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The Magnitude of Khat Use and Its Association With Health, Nutrition and Socio-Economic Status

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Abbreviations

APGAR	=	Adaptability, Partnership, Growth, Affection and Resolve
BMI	=	Body Mass Index
BP	=	Blood Pressure
CAGE	=	Cut down, Annoyed, Guilty, Eye opener
CI	=	Confidence Interval
CIDI	=	Composite International Diagnostic Interview
CNS	=	Central Nervous System
DBP	=	Diastolic Blood Pressure
EEG	=	Electro Encephalo Gramme
ICCA	=	International Council on Alcohol and Addictions
MOH	=	Ministry of Health
MSSI	=	Maternal Social Support Index
OR	=	Odds Ratio
PA	=	Peasant Associations
SAS	=	Statistical Analytic System
SBP	=	Systolic Blood Pressure
SD	=	Standard Deviation
SRQ	=	Self Reporting Questionnaire
USD	=	US Dollar

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Abstract: A house to house survey was carried out in a rural Ethiopaian community to determine the prevalence of khat use and its association with the health, nutritional, and socio-economic status of users. A total of 1200 adults were interviewed. Among these 60.9% were males and 79.1% Moslems. The current prevalence of khat chewing was found to be 31.7%. Muslims more than Christians, males more than females, those beween the ages 15 and 34 years more than other age groups were habitual users. Selected physical illnesses, (OR(95%CI))=1.52(1,14,2.02); injuries, (OR(95%CI)=2.31(1.42,3.79), undernutrition OR(95%CI)=1.76(1.24,2.48), mental distress, OR(95%CI)=8.30(5.20,13.31), were found to be associated with khat use. Family function among current khat users was significantly higher than non users (OR95%CI)= 1.56 (1.04,2.28). The social function among current users was observed to be about 20% higher. It is concluded that a fairly large proportion of the population consumes khat and that this is related to physical ill-health and metal distress, although family and social functioning and economic well-being seem to be unaffected.

Introduction

Khat (*Catha edulis* Forsk) is a tree of the family Celestraceae, that usually grows at high altitudes in East Africa, and Yemen. The leaves and young stems of this plant have been traditionally used in a variety of ways and for different purposes. Of particular interest is its stimulant effect, which seems to have led to its wide use in several countries, namely, Djibouti, Ethiopia, Somalia, Yemen and, to a lesser extent, in Kenya and Tanzania (1).

Khat is commonly known as "chat" in Ethiopia and has been used for various reasons. In earlier times the use of khat was observed frequently among Muslims who consumed it for prayer and during the fasting period of Romedan. Gradually its use became wide spread among many parts and different populations. Currently it is reported by users to give them better level of energy, alertness and confidence, a sense of happiness, better thinking capacity and creativity and facilitation of communication ability(2). In countries where khat use is endemic and has deep-rooted cultural traditions,

many houses have a room in which people gather each afternoon to consume the substance in a special setting. Furthermore, the psychological benefits of the group interaction that occurs during the khat session has also been stated as one reason for its intake by many.

The biologic effects of khat are due to the alkaloid active ingredient, cathinone and are known to resemble those induced by amphetamine(3). A common effect of khat use is insomnia, a condition that the users sometimes try to overcome with sedatives or alcohol. The withdrawal symptoms after prolonged khat use seem to be limited, however, to lethargy, mild depression, slight trembling and recurrent bad dreams.

An important consideration is that, habitual khat use may endanger health in that the resulting anorexia leads to malnutrition and thereby to increased susceptibility to infectious diseases(3).

The sharp recent increase in khat consumption may not only affect the health of individuals, but could also have serious socio-economic consequences for the countries involved. The potential adverse effect is diversion of income for the purchase of

khat, resulting in neglect of the needs of the family, leading to family discord and divorce. Furthermore, in countries where its use is substantial, it may negatively affect the economy since productivity is reduced in quantity and quality as a result of absenteeism and after- effects of the drug(4).

Although the literature on khat is fairly extensive, and several authors strongly stated the potential adverse effects of khat, very few population based studies exist to substantiate those claims. Studies based on laboratory animals and on a small sample of human subjects have been useful in elucidating the biologic effects of khat consumption among humans. However, community-based studies are required to scientifically prove or disprove the hypothesis that khat has negative effects on physical and mental health, nutritional status; social and family functioning and socio-economic status. No such study has ever been conducted in Ethiopia, and very few have been completed in Africa. Such studies are, however, important to inform national public policy makers.

The present study was, thus undertaken with the aim of filling this gap in knowledge by conducting a survey of khat use and its associated effects among 1200 household members in a predominantly rural district of south central Ethiopia.

The hypothesis in this study is that habitual khat intake (as measured by the length, and frequency of khat consumed) is not associated with reported physical ill-health, hypertension, mental distress, problem drinking, sleep disorders, sexual dysfunction, social and family functioning and to socio-economic problems.

Objectives

General:- To determine magnitude of khat use and its association with reported physical and mental well-being, nutritional status, social and family functioning and economic well-being.

Specific:- to determine

1. the prevalence of habitual khat consumption and concomitant use of other substances;

2. whether habitual khat consumption is associated with reported physical ill-health and hypertension;

3. whether habitual khat consumption is associated with nutritional status;

4. whether habitual khat use is associated with mental distress, problem drinking (of alcohol), sleep disorders and sexual dysfunction;

5. whether habitual khat use is associated with family and social functioning;

6. whether habitual khat use is associated with economic well-being.

Literature review

Historically, the original source of khat seems to be obscure. However, there is general agreement that its use was first observed in Ethiopia and from there, around the fifteenth century, the practice was transferred to the south-west of Arabian Peninsula (1).

The earliest scientific report on khat presented to Western culture was in the eighteenth century, when the botanist, Peter Forskal, identified the plant in Yemen and called it *Catha edulis*. However, he did not live long enough to publish his findings, which were later edited in 1775 by Niebuhr (1), the only survivor of the first European scientific expedition to Arabia. In memory of his friend, Niebuhr labelled khat under the generic name of *Catha edulis* Forsk.

Since the end of the nineteenth century, repeated studies have been made to establish the nature of the active principles of khat. In historical perspective, Fluckiger and Gerock in 1887 discovered the presence of an alkaloid which was identified as cathine. An important step was achieved in 1930, when Wolves (4) showed that Cathine was

identical with D-norpseudeophedrine. Realising the importance of conducting research studies on the spot, staff members of the United Nations Narcotic Laboratories visited Yemen in 1974 and obtained fresh khat leaves, which were immediately treated with various solvents for systematic investigation and analysis. The study conducted then isolated the compound aminoprpiophenone from the leaves of khat which led to formulation of the probable configuration of cathinone. The configuration was latter confirmed by Schopno and Steuneppe (1979). Many other constituents were also identified although their contribution to the observed effects of khat has not been elucidated.

The discovery of new substances such as cathinone supports previous doubts that the presence of cathine in khat is enough to explain its stimulant effects(3). It is now known that its action are mainly due to the alkaloid cathinone; a substance that can be called a 'natural amphetamine '(2,3).

