global Review. WHO, Geneva, 98.
2. Ethiopia, Ministry of Industry 1985. Manpower and Development Study in Ethiopia. MOI. Addis Ababa. 2-3.
3. International Labour Office. 1985. World Labour Report. No 2. ILO, Geneva. 135.
4. Foggon, G. 1986. Occupational Accidents. International Labour Organization, Geneva, 47-50.
5. International Labour Organization. 1983. Accident Prevention: Workers' Education Manual ILO, Geneva, 29-32.
6. World Health Organization, 1967, Joint ILO/WHO Committee on Occupational Health. Fifth Report. Technical Report Series No. 354. WHO, Geneva.
7. Phoon, WO. 1983. Occupational Health in Developing Countries: a Simple Case of Neglect. World Health Forum, 4,4, 340-343.
8. Ghosh, DB. 1981. Accidental Injuries Among Technical Personnel in Railways at Allahabad, India. India. J.Med, Res. 74, 621-629.
9. Annual Review of Public Health. 1985. Vol 6.

10. White, CL. and Watson, AP 1984, Work Place Injury Experience of Female Coal Miners. 35, 4, 198-200.

11. Goldwater LV, Noro,L, and Sholb, MD. 1976. Organization of Occupational Health Services in Developing Countries. Occupational Safety and Health Series 7,80. ILO. Geneva.

12. Beatjer, AM, 1977, Women in Industry, Their Health and Efficiency. Arno Press New York.

13. White, DL. and Watson, AP. 1984. Work Place Injury Experience of Female Coal Miners. 35, 4, 201-204.

14. International Labour Office. 1985. World Labour Report No. 2. ILO. Geneva. 136-146.

15. Johri, SC. Singh, G. and Bagchi, SC, 1973. An Epidemiological STudy of Injuries in Army Personnel at Peace Station, AF MJ 30, 138.

16. Seal, SC. 1971. Accidents and their Prevention, a Textbook of Preventive and Social Medicine.

17. White, CL. and Watson, AP. 1984, Work Place Injury Experience of Female Coal Miners. 35, 4, 205-206.

18. Ethiopia. Ministry of Industry. 1985. Manpower and Development Study in Ethiopia. MOI. Addis Ababa. 5-9.

19. White, CL and Watson, AP. 1984 Work Place Injury Experience of Female Coal Miners. 35,4, 207-209.

20. International labour Organization. 1972 Accident Prevention. Workers' Education Manual. ILO. Geneva. 1-2.

21. Ghosh, DB. 1981. Allahabad, India. Indian J.Med. Res 74, 630.

22. Wilkin, RJ. and Susan, PB. 1981. Injury Control. Preventive and community Medicine. 109-111.

23. International Labour Organization. 1983 Accident Prevention: Workers' Educational Manual. ILO. Geneva 40.

24. International Labour Organization. 1983. Accident Prevention. A Workers' Education Manual. 7.

25. Symposium of Occupational Accidents. 18 -20 August. 1982. Addis Ababa. Ethiopia

26. Negarit Gazeta. Number 29. August 1977. 268-269. 277-278. 282-283.

27. Negarit Gazeta. Number 8. Sept. 1987. 57-59. 65-66. 71-72.

OTHER GENERAL REFERENCES

Gordon, JE. 1949. The Epidemiology of Accidents American Journal of Public Health. 9. 504-515.

National Safety Council. 1975. Work Accident Trends and Analysis. National Safety News. 111. 81-105.

Saari. J. 1986. Accident Epidemiology. Epidemiology of Occupational Health. World Health Organization Reg. Publications- European Series No 20. 299 - 314.

DECLARATION

I, the undersigned, declare that this thesis is my work and that all sources of material used for this thesis have been duly acknowledged.

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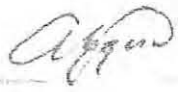
Signature 

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