COMMMUNITY BASED STUDY OF CHILDHOOD INJURIES IN ADAMITULU DISTRICT, ETHIOPIA

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COMMUNITY BASED STUDY OF CHILDHOOD INJURIES IN ADAMITULU DISTRICT, ETHIOPIA

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INTRODUCTION

It is an established fact that accidental injuries are the commonest cause of mortality and morbidity in children in developed countries. To a lesser extent, injury is probably also important in developing countries.

Since developing countries including Ethiopia are preoccupied with infectious diseases, little research and resource is devoted to the investigation of childhood injuries. As a result very little is known about the magnitude, patterns and impact of accidents and injuries in general.

The few available data collected from hospitals and analyzed at the national level may not represent the real situation in the country. Only 40-50% of the total population is thought to have access to medical services and the utilization, particularly of hospitals, is highly biased.

We looked into childhood injuries in eleven rural peasant associations and two urban dwellers associations in Adamitulu district, South Shoa region, Ethiopia, with a population of about 157,000. Parents in selected households were interviewed for the occurrence of recognizable intentional and/or unintentional injuries to their children during the past two months. Certain

background demographic and socio-environmental variables were registered, such as: age, sex of the child, site of injury, body part injured, family size and type, occupation and education of household head and mother, mothers' age, crowding index etc.

The study aims to look at the frequency distribution of injury in its different aspects and tries to come up with factors that can predict injury risk to children in a community.

We hope this study will be useful as a basis for future in-depth studies and as a source of data for health planning and prevention programmes in the district and elsewhere.

STUDY OBJECTIVES

General

To determine the occurrence and identify risk factors for intentional and unintentional childhood injuries in Adamitulu district.

Specific

1. To determine the incidence of childhood injuries
2. To describe injuries by;
    a. host factors
    b. agent/ mechanism of injury

c. environment

d. severity and location on the body.

3. Identify factors which put children at an increased risk for injury.

LITERATURE REVIEW

A lot has been written on injuries in childhood in developed countries(1). The public health importance of injuries is also gaining recognition in developing countries(2), even though the burden of infectious diseases and poverty is felt considerably(2). On the average, person years of life lost (PYLL) due to accidents as a percentage of total PYLL and accident mortality as a percentage of total death is higher in developed than developing countries (3).

Some aspects of progress have meant that developing countries have experienced dramatic increases in some particular types of injuries as opposed to the gradual build-up of injury rates in industrialized countries. For example, between 1955-1959 and 1970-1974 mortality due to road traffic accidents increased by over 600% in Mexico and 210% in Chile (4).

Not only do many developing countries have high rates of motor vehicle accidents (MVA), the capacity of their health system to handle victims of MVA is often limited, which increases disability and mortality rates. As well, prevention programmes, such as seat belt laws are non-existent in these countries.

Analysis of mortality data for 58 countries of the world, including developing countries showed that for all

countries accidents are in the five leading causes of death for all ages (2).

Morbidity data on injuries is often deficient in developing countries because of a lack of system of national registration (surveillance). As a result data are obtained from the few epidemiological surveys conducted so far (5,6).

Annual injury incidence for two Latin American countries was 302.8 for Chile and 219.8 per thousand for Venezuela in both institutional and community surveys for people 1-24 years of age (5). In a population based study in Northgate, U.K., annual incidence was 247 (7), a Massachussets study 224 (8), Goteborg, Sweden, 144 (9) and Glamorgan, UK, it was 198 per thousand (10).

In Ethiopia, out of 161,692 total hospital admissions in 1984, homicides and injuries ranked ninth accounting for 1.8% of all admissions (11). The same year, 2% of 6,156 reported hospital deaths in the country (12th in the rank) were due to all causes of injuries. Although this suggests that injuries are important, it must be remembered that in Ethiopia, hospital based data are not usually representative of the situation in the community.

Analysis of the ten-top diagnoses of three health centres and one hospital in the former Hykochina Butajira district in 1988 (12), put injury in 5th place of which

820 (21.8%) were in children under 15 years of age. For the hospital (Shashemene), injury alone was the third most common diagnosis with 324 (16.2%) occurring in the under 15 age groups. The proportion of children in both cases is low when we consider that children under 15 years comprise about 50% of the population. This might be due to the fact that more severe injuries that needed emergency room or hospitalization could have occurred in the older age groups where fighting often takes place on market days in the towns.

Male to female ratio for injuries was two and two point five for the awraja and the hospital respectively. This locality includes the area where the present study is conducted.

Ephriem Daniel studied 2,281 surgical admissions (22.0% of total) to the Ethio-Swedish Childrens Hospital in Addis Ababa, during January 1984 to December 1988 and found that 564 (24.7%) were due to accidental injuries (13). This is 5.4% of all admissions and is similar to reports by Fisseha Teklewold (14) of 1968-1971 admissions to the same hospital. Tekle also reported that burns, car accidents and falls were the leading causes of admission for accidental injury with an overall male to female ratio of 1.5 : 1.

Investigations on injuries have employed different case definitions and methodologic tools for analysis,

included varying age groups, injury types or agents making comparison of results difficult.

A much studied subgroup is accident resulting in death. Though this sample is easy to define, factors other than the event are likely to play a part in determining deaths. Attendance at a hospital and emergency department or admission introduce a potential bias which arises from the fact that both the action of seeking medical attention and the decision to admit to hospital are influenced by a variety of factors other than the injury itself (15). This fact is more pronounced in developing countries with very little medical care facilities.

Household surveys have some advantages; they identify accidents for which treatment was not sought and near accidents, provide figures for the population and details on the physical and psychosocial environment (16).

Different approaches are used as a measurement of aspects of injury; for instance type of injury is defined by many revisions of the ICD (International Classification of Disease). Some authors use definitions developed at national levels or their own modified scales. For injury severity the AIS (Abbreviated Injury Scale) and ISS (Injury Severity Score) are used in most studies, but because of complexity of coding and the need

for specialized personnel their use is very limited in developing countries, especially
in population studies.

One definition of accident given by Tursz (16), with which she says most agree - is an event, it occurs abruptly, is potentially harmful, is independent of human volition and has a cause outside the individual. There is a difference of opinions on whether to include accidents that do not cause any harm. She argued that the circumstances of such injury - free accidents may be the same as those of serious accidents, and that under a slightly changed circumstances they could have been serious. It is not clear at what point along the spectrum of injury severity to set a cutoff point for injury case definition.