The most frequent effects of khat chewing observed in humans are anorexia, insomnia, hyperactivity, euphoria, exitation, logorrhea,

hyperthermia, increased respiration, mydriasis arrhythmias, hypertension and constipation(5).

Increases in the locomotor activity of rats has been shown after intracerebral administration of cathinone. Based on reviews of subjects(6), consumption of khat appears to have an effect similar to that of amphetamine. These stimulate sympathetic paths leading to loss of appetite, euphoria, improved intellect, and alertness. It is also reported by subjects that fatigue is removed and performance is improved.

In a study that attempted to assess psychologic effects of khat use the Addiction Research Center Inventory and Visual Analogue scales were employed. Physiologic measures were systolic blood pressure, diastolic blood pressure, and heart rate(6). The results provided objective evidence for the amphetamine-like stimulator effects of khat leaves. These effects were closely similar to those observed after administration of cathinone, 0.5 mg/kg body weight, although peak plasma concentrations of cathinone after khat were delayed(3).

In places where khat grows naturally or is systematically cultivated, such as Ethiopia and Yemen, and where there is no prohibition against its

use, it is readily available. In others, where the climate is less favourable, as in Djibouti, it is regularly imported by air. Except for a small amount, the khat used in Somalia too is imported from neighbouring countries. With modern means of transport, fresh khat can now be made readily available far from the sites of its production.

The rapid spread of khat consumption and its production has been viewed as serious threat to the production of coffee and sorghum(7). Reports from Yemen have shown an increase in tracts of land used for khat cultivaton in 1972 by 17.4% and in 1973 by 11.8% . In Yemen, in 1973, a WHO sponsored mission has found that an overall prevalence rate of 80% among males and 8-13.3% among high school students in the age bracket 17-21 years exists. Similarly in 1981 prevalence rates of 75% and 10% for men and women respectively were reported from Somalia. Research on the epidemiology of khat conducted in Somalia in 1960's has delineated characteristics of users and identified specific problems associated with its use on the individual and the community at large. The results of this information collected on a large number of respondents has revealed a general

habitual use rate of 18.2-54.9% in the adult population (age 16 and above) with peak levels in the age range 20-40 years. Although all professions were found to be in the habitual use, it was shown that the majority were unemployed and about 18% were students. The major reasons for use were peer pressure and its pleasant effects.

In Ethiopia khat is cultivated mainly in Harrarge and in the Southern Regions, at an altitudes ranging between 1800 and 2400 m. In Harrarge Region it is grown on the sides of hills which are ploughed one or two times a year. The main harvest is usually during the rainy seasons. However, it is now equally harvested throughout the year using an irrigation scheme by the farmers. A newly planted tree is usually expected to yield its first products in about 5-8 years which afterwards is expected for a minimum of two harvests a year(7).

The price of khat varies with its quality, the total quantity offered and even the time of the day. However, it is much expensive during the dry seasons. According to earlier reports (7) that khat is much profitable than coffee in Harrarge Region in that a tree of khat is sold about ten times as much as a tree of coffee.

In Ethiopia, khat-chewing has systematically developed into a formal behaviour with characteristic cultural features. In Dire Dawa town, at midday, the khat market is generally crowded. The dealers bind the fresh twigs into small bundles which are then moistened with water and offered for public sale. In Addis Ababa, where it is abundant, it is sold everywhere in the streets and is usually wrapped in leaves of false banana to keep it fresh and preserve its potency. It is now a common observation by many that people have started to spend their week-end leisure time just chewing khat. This is openly observed along the road to Debre Zeit where the substance is consumed either in the cars or under a tree shade.

One clinico-psychosocial study in Ethiopia has presented a high prevalence of khat chewing and cigarette smoking among the younger age groups and khat was incriminated as a factor for initiation of smoking(8)

A recent study on the prevalence and socio-demographic correlates of khat chewing in Butajira District, Ethiopia (9), showed a prevalence of khat

use of 50%. It was also shown that khat chewing was highly associated with smoking, however, unlike observations by others no association with alcohol use was found presumably due to religion, as the majority of users were Muslims whose religion prohibits alcohol intake. Another study on multiple drug abuse among college and secondary school students in Gondar Ethiopia, has documented a pattern and use similar to that of developed countries. The leading substances of abuse were alcohol, cigarettes and khat with a prevalence rates of 31.1%, 26.3% and 22.3%, respectively. The combined current prevalence for the three drugs was about 11.5% . Alcohol was used more often to overcome the stimulation from khat (10).

Similarly a study conducted to determine prevalence of khat use among secondary school students in Agaro, South Western Ethiopia in 1995, has shown a high prevalence (64.9%) of khat use(11).

Through its complex constituents, khat has a wide range of physical effects on the body mainly on the digestive, respiratory, cardiovascular, endocrine and genitourinary systems. Several health problems have been associated with khat use. A high prevalence of dental and oral problems were reported.

In Somalia it was the opinion of many clinicians that the increase in the rate of duodenal ulcer and chronic constipation is attributable to habitual khat use(12). Both systolic and diastolic blood pressures were reported to stay elevated high until 18 hours after khat use(13). This may put the habitual user at an increased risk of high blood pressure. The development of hypertension depends on the interaction between genetic predisposition and environmental factors (14). In over 95 % of cases the etiology is unknown. Among those with known aetiology, administration of exogenous substances such as sympathomimetics is an important cause of hypertension.

Malnutrition and venereal diseases were also believed to be common in khat abusers. Although the reason for malnutrition is obvious from the appetite depressant effect of the substance, the reason for venereal disease spread seems to come from the preference of the company of the other sex usually after spending together on the khat party. The long hours of talk usually very close to each other in a tightly closed environment together with heavy smoking and poor nutritional status could be a factor

for putting the user at risk of developing infectious diseases. The pronounced anorexic effect of khat puts the habitual user on risks of malnutrition rendering him susceptible to infections(3). Evidences exist for a higher prevalence of tuberculosis among men users presumably aggravated by the accompanying heavy smoking(12).

The embryotoxic and teratogenic effect of khat was studied in Wistar rats (15). Khat reduced the food consumption and maternal weight gain and also lowered the food efficiency index, as compared to control mothers. Results of this study revealed khat retarded fetal growth and induced oncogenic effects. An animal study conducted to see effect of khat administration on fetal growth with a view to provide some clue whether similar effects would occur on the human mother has shown that total body weight of the fetuses was markedly reduced and the individual organ weight composition was altered(16). In this study using extract injection of khat to pregnant rats, the effects were shown to be directly related to the dose of the substance injected. It was stressed that these effects were similar to previous studies on the effect of amphetamine which are known to occur as a result of

sympathetic activation . Similarly, birth weights of babies was reduced and lactation inhibited in khat chewing mothers(17).

Khat chewing was found to be highly associated with dental carries although there is no documented evidence which has shown this to be a direct consequence of the khat itself on the teeth or the behaviour associated with its use. There are evidences in Ethiopia(18), indicating a general increase in the prevalence of dental problems in association with consumption of sugar, a common adjunct to khat.

One study of periodontal status of a subject sample of Yemenes (19) has shown a higher association between khat consumption and its detrimental effect on the periodontal tissue. On the other hand the association between oral leucoplakia and use of tobacco, alcohol and khat was studied in Kenya. Traditional beer, khat and chilies were not significantly associated with oral lesions specifically leucoplakia(20).

The digestive system is most obviously affected. In addition to the common complaints of anorexia and constipation, stomatitis, dyspepsia and gastritis,

due to the astringent effects of tannin, are often observed. The incidence of piles and hernia, as a result of constipation and its associated straining, has been reported to be significantly high. More recently, a study has shown the negative consequences of khat chewing on gastrointestinal physiology. Gastric emptying of a radio-labelled semi-solid meal was measured(21). Gastric emptying was significantly prolonged after chewing khat compared to those who did not chew. It was concluded that the sympathomimetic action of cathinone in khat may cause the observed delay in gastric emptying.

It was also felt clinically that the high rate of sexual impairment in the habitual users, though reversible, may progress to development of impotence. In Somalia, study subjects when asked on the effects of khat on sexual function, 60% of men have reported that khat increases libido but reduces performance. On the other hand 71% of the female respondents have reported that khat improves both libido and performance(12).

The adverse effects of khat use(22) on male fertility was observed in semen samples from two groups of Yemeni subjects. The parameters measured including semen volume, sperm count, sperm motility,

motility index and percentage of normal spermatozoa, were lower among addicts. Moreover significant negative correlation was also found between the duration of khat consumption and all the semen parameters.

A study to assess the effect of khat on resting and fatigued subjects has shown that it has similar effects to those of amphetamine use(13). All vital functions were affected with an upward shift of the parameters. Blood pressure was elevated and reached maximum after three hours, whereas heart rate was at its peak after 90 minutes of use. The patellar and light reflexes were exaggerated and the reaction time observed in the experiment were shortened, discriminative reactions were, however found to be optimal after 90 minutes of use.

There have been suggestions that the high rate of accidents observed in Somalia particularly of motor vehicle accidents is related to khat abuse. Reaction may be good but person under the influence of khat tends to be over confident and sometimes tries dangerous manouvres(12). These suggestions, however, have not been substantiated by a scientific study.

Sleeplessness, common among many users, seems to occur more often in the inexperienced, who have not yet found their optimal dose. Apart from the underlying cause of overstimulation, sleeplessness in itself my lead to more serious psychological complications. In an attempt to abolish the considerable side-effects of cerebral stimulation, various means may be used, such as indulgence in alcohol and the abuse of sedative and hypnotic drugs. In Ethiopia for example, indulgence in alcohol after khat is a common experience by many. The abuse of sedatives and hypnotics is also reported to be considerable( ).

Khat rarely causes toxic psychosis or schizophrenic reactions. However, abuse of khat may be a precipitating factor in functional psychosis in susceptible cases(23).

In 1997 a study conducted in rural Ethiopia measured the prevalence of specific mental disorders using the Composite International Diagnostic Interview (CIDI). In this, it was shown that a prevalence of khat dependence of 2.7% (life time) and 2.1%(one month)(24) were associated with mental disorders. In 1997 another study conducted in the same area which used the Self Reporting

Questionnairre (SRQ), reported no significant association between khat chewing and mental distress.

Like many pleasure-inducing agents, the growing of khat as a crop is a profitable business. This has encouraged its cultivation to the extent that in certain regions it has largely replaced well-respected traditional cash crops such as coffee. In countries where khat is not cultivated and has to be imported, its use clearly raises a major socio-economic issue. Djibouti, for example, imports daily about five tonnes of khat, and its cost is fairly high such that a consumer spends about 25 % of his daily earnings on khat, with deleterious effects on him and his family's well-being. Besides this, khat abuse has been postulated to be a factor in marital estrangements(25).

The social and economic impact of khat in communities that regularly use it could be high enough with its negative repercussions readily observed. Furthermore, in countries where its use is substantial, it has an impact on the national economy, since productivity is reduced in quantity and quality as a result of absenteeism and after-effects of the drug.

Results of a study in Harrarghe Region of Ethiopia, have shown that khat growing communities have an income level three times more than that of non-khat growing communities. Inspite of this difference, however, the nutritional status of children in the two communities was found to be generally similar(26).

In Harrage, Ethiopia it was stated that the habit of khat chewing was considered a normal day to day activity by all levels of social and economic categories(26). The lower age limit for its prohibition was estimated about 8 to 10 years of age but there is no upper limit. There were rough estimates of 85% and 75% life-time prevalence and current use rates. The social acceptance of its practice was suggested by the values observed in the allocation of resources in the special ceremonies, and the tradition of inviting guests and requesting the company of important person to participate. It is also a normal practice for students to openly request their parents to provide them with daily allowances to purchase khat. It has also been quite long time since the economic benefits of growing khat was realized by the farmers. Farmers have been proud of growing khat as they are gaining a lot of profit

with only little effort on farming as compared to efforts required on other crops. The expanding khat farm has gradually replaced the originally famous cash crop in the region, i.e. coffee.

The combined effects of the socio-economic problems and medical complications have been considered by some countries serious enough to warrant the introduction of preventive measures. At one time or another, legal regulations or total prohibition were attempted in most of the khat-using countries, but with little success. One of the earliest attempts to control khat was the introduction in 1921 of legal restrictions in what was then British Somaliland. In 1957 the import of khat into Aden from Ethiopia was prohibited but the ban was lifted in 1958, when the government developed system of licensing, registration of dealers and price control(2).

Similarly in view of the adverse effects of khat in Djibouti, the French Government considered khat a "narcotic" substance and "habit-forming", and accordingly passed on a decision in 1957 prohibiting its use. Again, however, prohibition proved to be

ineffective and inappropriate, and the law was violated.

Prohibition was introduced in other countries also. In Saudi Arabia, for example, a royal edict was issued in 1956 prohibiting the planting and use of khat. In Ethiopia and Yemen, where khat has been regularly cultivated, few serious attempts were made to restrict the spread of this plant. In 1972 a law was passed in Yemen prohibiting the cultivation of the khat plant on Government lands and khat-chewing in government offices. However, the law was resisted and was soon abrogated(2).

In addressing socio-economic aspects of khat in Ethiopia, the need for a scientific study was stressed and was first initiated by a group of health professionals in Ministry of Health (MOH) in 1960. The consensus reached after some observation by a group of expert was that, there was no adequate evidence to recommend its ban(26).

Corruption and criminal practices because of the very high cost of the habit were also considered as major social problems. It was also stated that family instability as a result of its effects on the user's behaviour and economic impacts were taken to be serious problems. Because, the khat session is

usually in mixed sexes, it is believed to encourage prostitution. Diversion of the scarce resources of the individual and the family to support the habit is a major economic problems.