Tursz has also noted two schools of thought. One says the aim of research on injury is not one of preventing accidents but of preventing serious injuries and therefore detecting the accident that gives rise to such injuries. The other school disagrees by saying it is difficult to foresee how serious injuries caused by a given type of accident will be. In addition this school says we must take into consideration that seeking medical care is also affected by factors other than the injury itself.

Most studies have looked into accidental injuries for which medical care is sought. However, in a rural Ethiopian setting where there is relatively little utilization of medical services, the use of this definition would have severely underestimated the injury incidence.

In understanding the occurrence of injuries and its determinants the AGENT-HOST-ENVIRONMENT model of communicable disease can be adapted (17). It assumes that injury is not a mere chance occurrence which can not be predicted but it is an interplay of psycho social and environmental factors of the injury and its victim.

Agent

Many studies have looked at the agent/mechanism of injury and found the highest rates for fall. The proportion of fall in the Latin America household survey ranged from 47% in Caracas to 62% in Chile(5). Falls accounted for 25-59% of all injuries in four developing countries studied. They also accounted for 35% in Glamorgan,U.K,(10) and 24.1% in Northgate(6),U.K. In a study of home accidents in underfive children, 48.5% were due to fall(18). The annual incidence rate of fall in the Northgate community based study in 0-19 years of age was 60 per thousand.

MVI were not found to be as important (5). The

areas surveyed in Chile and Cuba experienced few (2% and 3% respectively) compared to Caracas (14% of all injuries), and in the Northgate study MVI were 6%(7), with an incidence rate of 15 per thousand, but accounted for a high proportion of hospitalized children.

The Northgate(7) study showed a burn incidence of 8 per thousand for 0-19 year old children. Out of 48 hospitalized burn cases in Ibadan, 37 (77%) were in children under five (19).

For fatal accidents MVI are major causes of deaths followed by drowning in the WHO (20) mortality report and a study from
Israel (21).

The other causes of injuries (cuts, objects, poisoning, drowning, unknowns) altogether comprised 66.5%, 39.3%, and under 45% in various studies (7, 18, 5). Surprisingly, being struck by an object was the third most important cause in the last study. Poisoning is the least frequent, similar to drowning. However, in a home accident study in under-five children it was second to fall (16.0%) (18).

Host

Children are not just little adults who differ only in size, but also in proportion and development. Special characteristics of the child such as its small size,

larger head and surface to volume ratio, unmatured organ systems, and limited ability, knowledge, judgment and experience are unique risk factors (2).

Age is one important host factor to be considered in injury studies. Accident mortality is shown to have dropped from 32.7 for boys and 22.8 per 10,000 for girls in the 1-4 years age group to 23.1 and 10.9 for boys and girls in the 5-14 years age group in a study of accidents in selected countries of the world(20). The mean age for children involved in burns ranged from 5.0 years in Sao-Paulo, Brazil to 5.7 in Chile, which is a younger mean age than for other injuries (17).

In almost all accident studies, males have excess mortality and morbidity in all age groups, but in rural surveys of developing countries the sex ratio was found to be more or less the same (6).

Upper and lower extremities were the most frequently injured body parts. In Goteborg, Sweden 35% had head and neck-injuries followed by upper extremities (31.1%) and lower extremities (21.1%) (9). Head, abdominal and chest injuries in children are important because these injuries account for most of the deaths among injured children (22).

Environment

Looking into sites of injury occurrence, domestic

injuries are shown to dominate, i.e. injuries within the home and home yard . It varied from 49% in Cuba to 54% in Caracas (5). A survey in developing countries showed a range from 52.9%-84.6%(6); in Glamorgan 69%(10); in Goteborg 49% of injuries occurred in and around homes and the proportion of accidents outside the home area was higher at higher ages for both sexes. Since most children may spend much of their time around the home, the greater proportion of injuries in the home occurred in younger children, 60.3%(9).

A study of childhood deaths in Maine (23), 1976-1980 showed that children from low income families were at higher risk of accidental deaths (2.6:1) and homicide deaths (5.0:1). A higher incidence within the child's home area was correlated to a poor social environment (9).

Home accident incidence was higher in families of under-five children living in rented as compared to private houses, who also have a higher average size of families (24). In a Columbian study of families enrolled in a medical plan, increasing family size (25) and number of older children in the family increased the risk of hospitalization from injuries (26). Over crowding was also strongly associated with accident risk to children (18,26).

Interviews done on British birth cohorts (15) at the

age of five for the outcome variable "at least one accident resulting in an injury which warranted medical attention," showed that of all social and environmental factors, having a young mother and living in an average urban neighbourhood predisposed children to accidents when chosen referent categories with lowest risk were mothers above age 35 and rural neighbourhood. For the outcome variable "hospitalized child", in the same study, the accident risk was increased when the mother is young, when three or more children live in the household, or in family situations other than two natural parents, especially a single unsupported parent. This also demonstrates how two different outcome case definitions in the same study population have differing predisposing factors.

Children living with household heads with only a primary level of education experienced a three-fold risk for home injuries (27).

Since most availabe studies used institutional cases of injuries, type of care given for victims was not analyzed. In one study(5) it was found that from 82% in Cuba to 98% in Caracas did not have any medical/nursing care at the site of injury. In Northgate(7), 59.5% were treated at a clinic, some 38% at emergency room, 2.5% were admitted. In Glamorgan(10) 71% of the injured needed simple reassurance, 23% emergency room and 6.0%

admission for observation and treatment.

In a Brazilian institutional study 41% of the injury victims were not supervised by a parent or relative while 42% were being supervised. No information was given about the remaining 17%.

We can see that no factor is consistently found across studies in many countries predicting injury risk to all children for all injuries. This may be explained by the fact that case-definition, source and study populations and analytic approaches vary widely. It may also be partly explained by the fact that injuries are a heterogeneous group. Risk factors for burns, for example, may be quite different from risk factors for MVI's. The problem in developing countries is further complicated because of lack of standardized measurement and insufficient data on the magnitude and seriousness of injury.

Injury research application and prevention has a multidisciplinary feature (28) that requires understanding among many sectors at a national, regional or international levels.

METHODS

A. Study Design

A cross-sectional study of childhood injuries from April-June 1990 in Adamitulu District. A case control

analysis of risk factors was conducted, with cases being all injured children and controls being all uninjured children.