In Djibouti; khat is obtained entirely by importation mostly from Ethiopia and a small amount from Kenya. About 8 metric tonns of khat were imported daily from Ethiopia, mainly by a private corporation. Many people were considered to be aggressive and delinquent especially towards the end of the month when financial constraints are maximal. Habitual use was observed mainly among the uneducated and the economically unprivilleged where it is associated with illness and unemployment. The effect at the family level was also serious in that males are usually absent from home and come late at when the rest of the family is asleep. On arrival most were in a mental status that was agitated, restless, aggressive, silent, remote or aloof. Sexual dysfunctioning of the male was incriminated for the very high devorce rate (50%) in Djibouti(25). Economically, khat has been condemned as a major factor for the countries under development. Although, the total daily working time was 6 hours,

only three hours were spent on work by the majority. A statistics for the year 1977 to 1982 has shown that a daily average of 30,560 USD was spent on import. On the other hand about 28,000 persons were registered as having their livelihood from the sale of khat and the daily profit of the Syndicate (SOGIK) in 1982 was estimated at 27,303 USD.

In 1983 a conference held on khat in Madagascar addressed the need for control of khat because of its potential impact on the socio-economic life and health. Accordingly the presence of little or no legal enforcement for control was appreciated and a recommendation was passed on for the need and the development of action plans that would protect both khat producing and importing countries from its negative consequences for the people concerned. The need for creating a body responsible for khat within the International Council on Alcohol and Addictiions (ICCA) as source for future information and research was also recommended(25).

It is true that there are legislations about the use of khat in some countries, with apparently very little effect on reducing the problem. Infact much is not expected since governments have now realized that they are gaining a substantive amount

of income from taxation on khat. For example Djibouti has about 10% of its national income whereas Ethiopia earns about 12 million Pounds Sterling annually from export revenue. Therefore, taxation didn't appear to have effect on its consumption(2).

International law on this issue is currently highly ambiguous. Importation of khat is illegal in France as in Switzerland, but legal in the United States and Great Britain as in most African countries.

Though in principle legislative measures constitute a central basis for the control of this problem, clearly other inherent social, cultural and economic aspects have to be taken into consideration. In the light of past experience, and depending on local conditions, the proper control of khat seems to lie in the adoption of an approach where khat would be considered part of general problem and dealt with in that context.

Methods

Study Design: The study is a community based cross-sectional study.

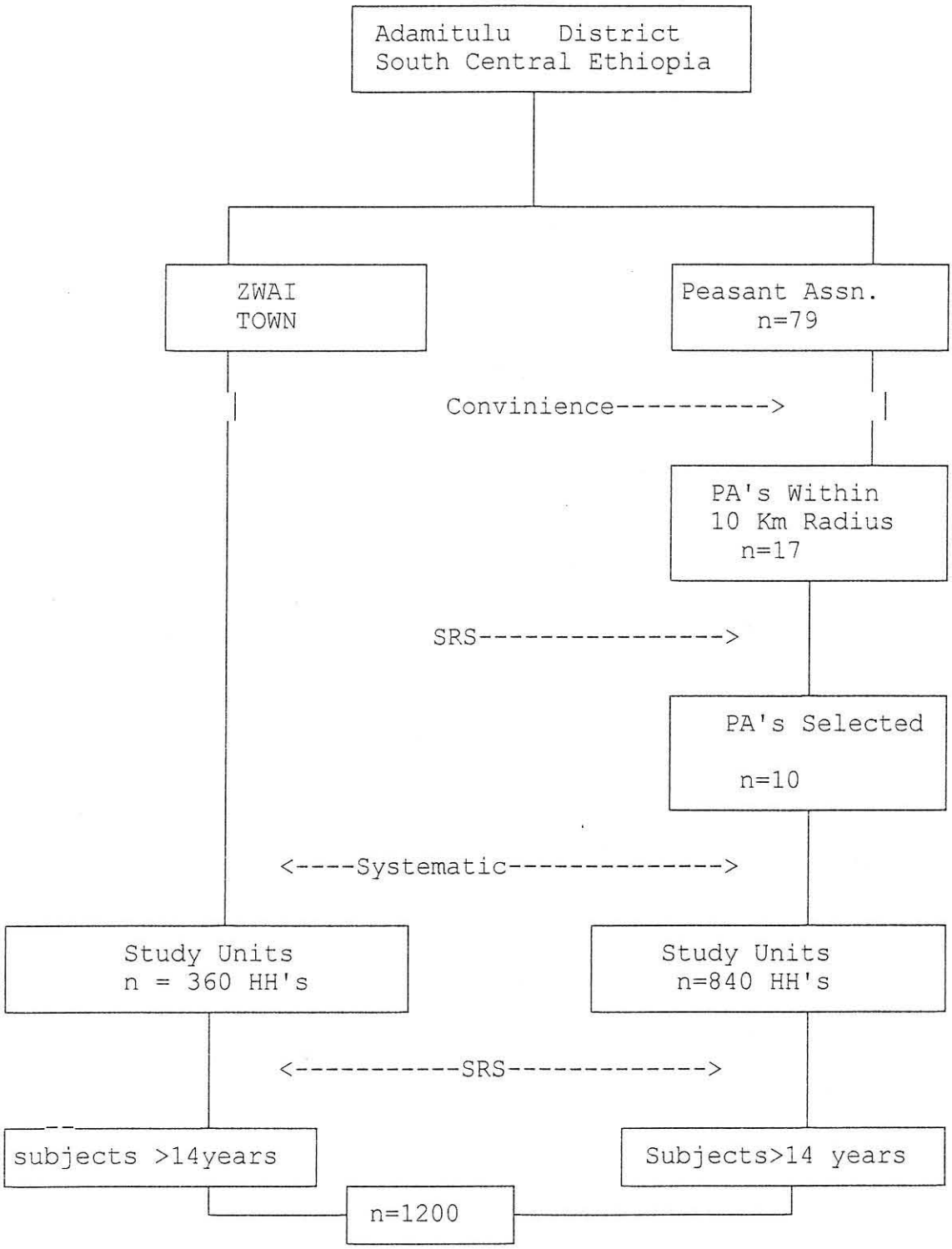
Study area: The study was conducted between January and September 1997 in Adamitulu District (*Woreda*) and in the district town (Zwai) which is located 169 km. south of Addis Ababa. The population of the district is estimated at 120,000 and of Zwai town at 36,000. Of the total rural community 97% are Moslems, and 2.2% are Christians. In Zwai town 87% are Orthodox Christian and 8% Moslems. Khat in this Woreda is believed to be consumed by its inhabitants. There is one health center in the town of Zwai.

Residents of the district 15 years of age and above were the source population for this study. The study population were people aged 15 and above who have resided in the woreda for at least 6 months. Using standard sample size calculation and based on the assumption of prevalence of 50% and allowing for 3% margin of error, 10% loss, and 95% confidence interval, a total of 1200 subjects was estimated to be included in the sample.

Out of the total 79 peasant associations, those peasant associations which are found within 10 km radius from Zwai town were included in the

sampling(Figure 1). After listing all the peasant associations ten peasant associations were selected by simple random sampling. The town of Zwai was also included in the survey. The sampling unit was a household. After random identification of a starting household, the households were included systematically. In the peasant associations evrey third households in 4 directions i.e south, north, east, west, were included in the study. In Zwai town since the houses are already numbered, the house numbers were used for systematic sampling. The respondents were any one member of the household aged 15 and above selected by a lottery method. Because the proportion of rural population is 70 %, 328 out of the total 4859 house holds in Zwai town and 695 out of the total 16479 house holds in the peasant associations were selected.

Figure 1. Sampling Technique



Inclusion and exclusion criteria : Persons 15 years old and above, who have resided in the area for at least six months were elegible to be included in the study. Those individuals who were unable to give interview because of a severe mental and physical illnesses were not included in the study.

Field Methods and instruments: Questionnaire which has been developed in English was translated into Amharic by the investigator and to the local language (Oromigna) by translators in the locality. It was closed-ended and was pre-tested and standardized in the same community but not on the study subjects. To secure correct meaning back translation to English was made by the translators. A total of six enumerators, who have completed twelvth grade were recruited from Zwai town and training was given for five days on data collection. Two health worker supervisors were assigned to assist in the study. Information on physical ailments were collected on questionnaire developed by the investigator. Data on the mental and social conditions were collected using existing instruments developed by others. The WHO Self Reporting Questionnaire (SRQ), which has been developed to screen psychiatric disturbances was applied(27).

Another instrument was the CAGE rating scale used to assess the degree of alcohol dependence(28).

The World Health Organization Research and Reporting project on the Epidemiology of drug Dependence(28) has produced a report with a view to provide a general guideline on a practical methodological tools for meeting the information needs of planners in countries with serious drug abuse problems. This guideline was reviewed during the development of the questionnaire on khat use. It also provides a review of survey in eight countries both from developed and developing countries.

The Composite International Diagnostic Interview, core version 1.0 (CIDI-Core)(31) developed by the Division of Mental Health of WHO was also reviewed and used in the development of questionnaire for collection of data on substance dependence and mental health. It is standardized and extensively tested instrument. The Amharic version of this instrument is also available and was used as a source for some questions in this survey.

Measuring heights and weights of subjects are very useful ways of assessing individual and community nutrition. WHO recommends their worldwide use for this purpose (32). Standard heights and weight for adults are provided in tables. The standards are applicable internationally with very few exceptions, even in the

presence of other factors that determine height and weight including genetic differences. A very useful and simplified instrument for community based assessment of nutritional status of adults is the body mass index (BMI) (Weight(Kg)/Height^2(m), or Quetelet's index). This function can easily provide a measure of weight for height that is largely independent of actual height. Weight was measured to the nearest 100 gm. using a beam balance while height was measured to the nearest 1cm. using a graduated height stick with a movable head piece. The scales were checked and calibrated with a known weight at the start of the day and at regular interval throughout the day.

According to WHO, blood pressure measurements should be taken after the patient has been seated for several minutes in a quite room in a chair that is comfortable. The sound heard at first was taken as the systolic BP and the point when the sound disappears as the diastolic BP. Both SBP and DBP were measured three times over a period of no less than 15 minutes interval, and mean values for each were calculated.

The family is the functional unit of a society. In order to measure the family function one needs to use a reliable instrument. The APGAR index (annex 1) was used to measure family function. The acronym APGAR stands for

Adaptability, Partnership, Growth, Affection and Resolve which are designed to test the fewer areas of family function(33).

It is believed that the degree of social support available in one's surrounding will have effects in coping up with environmental stresses. Evidence of such a relationship may suggest specific interventions in facilitating social interaction. The social support index used in this study was adapted from the Maternal Social Support Index (MSSI) which consists of 7 items measuring interactions with in the home environment, the immediate surroundings, and the interactions with social organizations(32). The cut-off point taken for poor and good social support index was determined using the mean value obtained for the whole study subjects.

Quality was maintained by intensive training, on the spot evaluation, data cleaning and feedback to interviewers. Respondents not available on 3 consecutive visits were labelled as "missing". Incomplete questionnaires were filled out by the same interviewer.

Variables:- The following variables were measured:

a. History of physical illness in the past 30 days for selected problems, was measured. These include dental and oral lesions, dyspepsia, constipation, anal swelling

(piles), and rectal bleeding. b. history of intentional and unintentional injuries

c. Mental distress as measured by the SRQ-20 (an instrument developed by WHO for mental health survey, Amharic version available). d. Systolic and diastolic blood pressures: blood pressure measurements were taken after the subject has been seated for several minutes in a quite room in a chair that is comfortable. e. Problem-drinking (of alcohol) as measured by CAGE(a screening instrument); f. Measurements of weight and height; g. Frequency of alcohol drinking; h. Tobacco and coffee consumptions, and I. Levels of family and social functions as measured by APGAR and SSI (instruments for measuring family and social functions). h.economic well-being: measured by qestions enquiring difficulties encountered in the past 30 days.

The following operational definitions were used: a. Pattern: a description of frequency, duration and circumstances of khat use; b. Previous use: history of khat use in life time but not in the past 30 days; C. Current use : history of ingestion of khat in the past 30 days; d. Non-user : Person who in his life time has never used khat in any form; e. Habitual use: Refers to a compulsive intake of khat on a continuous or periodic

basis in order to experience its psychic effects, and or to avoid the discomfort of its absence. It refers to use of khat on a daily or frequently grade; f.Substance: is any of the drugs used by subjcts such as khat, tobacco, coffee, or alcohol; g. Intensity: refers to the frequency with which one uses one khat. It is measured in days, weeks, or months; h. Chronicity: refers to the duration of use of khat by current users. It is classified in periods of use for up to 2 years and for more than two years; I. Physical Illness: History of presence of five or more of the following signs or symptoms in t he past 30 days. Gum bleeding, oral mucosal lesion, toothache, fever, cough, palpitation, weigh loss, constipation, and swelling or bleeding, dizziness, high blood pressure, and diarrhoea; j. Mental Distress:a positive response to 11 or more items out of the 20 items in the Self Reporting Questionnaire (SRQ); k. Total sleep disturbance: insomnia or inability to sleep mentioned as troubling him; l. Late sleep: inability to go to sleep for two or more hours in bed while expecting to fall asleep; m. interrupted sleep: frequent waking-up of not less than 3 times in one night; n. Early waking: waking up before 4AM at least 3 or more times in the past month; o.Nightmare as defined by the occurrence of 3 or more unpleasant dreams resulting in bad sleep during last 30 days; p. Under nutrition: Body mass

Index (BMI) of less than 19, using the formula of weight in kilograms divided by the square of height in meters. Q.Heavy smoking defined as a sum of 11-20 cigarets smoked each day; r. coffee indulgence: defined as a sum of 5 or more cups of coffee consumed each days; s. Problem-Drinking: a positive response on atleast 2 items out of 4 items in the CAGE (a screening instrument); t. Failure of penile erection: inability to initiate and/or maintain erection during sexual relationship in the past 30 days.u. Absence or loss of sexual pleasure: defined as lack of desire and interest in sex during the past 30 days. v. Functional Family : functional family defined as a score of atleast 8 out of a total of 10 in the APGAR (in instrument for a test of family function). w. Poor social functioning defined as a score of 10 or less points to a the Social Support Index (SSI) an instrument for a test of social functioning; x. Economic well-being: defined as a score of 0 or 1 out of the 5 questions enquiring a yes or no answer.Items included here are those questions on economic difficulty encountered by the respondent such as: i. difficulty in covering monthly expenditures; ii.objections by family members due to inadequacy of financial support; iii. frequent lending of money; d.

experience of saving; e.avbailability of *ekub* (traditional savings).