B. Study Domain

Adamitulu is one of the 13 districts of South-Shoa region in central Ethiopia. It had an estimated 157,000 people in 1990. 85% of the population is rural and 15% urban. The rural area is divided into 142 peasant associations (villages). There are 5 small towns that are divided into 8 urban dwellers associations. All the towns lie along the only asphalt road to Addis Ababa, the capital. Meki town, the seat for the district is 130 km south of Addis Ababa.

46.2% of the total population is children under the age of 15. There is one health centre and 3 health stations in the district.

C. Population

1. Source Population

All resident children under 15 years of age in Adamitulu district. Twenty eight peasant villages, predominantly Gurage speaking were excluded due to language barriers.

2. Study Population (Fig.1)

Eleven peasant and two urban dwellers' associations were selected by stratified random sampling. After obtaining a list of households from each peasant association (PA) office, households were selected by systematic random sampling in each village separately. Finally from each household two children are selected by a lottery method. Where there were one or two children per house they are both taken. Sampling frames were checked for completeness from the district peasant association office. As such, in the 1084 households surveyed, 2021 children were registered and studied by interviewing their principal care giver.

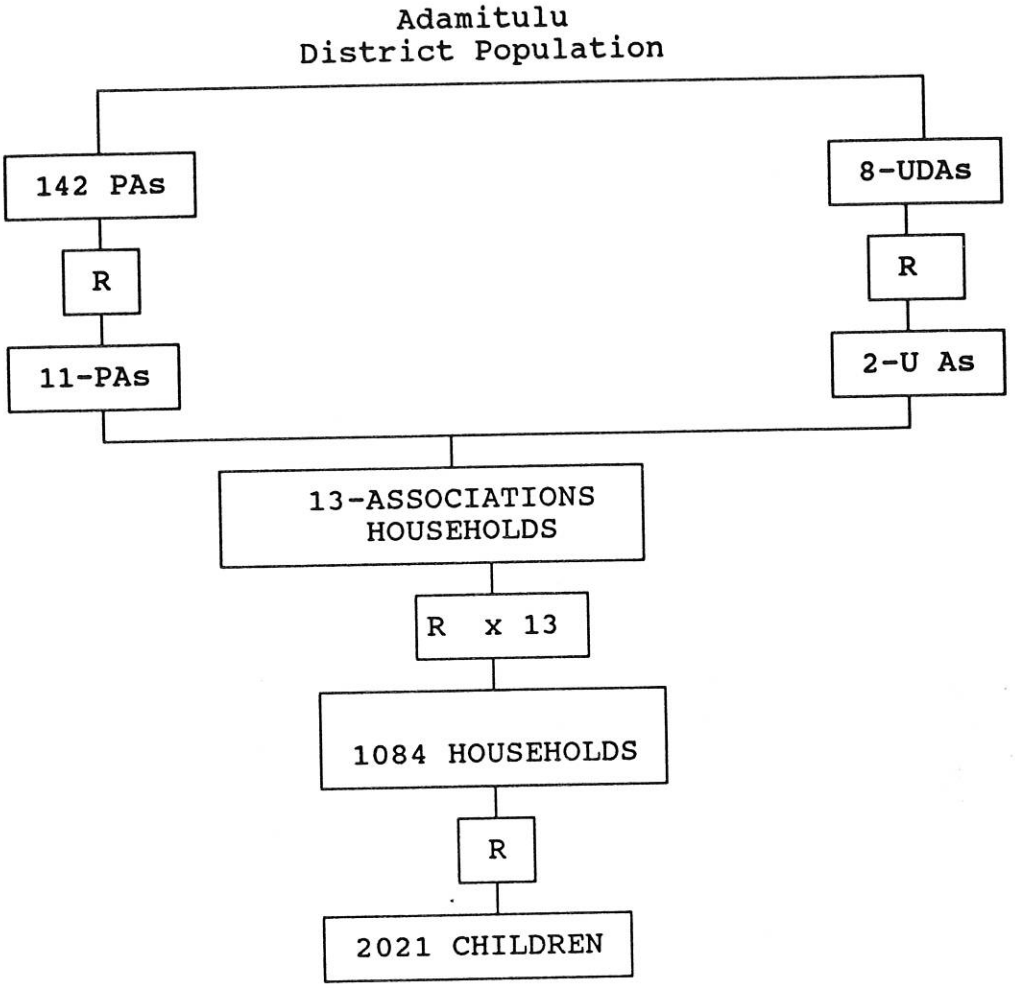

Fig. 1 Source Population and Selection Procedure

3. Sample Size and Power Calculation

$n = (Z \text{ alpha}/2 + Z \text{ beta})^2 \; p \; (1-p) \; (r+1) / \; (d^*)^2 \; r$

$n = (7.849)(.2)(.8)2 \; / (.05)^2$

$n = 1004$

sample size $= 1004 \times 2$

$= 2008$ + 10% contingency

$= 2210$ under 15 children

Alpha = .05

Beta = .2

Number of exposed group (n)* = 1004

$(z \text{ alpha } /2 + z \text{ beta})^2 = 7.849$

Over all incidence (p) = .2

Ratio exposed to unexposed(r) = 1

Difference between exposure groups in proportion of injury (d*) = .05

* such as child gender (male) and large family size ≥ 7

D. Measurement

Students living in or near the selected villages were recruited and trained, one for each village. A questionnaire was developed in Amharic and Oromigna. The questionnaires in English and Amharic are seen in appendix 1.

The interviewer walks up to each house and

identifies the appropriate respondent. He asks the respondent if any of the eleven unintentional and the three intentional causes/mechanisms had injured the child during the reference period. Near misses and emotional upset due to accidental mishappenings were not included.

The definition of injury was an event that caused persistent pain and/or swelling, and/or bleeding and cuts and/or disturbance in function and/or restrictions of activity for at least one day. All foreign bodies in the child were included whether or not they had resulted in any damage. If more than one injury had occured during the two months, only the most remote was recorded. The interview also included demographic, social and environmental characteristics. Body part, location and care of injury and attendance at accident were also registered. Questions on crowding index, home conditions and water source were completed by the observation of the data collector.

Selected Operational Definitions

1-Household head - In marriage union, the husband. In other cases, person regarded as head by members of the household.

2-Other causes of unintentional injuries-include sport, electricity, farm machinery, firearms, surgical

medical misadventures, being struck by other objects and over exertion.