Data processing:- Data were entered to EPI Info version 5 and analysis made using the Statistical Analysis System (SAS) software. All data were coded, frequencies, rates, and ratios were computed for all variables. Bivariate and multivariate analysis were done where necessary. The Odds Ratio (OR) values and 95% confidence interval were taken to determine significance of associations. The Odds Ratio was calculated by the logistics regression method. To adjust for potential confounders the following variables were included in the model: Pattern of khat use, specific physical, mental, nutritional, family and social functions were inserted as dependent variables. The independent variables included in the model are: sex, age(5 levels), marital status(5 levels), education(5 levels) and occupation (7 levels).For the purpose of simplicity tabular presentations using orderly array, frequency tables and cross tabulation as well as diagrammatic presentations have been applied.

Informed consent was obtained from community leaders and willingness of the study subjects to participate in the study was asked. Subjects were assured of the confidentiality of their responses.

The study was approved by the Ethical Review Committee of both the Department of Community Health and the Faculty of Medicine, Addis Ababa University.

Those who were found at the time of the survey to be under weight or suffering from an ailment believed to be aggravated by the use of khat were given advices to discontinue and they were refereed to Zwai Health Center for appropriate medical care. Health education on the health and nutritional consequences of habitual khat use was given to all current chewers at the completion of data collection.

Results

The study population consisted of 1200 subjects and the overall response rate was 85.6%. A total of 172 subjects were not included in the study for various reasons. One hundred and two subjects did not volunteer to be interviewed, 10 were unable to communicate and 60 could not be traced on three appointments. Each questionnaire took an average of 90 minutes to complete. Failure to identify houses and respondents was a major problem faced during data collection.

The mean age of respondents was 30.5 years. Sixty one percent were males. About 54% had no formal education.

The majority were, young, in the age range between 15 and 24 years (68.5%) and married (83.8%). Most males were engaged in occupations such as farming and the females were mostly housewives (Table 1).

The current prevalence of khat chewing was 31.7% and the mean age at first chewing was 21.1 (SD 7.8) the majority being in the age bracket 25 to 34 years.

Among current users 17.9% were habitual users while 82.1% were occasional users. Seventy seven percent of current users were males, and belong to Oromo ethnic group and about 79.1% were Moslems, 56.8% uneducated, 44.8% farmers and 37.7 housewives. Pregnants and lactating women who currently chew khat were 7.0% and 19.3 respectively.

The duration of khat use ranged from one year to 64 years. The median duration was 10 years.

Physical illnesses were reported much frequently among current khat chewers. The odds of current khat chewers reporting physical illness was about 50% higher compared to none users and past users: Odds Ratio (OR) and 95% Confidence Interval (CI) = 1.52 (1.14,2.02). This association was statistically significant. A similar pattern was observed for both intencity and chronicity of use (Table 2).

The odds of reporting injuries among current users was more than twice higher than none users : OR and 95% CI=2.31 (1.42,3.79). This was again statistically significant. Both intensity and chronicity of khat use have shown a similar association with injuries.

Mental distress was reported much more frequently among current khat users compared to none users. The odds of current khat chewers reporting mental distress was about 25% higher than none users: OR and 95%CI =8.30(5.20,13.31). Both intensity and chronicity have shown a similar pattern of association.

Failure of penile erection was reported by 17.3% of current khat users this was more than twice higher than non khat users: OR and 95% CI = 3.78(1.73,8.45).

Family function among current khat users was found to be 56% higher than non users. This was significantly associated users khat use: (OR)(95% CI) = 1.56 (1.04,2.28). Similar observation was recorded in those who take the substance on a daily basis and for more than 2 years.

The social function observed among current users was observed to be about 20% higher compared to none users (OR)(95%CI)=0.81(0.59,1.09). There is an increasing social function as intensity, and duration of use increased. This was however not staisticlly significant.

The odds of khat users having economic problems was shown to be about 25% lower than non-users. This association was significant. (OR)(95% CI)= 0.74 (0.55, 0.98). A similar pattern was observed when both intensity and chronicity of use increased.

Table 1. Socio-Demographic Characteristics of Study Population in Adamitulu District, South Central Ethiopia, 1997

Variable	Population No (%)	Current Khat Users Urban No (%)	Rural No (%)
Sex: Male	626 (60.9)	58 (9.2)	195(31.1)
Female	402 (39.1)	3 (0.7)	70(17.4)
Age: 15-24	304 (29.1)	9 (2.9)	60(19.7)
25-34	400 (38.9)	30 (7.5)	108(27.0)
35-44	206 (20.0)	17 (8.2)	54(26.2)
45-54	60 (5.8)	5 (8.3)	21(35.0)
55+	58 (5.6)	0 (0.0)	22(37.9
Religion			
Orthodox Christian	321 (31.2)	34 (10.6)	30(9.3)
Muslim	614 (59.7)	23 (3.7)	253(41.2)
Catholic	6 (0.6)	0 (0.0)	1(16.6)
Protestant	84 (8.2)	2 (2.4)	0(0.0)
Other	3 (0.3)	0 (0.0)	0(0.0)
Ethnicity:			
Amhara	123 (12.0)	14(11.4)	4(3.2)
Oromo	696 (67.7)	25(3.6)	228(32.7)
Gurage	119 (11.6)	14(11.7)	25(21.0)
Tigre	13 (1.3)	1(7.6)	0(0.0)
Others	77 (7.5)	7(9.1)	8(10.4)
Education:			
Not literate	556 (54.3)	12(9.7)	167(30.0)
Elementary	272 (25.6)	16(5.8)	73(26.8)
Secondary	189 (18.5)	27(14.3)	19(70.4)
Higher	67 (6.2)	4(5.9)	0(0.0)
Occupation:			
Farmers	472 (45.9)	11(2.3)	208(22.8)
Housewives	306 (29.8)	4(1.3)	42(13.7)
Gov'temploYees	64 (6.2)	15(23.4)	1(1.5)
Daily labourers	36 (3.5)	10(27.7)	2(5.5)
unemployed	35 (3.4)	0(0.0)	1(2.8)
Students	23 (2.2)	2(8.7)	3(13.0)
Others	92 (8.9)	17(18.5)	4(4.3)
Marital Status:			
Single	126 (12.3)	2(1.6)	19(15.0)
Married	859 (83.8)	54(6.3)	287(33.4)
Divorced	11 (1.1)	2(18.2)	1(9.1)
Widowed	26 (2.5)	1(3.8)	6(23.1)
Separated	6 (0.3)	0(0.0)	2(33.3)
Total	1028	61	265