3-Other intentional injuries-include any self-destructive measures and war.

4-Crowding index - Number of household members divided by the area of the house excluding kitchen, store and wash room.

5-Family relationship of the child-Whether the child lives with any of his natural parents or whether he lives with other people.

E. Conduct of Study

After the approval of the research protocol, an official letter was written to the district administration explaining the purpose of the study.

Training of the 13 data collectors took two weeks. A pretest was conducted in one village and the questionnaire was modified based on the findings.

Data collectors inform and ask each respondent to participate in the study. Only parents or guardians, preferably mothers, were interviewed. If there was non-participation, non-response or absence in three-separate visits, the next household in the sampling frame was taken.

During the survey, each data collector was supervised. Out of all households interviewed that far,

a few picked haphazardly
were reinterviewed by the principal investigator or project co-ordinator and the findings compared. No major errors were found.

F. Data Analysis

Data analysis was done using the SPSS-PC+ and EPI-INFO statistical programs. Data entry, cleaning and editing were done using the SPSS Data Entry program.

RESULTS

Population Characteristics

In the 1084 households selected, there were 3660 children under the age of 15. From these 2021 are included in the study. Most of the children live in rural areas, and have male household heads who are farmers and illiterate (Ill.) and/or attended only literacy campaign (Lit. Camp). Their mothers are mostly housewives, illiterate and young.

Table 1 presents the demographic and certain social and environmental characteristics of the study population, cases and controls with their significance levels.

Table 1. Distribution of Study Population, Cases and Controls by Certain Characteristics.

Variable	Category	Total Sample	Case	Control
Residence** (1)	Rural	1684(83.5)	182(77.9)	1502(84.3)
	Urban	333(16.5)	54(22.9)	279(15.7)
Occup. of household head*				
	Farmer	1711(85.6)	186(79.5)	1525(86.4)
	Others	287(14.6)	48(20.5)	239(13.6)
Occup. of mothers* (2)	Others	679(35.6)	62(28.8)	617(36.4)
	house Wife	1229(64.4)	153(71.2)	1076(63.6)
Education of household head*	Ill.+Lit.camp.	1404(71.3)	149(65.1)	1255(72.1)
	Formal Educ.	565(28.7)	80(34.9)	485(27.9)
Education of Mothers	Ill.+Lit.camp.	1711(89.3)	188(86.6)	1523(89.6)
	Formal Educ	205(10.7)	29(13.4)	176(10.4)
Family Size*	1-6	1096(54.2)	111(47.0)	985(55.2)
	7-21	925(45.8)	125(53.0)	800(44.8)
Gender of the child	Female	983(48.7)	104(44.1)	879(49.3)
	Male	1037(51.3)	132(55.9)	905(50.7)
Age of the child	1-4	751(37.2)	85(36.0)	666(37.3)
	5-9	799(39.5)	92(39.0)	707(39.6)
	10-14	470(23.3)	59(25.0)	411(23.0)
Age of the mother	15-25	515(27.0)	68(31.5)	447(26.5)
	26-35	821(43.1)	85(39.4)	736(43.6)
	36-62	568(29.8)	63(29.2)	505(29.9)
Crowding index	01-.50	856(91.9)	214(90.7)	1642(92.1)
	.51-8.0	163(8.1)	22(9.3)	141(7.9)
Number of cows & oxen***	1 - 99	1616(80.0)	169(71.6)	1447(81.1)
	None	405(20.0)	67(28.4)	338(18.9)

Chi-square significance level.

* $p < .05$
** $p < .01$
*** $p < .001$

(1) Figures do not always add to 2021 due to incompelete data.

(2) For variables relating to mothers: only children with mothers were considered.

Injury Occurrence

Out of the 2021 children surveyed, in 236 one type of injury was reported making the two months incidence of childhood injuries 11.67% (95% CI 11.66-11.68).The annual incidence is extrapolated to be 700.8 per thousand.

If we exclude the 64 foreign bodies which were registered as a case whether they did any harm or not, the two months reported incidence of childhood injuries would be 85.1 per thousand. (The annual incidence is extrapolated to be 510.6 per thousand).

51.3 and 48.7% of all injuries were in males and females rspectively with a male to female ratio of 1.05:1. Table 2 Shows the distribution of all injured children by age and sex. In each age category there was not a significant sex difference among cases and controls.

Table 2. Distribution of Cases and Controls by Age and Sex, and P - values.

Age	Male		Female		P-Value
	case	control	case	control	
1 - 4	43	302	42	363	.4
5 - 9	50	372	42	335	.8
10 - 14	39	231	20	180	.2

Injury Mortality

We asked for injury deaths during the recall period in the 1084 housholds surveyed. 13 deaths due to injuries were reported in children under 15 years of age during the reference period, of which eight were in females and five in males. Nine were due to other unintentional injuries, two by drowning and two by bicycle accident. Seven of the deaths occurred in children ages 0-4 and the remaining in the 5-9 year age group. The two months injury specific mortality was 355.2 per 100,000 under fifteen population, which extrapolates to an annual mortality rate of 2131 per 100,000.

Agents/Mechanisms of Injury

As shown in table 3 foreign bodies were the most important causes of injury reported (27,1%), followed by other unintentional agents (21.1%), falls (18.2%) and burns (11.4%). Out of 27 burn/scald injuries 23 (85.2%) occurred in children under the age of five. The mean age of children involved in burn/scald and fall injuries was 6.3 (sd=3.8) and 7.6 (sd=3.5) years respectively.

Intentional injuries, of which violent assaults on a child dominated, comprised 4.2%; seven (77.7%) out of nine assaults happened to children aged five to nine

years. Three were committed by neighbours, two by other guardians, and mother and sibling each caused one. No suicidal attempt, case of poisoning or near drowning were reported.

Table 3. Distribution of Injured children by Agent/Mechanism and Projected number of Injured children per year.

AGENT/MECHANISM	Number	%	Incidence per thousand
Unintentional			
Foreign body	64	27.1	1627
Fall	43	18.1	1093
Burn/Scald	27	11.4	686
Cutting/Piercing Obj.	23	9.7	584
Animal/Insect bite	12	5.1	305
MVI	6	2.5	152
Bicycle	1	0.4	25
Others	50	21.2	1271
Intentional			
Violent Assaults	9	3.8	228
Other intentional	1	0.4	25
Totals	236	100.0	700.8

Location of Injury Occurrence

Table 4 shows injuries by location. The home, 125 (53.0%) and home yards 54(22.9%) were the most common locations together comprising 77.9%, followed by the road (paths) 33(14.0%). Schools and market places were not found to be important locations.

The mean age of children injured inside homes is 7.9 (SD=3.31)higher than in other locations,i,e 5.2 years(SD=3.7). Twenty five(92.6%) of all burn/scald injuries occurred inside homes.

Table 4. Distrbution of Injured Children by Location of Occurrence.

Location	Number	%
Inside home	125	53.0
Home yard	54	22.9
Roads	33	14.0
Other places	12	5.1
Farm	7	2.9
School	4	1.7
Market place	1	0.4
Totals	236	100.0

Child Supervision at Accident

77 (32.6%) of the injured were alone (unattended) at the time of the accident. The mother alone and with other people (father, sibling) were present 19.5% and 18.6% of the time, respectively. Only in 5 (2.1%) of accidents was the father alone present.

Body Parts Injured

In the 236 cases a total of 276 body parts were involved. 196(83.05%) had injury to only one body part, 32(13.56%) to two and 8(3.39%) to three body parts.

29 (52.7%) of the foreign bodies entered through the ear followed by the eye 20(36.3%). For the other (non-foreign body) injuries, head and neck including the face 61(27.1%) and lower extremities 60(27.1%) are the two most affected body parts.

Type of Injury Care

Table 5 shows the type of care, (which would be expected to be a correlate of severity) given for injury victims.

In 87(36.9%) cases nothing was done. These are considered as mild injury. In 80(33.9%) treatment was given by the self/home and/or a local healer or CHA, considered moderately severe and in 66(28.0%) emergency room (OPD) treatment was given. Three cases (1.2%) required admission. The last two are considered as

severe injuries.

Of the 69 severe injuries (treated at OPD and admitted) 18(26.1%) were caused by foreign bodies, 8(11.6%) by burn/scalds 5(7.2%) by fall and 26(37.7%) by other unintentional agents.

Table 5. Distribution of Injured Children by Type/ Site of Care.

CARE	NUMBER	%
Nothing	87	36.9
Health Institution		
OPD	66	27.9
Admission	3	1.3
Home/self treatment	63	26.7
Local Healer/CHA	17	7.2
Total	236	100.0

Factors Associated With Inj ry

Table 6 shows the result of the statistical analysis done for significantly associated factors. Cases are those injured children reported as injured (N = 236) and controls are the remaining non-injured children and included in the study (N = 1785).

Living in an urban area, mother being a housewife, household head having attended formal education and having no cows or oxen put children at an increased risk of injury. An analysis was done to see if the association between urban residence and injury was due to motor vehicle injury. In fact, urban children in this study have less MVI; the odds of being urban is 0.5 in MVI compared to non - MVI.

To see if the other variables associated with injury in table 6 are correlated positively with urban residence, crosstabulation showed a significant association as is shown in table 7.

When we excluded foreign bodies and did a risk analysis, all the factors in table 6 continued to show a significant association with injury occurrence among cases and controls.

Age group 0 - 4 and inside homes increased the risk of children suffering from burn/scald injury. In each case the odds of being under five and inside home among burn cases and other injury controls was 13.6.

Table 6. Factors Associated With Injury.

Variable category Interval	Cases	Controls	OR	Confidence
Residence (1)				
Rural	182	1502		
Urban**	54	279	1.60	1.13-2.25
Occup.of household head				
Farmer	186	1525		
Others**	48	239	1.65	1.15-2.36
Occup. of mothers (2)				
Others	62	617		
Housewife*	153	1076	1.42	1.03-1.96
Education of Household Head				
Illiterate+Lit.camp.	149	1255		
Formal*	80	485	1.39	1.03-1.88
Number of cows and oxen				
1-99	169	1447		
None***	67	338	1.70	1.30-2.40

Chi-Square Significance: * P< .05
** P< .01
*** P< .001

1) Figures do not always add to 2021 because of incomplete data

2) Only children with mothers were considered

Table 7. Factors Associated With Urban Residence.

Variable Category	Urban	Rural	OR	C.I
Educ. of household head				
Illit. & lit.comp.	123	1277		
Formal education	180	385	2.56	2.26-2.91
Educ. of mothers				
Illit & lit.comp	185	1522		
Formal education	117	88	7.09	5.53-9.08
Occup. of household head				
Farmer	70	1617		
Others	235	40	31.60	33.11-43.19

Chi-square significance level: P = .0001

To see if the association between urban residence and injury is affected by the child's being a student or not a stratified analysis was done. We found that the odds of being urban and injured among students (strata 1) to be 0.91 (CI=.42-1.96) and among non-students the odds of being injured and urban were 1.84 (CI=1.17-2.9). Since the crude odds ratio (1.6) is between the two stratum, this suggests some effect modification by being a student as an injury risk in urban residence.

Factors Associated With Injury Severity

As discussed on the section of the site of injury care given, type of care given was taken as a measure of severity. Therefore, those injuries treated at health institutions (OPD and/or admission), are considered as severe, the others as less severe.

As can be seen in table 8, injuries in urban residence and inside homes are strongly associated with severe injuries. Severe injuries were not related to burn/scald injuries (OR=1.02, 95%C.I 0.39-2.63) compared to other agents.

Age and sex of the household head, family relationship and child attendance at the time of accident were not associated with injury severity.

Table 8. Factors Associated With Injury Severity.

Variable	Severely Injured	Less Severe	OR	Confidence Interval	P-Value
Location of injury					
Other places	21	90			
Inside home	48	77	2.67	1.41-5.07	.001
Residence					
Rural	46	136			
Urban	23	31	2.19	1.11-4.34	.01

Multiple Logistic Regression Analysis

To calculate adjusted odds ratio by controlling for possiblle confounding and/or effect modifier for the association between urban residence and injury occurrence(Yes/NO) a model was chosen out of which table 9 shows the final result of the logistic regression on selected variables entered based on their adjusted odds ratio. The odds of being urban among cases and controls is 1.7 compared to rural adjusted for the other variables in the model.

Table 9. Logistic Regression Analysis of Childhood Injuries.