Table 2: Khat (*Catha edulis)* use and physical well-being in Adamitulu district, south central Ethiopia,1997

Pattern of use	History of Physical Illness[1]		History of Injuries[2]		Hypertension[3]		Total
	No (%)	OR (95%CI)[4]	No (%)	OR(95%CI)	No (%)	OR(95%CI)	
I. User type							
- Never	240 (43.2)	1.00[5]	35(6.3)	1.00	32 (6.1)	1.00	554
- Past	64 (43.5)	1.01(0.69,1.48)	19(12.9)	2.20(1.17,4.12	12 (8.4)	1.40(0.66,2.92)	147
- current	175 (53.7)	1.52(1.14,2.02)	44(13.5)	2.31(1.42,3.79	18 (5.5)	0.89(0.47,1.68)	326
-P value[6]	0.03		0.002		NS[7]		
II. Intensity							
- Never	240 (43.2)	1.00	35(6.3)	1.00	32 (6.1)	1.00	554
- Past	64 (43.5)	1.01(0.69,1.48)	19(12.9)	2.20 (1.17,4.44)	12 (8.4)	1.40 (0.66,2.92)	147
- Occassional	44 (53.0)	1.48(0.91,2.41)	12(14.5)	2.56 (1.17,5.29)	4 (4.8)	0.77 (0.23,2.38)	83
- Frequently	31 (52.5)	1.45(0.82,2.57)	6(10.2)	1.68 (0.60,4.42)	5 (8.5)	1.41 (0.46,4.02)	59
- Daily	100 (54.3)	1.56(1.10,2.22)	26(14.1)	2.44 (1.38,4.31)	9 (4.9)	0.79 (0.34,1.76)	184
- P-value	0.003		0.001		NS		
III.Chronicity							
-Never	240 (43.2)	1.00	35 (6.3)	1.00	32 (6.1)	1.00	554
-Previous user	64 (43.5)	1.01(0.69,1.48)	19 (12.9)	2.20 (1.17,4.12)	12 (8.4)	1.40(0.66,2.96)	147
-Using since 2Yrs	21 (65.6)	2.51(1.13,5.66)	4 (12.6)	2.12 (0.59,6.83)	1 (3.1)	0.49(0.02,3.55)	32
-Usingforover2Yrs	154 (52.4)	1.44(1.08,1.94)	140 (13.6)	2.34 (1.34,3.31)	17 (5.8)	0.94 (0.49,1.78)	294
- P-value	0.00	0.0005	NS				
Total							1028

1. History of presence of five or more of the following signs or symptoms in the past 30 days : Gum bleeding, oral mucosal, lesion toothache, fever, cough, palpitation, weight loss, constipation, anal swelling or bleeding, dizziness, high blood pressure, and diarrhea; 2.history of intentional and unintentional injuries ; 3. Hypertension defined as mean diastolic blood pressure of 90 mmHg or more measued three times 4. Odds Ratio (95% confidence Interval),
5. Reference value 6. p-value obtained from Mantel-Haenzel Chi square Test for Trend; 7.NS= not significant (i.e, $P \geq 0.05$).

Table 3: Khat (*Catha edulis)* Use and Metnal well-being of study subjects, Adamitulu District, south central Ethiopia, 1997

Pattern of use	Mental distress[1]		Problem drinking[2]		Loss of sexual pleasure[3]		Failure of Penile erection[4]		Total
	No (%)	OR (95%CI)[5]	No (%)	OR (95%CI)	No (%)	OR (95% CI)	No (%)	OR (95%CI)	
I. User type									
- Never	28 (5.1)	1.00[6]	21 (3.0)	1.00	141 (28.2)	1.00	7(2.1)	1.00	554
- Previous	13 (8.9)	1.83(0.87,3.80)	13 (8.8)	2.46(1.13,5.31)	29 (21.3)	0.69 (0.43,1.11)	1(2.5)	Invalid	147
- Current	100(30.7)	8.30(5.20,13.31)	17 (5.2)	1.40(0.69,2.81)	95 (30.1)	1.09 (0.79,1.51)	11(4.3)	2.07 (0.73,5.99)	326
- P-value[7]	0.000		NS[8]		NS				
II. Intensity									
- Never	28 (5.1)	1.00	21 (3.9)	1.00	141 (28.2)	1.00	7(2.1)	1.00	554
- Previous	13 (8.9)	1.83 (0.87,3.8)	13 (8.8)	2.46(1.13,5.31)	29 (21.3)	0.69(0.43,1.11)	1(2.5)	Invalid	147
- Occassional	28 (33.7)	9.55 (5.07,18.01)	7 (8.4)	2.34(0.87,6.05)	24 (28.9)	1.04(0.60,1.78)	2(2.9)	1.41 invalid	83
- Frequent	16 (27.1)	6.95 (3.31,14.65)	5 (7.2)	2.35(0.74,6.94)	23 (39.7)	1.67(0.92,3.03)	3(6.8)	32 (0.64,14)	59
- Daily	56 (30.4)	8.20 (4.88,13.85)	5 (2.7)	0.71(0.23,2.02)	48 (27.4)	0.96 (0.64,1.44)	6(4.2)	202(0.59,6.84)	184
- P-value	0.00		0.00		NS		NS		
III. Chronicity									
- Never	28 (5.1)	1.00	21 (3.9)	1.00	141 (28.2)	1.00	7(2.1)	1.00	554
- Previous	13 (8.9)	1.83 (0.87,3.80)	13 (8.8)	2.46(1.13,5.31)	29 (21.3)	0.21 (0.12,0.34)	1(2.5)	1.19 invalid	147
- Since 2Yrs	11 (34.4)	9.82 (3.99,24.01)	7 (2.3)	7.11(2.48,19.81)	4 (13.8)	0.41 (0.12,1.26)	0(0.0)	0.00(0.00,8.28)	32
- More than 2 Yrs	89 (30.3)	8.14 (5.06,13.17)	10 (3.4)	0.89(0.39,2.02)	62 (21.6)	0.70 (0.49,1)	11(6.3))	2.22(0.81,620)	294
- P-value	0.00		NS		0.028				
Total							NS		1027

1. History of mental distress defined as a positive response to 11 or more items out of 20 items in the Self Reporting Questionnaire (SRQ); 2. History of problem drinking(of alcohol) defined as a positive response to at least 2 items out of 4 items in the CAGE (a screening instrument); 3. Absence or loss of sexual pleasure during the past 1 month; 4.Failaire of penile erection defined as inability to initiate and/or maintain erection during sexual relationship during the past one month; 5. Odds Ratio (95% Confidence Internal); 6. Reference value; 7. P-value obtained from Mantel- Haenzel Chi square Test for Trend; 8. NS= Not Significant (i.e, $P \geq 0.05$)

Table 4: Khat (Catha edulis) use and sleep patern of studies subjects, Adamitulu District, south central Ethiopia, 1997