Variable	Estimate	S.E	T-test	AD .OR	C.I
Constant	- 2.173	.124	- 17.516		
Residence					
urban:rural	.534	.211	2.532	1.70	1.38 - 2.11
Mother's occup.					
house wife:others	- 0.319	.169	- 1.891	.727	.6 -.86
Child gender					
male:female	.260	.141	1.845	1.297	1.1 - 1.49
Mothers'occup*					
residence	- 0.181	.383	- 0.472	.834	.57 - 1.22

* Interaction Between the Two Variables.

DISCUSSION

We have assumed respondents reported incident cases of injury, which excludes all prevalent injuries before the first day of the reference period accurately, and calculated incidence rather than period prevalence. There is a risk of running a recall bias by calculating incidence in this study because mothers may not be able to differentiate between injury events that occurred within the past two months and earlier. This might have led to over reporting of injured children.

If we assume injuries occur constantly throughout the year in the study communities, the annual reported incidence will be 700.8 per thousand. Even without all foreign bodies the annual incidence 510.6 per thousand is probably the highest ever reported followed by a Chilean community study (302.8 per thousand) for 1-24 age groups.

Although we have calculated incidence, in fact this study measured injured children rather than injuries. This limits the validity of the incidence measure. Since a child may have had more than one injury, the real incidence may be higher than the calculated figure.

One possible explanation for the high incidence is that we used all intentional and unintentional injuries with a very liberal case definition. For example, any tissue swelling or damage as a result of minor cuts, falls etc., and otherwise insignificant

accidents (such as entry of foreign body into a child's ear, nose etc., without harm) were all included.

Another possible explanation is that mothers' reports were accepted at face value, and the child was not examined. To the extent that mothers exaggerated the number and severity of injuries, this would result in an over estimate. Of course, it is possible that error will occur in the opposite direction as well if mothers do not report all injuries. This is most likely to occur in intentional injuries.

The two months study period generally covered one month of rainy and dry season each with variation among villages, and a school season both of which could have either lowered or raised the incidence. There is no sex difference in injury occurrence similar to a study in four developing countries but different from industrialized countries.

It should be noted that this study was not designed to measure injury mortality. If mortality was to be measured accurately, all house holds, rather than only house holds with children under 15, should have been surveyed. Some house holds not surveyed may have had a death in a child under 15 during the two month recall period. Thus a bias of under estimating the true accident mortality rate may be made. In the 1084 house holds there were a total of 3660 under 15 children which

we used as a denominator for the calculation of the mortality rate. Accident related mortality is very high; it is more than 100 times greater than that reported in Israel (10.9 per 100,000, 1980-1984). As this calculation is based on a small number of actual deaths,it must be interpreted with caution.

In the study foreign bodies dominated, (27.1%) through which 29(52.7%) entered the ear and 18(28.1%) were severe enough to be taken to health institutions. The high number is because we accepted all reported foreign body entries whether or not they caused any harm.

The broad area of other unintentional injury has followed foreign bodies with 21.1%. Of this category, we can suspect being cut or injured by farm equipment and being struck by objects (as is the third most common cause in the Latin American study) would be the commonest.

The reported number of cases of violence against children represents 3.81% of all injuries. The annual incidence in this study (228)is much higher than the Northgate(7) community based study of eight per thousand which also included older age groups (15 - 19).

The home and homeyards are the most common locations for injuries to happen and the mean age of children involved in home injuries(7.9 years) is greater than for those outside in contrast to the Swedish study(9) where

it was lower. This is not only because younger children stay in and around homes, but also because many older (school age) children stay home serving their family (26.9%).

Roads which have 14.0% of all injuries next to home and homeyards refer mainly to small rural paths on which children spend their time going between home and schools, markets etc. This again may be related to the time when children are away from parental supervision, or to the unsafeness of rural and semiurban roads. Urban children also use roads as a play ground.

Schools did not account for a significant proportion of injuries probably because only 12.9% of all children in the study population go to school as opposed to 26.9% who serve the family. Many injuries (38.1%) occurred in the presence of the mother alone and/or with other people in contrast to the 32.6% unattended injuries. This does not have to lead to the conclusion that mothers presence is a risk factor for childhood injury; naturally children may stay around their busy and often tired mothers a lot and we don't exactly know how much attention (time) mothers or other guardians should devote to supervising their children nor how much time and energy those mothers actually have to do it.

Though we have only 50-60% geographic coverage by medical service, defined as living within 10 km of a

health institution, type/place of care is considered as a practical correlate for injury severity.

The fact that 36.9% of injuries did not require any treatment may support our discussion of a liberal case definition. However inaccessibility, lack of foresight into injury consequences (disability, disfigurment, infection, etc) or an established attitude to leave injuries to heal by themselves or by other forces can still partially explain that no measures are taken.

33.9% of injuries needed self/home and/or some local healer, 28.0% emergency(OPD), and 1.3% admission treatment. This finding is in line with a community based study in Northgate where 59.5%, 38.0% and 2.5% were treated at a clinic, emergency room and by admission respectively.

Being under five and inside homes each has increased the risk(13.6 times) of burn injury. Most houses in this district use unprotected fire places right in the middle of the rooms posing a danger to crawling young children. We know houses, particularly rural huts, are not adequately lighted increasing the risk for young children who are very active with very little self control.

We have found cases to have come more from urban than rural areas. Urban children play on roads away from homes, use consumer products, have household facilities

including electricity and engage in sport activities more than their rural counterparts, which may explain their predisposition to injury

Urban residence is also shown to increase the risk of injury consistently in the bivariate and multiple logistic regression analysis. Such a finding is also discussed in the Latin American study(27) where average urban neighbourhood increased injury risk compared to rural. We did not show a predictor model because injury is such a wide - range of diagnosis and its aetiology diverse. Injuries also differ in severity and their outcome is affected by many factors. Therefore, it may not be surprising that a single predisposing factor for so many different types of injuries could not be found.

Limitations of The Study

The study has many limitations. As noted above, the accuracy of the measure of incidence is limited by the recall period, and the use of injured children rather than injuries as a unit of measure. The estimate of incidence may also be affected by seasonal variation, and some weakness in the design of the questionnaire and the study. Specifically, the lack of the definition of

injury on the questionnaire itself may have caused more inter interviewer variabilty during the survey. Neither this, nor variability within mothers was measured.

These problems with the questionnaire may have affected our measurment of exposure variables as well as incidence.

CONCLUSION AND RECOMMENDATIONS

Our study has demonstrated a high incidence of childhood injury in this part of Ethiopia. Methodologic approaches in community based childhood studies, injury and severity case definition particularly in developing countries need to be worked out and standardized to make comparison possible.

The home is where most of the injury to children occurred, especially burn to young children, and severe injuries are encountered inside and around homes more than elsewhere (OR=2.7). Improvements in housing conditions need to be considered by responsible agencies such as ministries of urban development and housing,agriculture,health etc.

Young children in homes should be protected against burn/scalds. Projects already underway in the district to replace unprotected open-fire places by more fuel efficient and elevated stoves should be encouraged and

immunization clinics is probably an acceptable approach. Rural basic technology and rural women development departments in the Ministry of Agriculture in collaboration with other sectors (Education, Health,Social affairs etc),and NGOs should continue their efforts in this line.

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APPENDIX 1.

Questionnaire For the Investigation of Childhood Injuries in A Community, June, 1990.

1.Village code and house number

2.Gender of head of the household Female 0

Male 1

3.Residence Rural 0

urban 1

4.What is the total number of family members ?

5.Are there relatives living with you ? No 0

Yes 1

6.How many children aged 0-14 live in this house ?

a.How many are between age 0-4 years ?

b.How many are between age 5-9 years?

c.How many are between age 10-14 years?

Now select two children and interview separately.

7. Give number 01 to the older and 02 to the younger child in the

answer sheet.

a.sex of the child Female 0 Male 1

b.age of the child

8. With whom does the child live ?

   1. with mother and father together
   2. other than parents
   3. with the mother
   4. with the father

9. Why does the child in Q8-3 or 4 live with a single parent ?

   1. parents are separated
   2. parents are divorced
   3. parents are widowed
   4. unknown

10. Where is the child usually engaged in ?

   1. preschool age
   2. student
   3. hired labour
   4. private business
   5. serving the family
   6. unspecified

11. Had any of the following caused injury to the child between april 11 and may 9 ,1990 ?

Unintentional

1. motor vehicle occupant
2. motor vehicle pedestrian
3. bicycle
4. burn
5. fall
6. foreignbody
7. poisoning
8. drowning(near)
9. animal/inect bite/sting
10. piercing/cutting objects
11. other unintetional

Intentional

12. violence by other Person
13. suicidal attempt
14. other intentional

12. Who did the violence on Q11-12

1. the mother
2. the father
3. sibling
4. relatives
5. neighbours
6. caretaker
7. others
8. unknown

13. Which part of the body was injured ?

1. head,neck and face
2. chest
3. abdomen
4. back
5. upper extremities
6. lower extremities
7. others
8. through the ear
9. through the nose
10. through the mouth
11. through the eye

14. Where did the injuury take place ?

1. inside home
2. homeyard
3. school
4. on the road
5. market place
6. farm
7. other places

15. What was done to treat the injury ?

0. nothing
1. home/self care
2. local healer/cha
3. health institution — if yes 0. OPD
   1. admission

16. Who was with child at the time of the injury ?

1. the mother
2. the father
3. siblings
4. others
0. nobody

What is the occupation of the household head (17) and the mother (18)?

1. farmer
2. housewife
3. private home business
4. trader
5. government employer
6. hired labour

7 .unspecified

What is the education level of the household head(19) and the mother(20)?

1. illitrate
2. literacy compain
3. regular school(specify grades)

21. What is the age of the mother ?

22. Who owns the house ? rent 0 own 1

23. Was there child death in the family due to injury during the reference period ?

No 0 Yes 1

24. a. what was the cause of the injury death in Q23 ?

b. what was the age of the child ?

c. what was the gender of the child ?

female 0 male 1

25. Where is your water source located ?

0. in the compound (neighbourhood)
1. within 500mt
2. within one km
3. within three km
4. out of three km

26. What is the total area of living rooms ?

For huts(tukuls), radius in mt _____

For other houses, in mt square _____

27. Availabilty of separate rooms for living,kitchen,store and animals ?

1. three or more separate rooms without animals
2. four separated rooms with animals
3. three separate rooms with animals
4. two separate roms,one only for living
5. two rooms but all purpose
6. one room without animals
7. one room with animals

28. How many domestic animals do you own ?

cows and oxen _____

sheep and goats _____

horses and donkies _____

የቃለ መጠይቅ ቅጽ

1. የቤት ቁጥር [| |]

2. የአባወራ/ የቤተሰብ ኃላፊ ፆታ   ሴት [0]   ወንድ [1]

3. መኖሪያ ሥፍራ የት ነው ?   ገጠር [0]   ከተማ [1].

4. የቤተሰብ አባላት ጠቅላላ ብዛት ስንት ነው ? [|]

5. ከእርስዎ ከባለቤትዎና ከልጆቻችሁ ውጭ አብረዋችሁ
   የሚኖሩ ዘመዶች አሉን ?   የሉም [ ]   አሉ [ ]

6. ዕድሜያቸው ከ0_14 የሆኑ ስንት ልጆች ቤት ውስጥ አሉ ? [|]

   የእያንዳንዳቸውስ ዕድሜ ስንት ነው ?   ሀ. ከ0_4 [|]

   ለ. ከ5_9 [|]

   ሐ. ከ10_14 [|]

/ ከዚህ በኋላ ሁለት ልጆች መርጠህ ታላቁን መጀመሪያ ታናሹን ቀጥለህ ጠይቅ /

---

7. ለልጁ ቁጥር ስጥ :_   ለታላቁ [0 1]

   ለታናሹ [0 2]

   ፆታ   ሴት [0]   ወንድ [1]

   ዕድሜ [|]

8. ልጁ የሚኖረው ከማን ጋር ነው?

   ከእናትና ከአባት ጋር? [1]
   ከወላጆቹ ሌላ ነው ? [2]
   ከእናቱ ጋር ነው ? [3]
   ከአባቱ ጋር ነው ? [4]

9. ልጁ ተለይቶ የሚኖረው ወላጆቹ ምን ሆነው ነው ?

   ተለያይተው ነው ? [1]
   /መልሱ 3 ወይም 4 [illegible]ተው ነው ? [2]
   ከሆነ ብቻ የሚጠየቅ / በሞት ነው ? [3]
   አይታወቅም ? [4]

ልጁ በአብዛኛው ምን ሥራ ይሠራል ?

ቅድመ ትምህርት ቤት ያለ	1
ተማሪ	2
ቅጥር ጉልበት ሥራ	3
የግል ሥራ	4
ለወላጅ አገልጋይ	5
ያልተለየ	6

ከዚህ በታች ከተዘረዘሩት አደጋዎች ባለፉት ሁለት ወራት ውስጥ /ሚያዝያ 4 እስከ ሰኔ 4 1982 ዓ.ም/ በልጁ ላይ ድንገተኛ ጉዳት የደረሰበት ምክንያት ነበርን?

በሞተር ተሽከርካሪ በተሳፋሪነት	1	በሌላ ሰው ታውቆ መጎዳት	12
ወይንም በእግረኛነት	2	ራስን በመግደል	13
በብስክሌት	3	በሌሎች ታውቆ የተሠራ	14
በቃጠሎ	4		
በመውደቅ	5		
በባዕድ አካል	6		
በመመረዝ	7		
በመስጠም	8		
በእንስሳ /ነፍሳት/ መነደፍ	9		
በስለት መቆረጥ /መወጋት	10		
በሌሎች ድንገተኛ አደጋዎች	11		

አደጋው የተሠራው በሌላ ሰው ከሆነ ፈጻሚው ማን ነበር ?

እናቱ	1	ጎረቤቶቹ	5
አባቱ	2	አሳዳጊ/አሳዳሪ/	6
ወንድም /እህቱ/	3	ሌሎች	7
አብሮ ኗሪ ዘመድ	4	አይታወቅም	8

አደጋው የደረሰው ምኑ ላይ ነበር?

ከአንገቱ በላይ	01	በጀርባው የገባ	08
በደረቱ ላይ	02	በአፍንጫው የገባ	09
በሆዱ ላይ ጀርባ ላይ	03	በአፉ የገባ	10
ጀርባ ላይ	04	በአይኑ የገባ	11
እጆቹን	05		
እግሮቹን	06		
ሌላ	07		

=ለባዕድ አካልና ለመርዝ ብቻ የሚመለስ

አደጋው የደረሰው የት ነበር?

መኖሪያ ቤት	1
ቤተ አካባቢ	2
ተምህርት ቤት	3
መንገድ ላይ	4
ገበያ ቦታ	5
አርሻ ቦታ	6
ሌላ ቦታ	7

ለደረሰበት ጉዳት ምን ፅርዳታ ተደርጉለት ነበር.

ምንም አልተደረገ	0
የገለ / የቤት ህክምና	1
አዋቂ / ጠና ተጠሪ ፅርዳታ	2
በጠና ደርጅት ህክምና	3

ከሆነ
_ በተመላላሽ 0
ወይንስ _ በማስተኛት 1

አደጋው በደረሰበት ጊዜ ከሰው ጋር ማን ነበር?

አና ት ነበረ	1
አባ ት ነበረ	2
ወንድሙ/እህ ት/ ነበ ታ	3
ሌሎች ነበረ	4
ማንም አልነበረ	0

አባራው ሰራው ምንድነው ?

ገበሬ	1
የቤት እመቤት	2
የገለ ቤት ውስጥ ሥራ	3
ነጋዴ	4
የመንግሥት ሠራተኛ	5
የቅጥር ጉልበት ሥራ	6
ያልተገለፀ	7

18. የሰው እናት ሥራ ምንድነው ?

	1
	2
	3
	4
	5
	6
	7

የአባወራው የተምህርት ደረጃ ምንድነው ? 20. የሰው እናት ተምህርት ደረጃ ?

አልተማረም	1
መሠረተ ተምህርት ብቻ	2
ተምህርት ቤት ገብተዋል	3
	1
	2
	3

/መደበኛ ተማሪ በሆኑ ከፍሉ ይፃፉ/

የእናቱ የዋ ፅድሚ ስንት ነው?

የመኖሪያ ቤቱ ባለቤት ማን ነው?

የኪራይ	0
የገለ	1

3. በአደጋው ምክንያት [illegible]ደረሰ ጉዳት ባለፉት ሁለት ወራት ውስጥ /ከሚያዝያ 4 – ሰኔ 4 1982 / የሞተ ሰው ነበርን ?

የለም	0
አለ	1

4. /የሞተ ሰው ከነበረ/ የአደጋው ምክንያት ምን ነበር ? [ ][ ]

የሰው ዕድሜስ ስንት ነበር ? [ ][ ]

ፆታውስ ?

ሴት	0
ወንድ	1

5. ውሃ የሚቀዱበት ሥፍራ የት ይገኛል ?

በግቢ /ጉረቤት /	0
በ500 ሜትር ውስጥ	1
በአንድ ኪ.ሜትር ውስጥ	2
ከሶስት ኪ.ሜ ውስጥ	3
ከሶስት ኪ.ሜ ውጭ	4

6. የክፍሎቹ ጠቅላላ ስፋት በካሬ ሜትር ስንት ነው?

- ክብ ቤት ከሆነ ሬድየስ ____
- ሌሎች ቤቶች በካሬ ሜትር____

7. ያመኖሪያ የሚ[illegible]ው፣ የዕቃና የከብት መኖሪያ ክፍሎች አጠቃቀም እንዴት ነው?

ሶስት ወይም ከዚያ በላይ የተለያዩ ክፍሎች፣ ከብት የሌለበት	1
አራት የተለያዩ ክፍሎች፣ ከከብት ጋር	2
ሶስት የተለያዩ ክፍሎች ከከብት ጋር	3
ሁለት የተለያዩ ክፍሎች፣ አንዱ የመኖሪያ ብቻ	4
ሁለት ክፍሎች ግን ለሁለገብ አገልግሎት	5
አንድ ክፍል ቤት፣ ያለከብት	6
አንድ ክፍል ከከብት ጋር	7

8. ከብት ካሏቸው ምን ያህል ፡_

በሬና ላም		
በግና ፍየል		
አህያና ፈረስ		

መሸከ መጠይ ቅጽ

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ለ/

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/እዚህ ገ ሁለት ለጆቾ በዐጠ ምርጫ ተራ በ ተራ ጠይ ቋቸው/

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DECLARATRION

I, the under signed, declare that this thesis is my original work and has not been presented for a degree in this or any other university, and that all sources of material used for the thesis have been duly acknowledged.

Name Solomon Demamu

Signature

Place Department of Community Health,
Faculty of Medicine, Addis Ababa University

Date of submission 04/05/91

This thesis has been submitted for examination with my approval as university advisor.

Dr. Joyce Pickering