Pattern of use	Total sleep disturbance[1]		Late sleep[2]		Interupted sleep[3]		Early waking[4]		Nightmare[5]		Total
	No (%)	OR (95%CI)	No (%)	OR (95%CI)	No (%)	OR (95%CI)	No (%)	OR (95%CI)	No (%)	OR (95%CI)	
I.User Type											
- Never	67 (12.1)	1.00[7]	39 (4.04)	1.00	32 (5.8)	1.00	37 (6.7)	1.00	14 (2.5)	1.00	554
- Previous	28 (19.0)	1.71(1.02,2.85)	16 (40.8)	1.57(0.83,3.1	13 (8.84)	1.58 (0.76,3.23)	12 (8.16)	1.24 (0.59,2.55)	5 (5.44)	1.36(0.42,4.12)	147
- Current	111(34.0)	3.75(2.63,5.37)	38 (11.6)	1.7 (1.06,2.86	15 (4.60)	0.78 (0.40,5.55)	28 (8.6)	1.31 (0.76,2.25)	15(4.60)	1.86(0.84,4.14)	326
- P-value	0.000		NS[9]		NS		NS		NS		
II. Intensity											
- Never	67 (12.1)	1.00	39 (7.03)	1.00	32 (5.8)	1.00	37 (6.7)	1.00	14 (2.52)	1.00	554
- Previous	28 (19.0)	1.71 (1.02,2.85)	16 (10.9)	1.57(0.83,3.09	13 (8.84)	1.58 (0.76,3.32)	12 (8.6)	1.24 (0.54,2.55)	5(5.44)	1.36(0.42,4.12)	147
- Occassional	32 (38.1)	4.56 (2.65,7.83)	9 (10.8)	1.42(0.62,3.18	4 (4.81)	1.83 (0.42,2.54)	8 (9.63)	1.45 (0.61,3.49)	5(6.02)	2.47(0.75,7.61)	83
- Frequent	15 (25.4)	2.44 (1.24,4.84)	7 (11.8)	1.73(0.69,4.14	2 (3.4)	0.57 (0.09,2.54)	6 (10.2)	1.58 (0.57,4.15)	2 (3.4)	1.35(N.A)	59
- Daily	64 (34.8)	3.88 (2.56,5.88)	22 (11.9)	1.75(1.00,3.22	9 (4.9)	0.84 (0.36,1.88)	14 (7.6)	1.15 (0.58,2.28)	8(4.34)	1.79(0.68,4.65)	184
- P-value	0.00		NS		NS		NS		NS		
III. Chronicity											
- Never	67 (12.1)	1.00	39 (7.03)	1.00	32 (5.8)	1.00	37 (6.7)	1.00	14 (2.52)	1.00	554
- Previous	28 (12.5)	2.72 (1.02,2.85)	16 (40.3)	3.95 (1.97,7.9)	13 (8.84)	1.58 (0.76,3.32)	12 (8.6)	1.24 (1.12,5.14	5 (5.44)	1.36(0.42,4.14)	147
- Since 2Yrs	8 (25.0)	2.48 (0.96,5.95)	5 (5.3)	1.26 (0.42,3.53)	2 (33.3)	0.60 (0.10,2.69)	3 (50)	0.64 (0.15,2.26)	0 (0.0)	0.00(0.00,6.47)	32
- M/than 2Yr	13 (3.50)	3.92 (0.17,0.64)	44 (12.6)	1.25 (0.75,2.1)	3 (22.0)	0.63 (0.31,1.27)	34 (11.5)	0.87 (0.50,1.51)	65 (22.1)	10.95(5.84,20.86)	294
- P-value	0.00		NS		NS		NS		0.00		

1. Total sleep destrubance as defined by a yes answer to insomma or inability to sleep in the SRQ; 2. Late sleep is defined as inability to go to sleep for two or more hours in bed while expecting to fall a sleep; 3. interrupted sleep as defined by frequent waking-up of not less than 3 times in one night 4. Early waking at least 3 or m days before 4 Am in the past month; 5. Nightmare as defined by the occurrence of 3 or more unpleasant dreams resulting in bad sleep during last 30 days; 6. Odd's R (95% Confidence Interval) ; 7.Reference value; 8. P-value obtained from Mantel Heazen Chi-square Test for Trend; 9. NS= Not significant (i.e $P \geq 0.005$)

Table 5:Khat (*Catha edulis)* Use Versus Nutrutional Status and Concomitant substance use among study subjects, Adamitulu District, South Central Ethiopia, 1997

Pattern of use	Under Nutrition[1]		Alcohol Drinking[2]		Heavy Smoking[3]		Coffee drinking[4]		
	No (%)	OR (95%CI)[5]	No (%)	OR (95%CI)	No (%)	OR (95% CI)	No (%)	OR (95%CI)	Total
I. User type									
- Never	94 (16.9)	1.00[6]	132 (25.3)	1.00	2 (0.4)	1.00	416 (76.1)	1.00	554
- Previous	33 (22.4)	1.42(0.89,2.27)	47 (33.1)	1.46(0.96,2.23)	29 (19.4)	67.8(15.4,417)	96 (67.6)	0.68 (0.40,1.16)	147
- Current	86 (26.4)	1.76(1.24,2.48)	125 (38.3)	1.90 (1.40,2.60)	39 (12.1)	31.7(8.7,226)	26 (69.3)	1.35 (0.86,2.16)	326
- P-value[7]	0.0007		0.006		0.001		NS[8]		
II. Intensity									
- Never	94 (16.5)	1.00	132 (25.3)	1.00	2 (0.4)	1.00	416 (76.1)	1.00	554
- Previous	33 (22.4)	1.42 (0.89,2.22)	47 (33.1)	1.4(0.96,2.23)	28 (19.4)	67.8,(15.4,417)	96 (67.6)	0.68 (0.40,1.16)	147
- Occassional	25 (30.1)	2.11 (1.22,3.66)	26 (31.7)	1.3(0.80,2.34)	13 (15.7)	51.2(10.6,336)	61 (73.5)	1.25 (0.57,2.83)	83
- Frequent	14 (23.7)	1.53 (0.76,3.01)	20 (35.1)	1.6(0.86,2.95)	4 (6.9)	20.0(3.0,161)	31 (52.5)	1.15 (0.41,3.47)	59
- Daily	47 (25.5)	1.63 (1.11,2.55)	79 (43.9)	2.3(1.60,3.35	22 (12.1)	37.4(8.4,233)	134 (72.8)	1.46 (0.81,2.26)	184
- P-value	0.001		0.001		NS		NS		
III. Chronicity									
- Never	94 (16.9)	1.00	132 (25.3)	1.00	2 (0.4)	1.00	416 (76.1)	1.00	554
- Previous	33 (22.4)	1.42 (0.89,2.27)	47 (33.1)	1.4(0.96,2.23	28 (19.4)	85.09 (19.2,525)	96 (67.6)	0.68 (0.40,1.16)	147
- Since 2Yrs	11 (34.4)	2.11 (1.22,3.66)	14 (42.2)	2.4(1.10,5.36	3 (9.4)	33.8 (4.26,306)	26 (81.3)	1.60 (0.45,6.83)	32
- More than 2 Yrs	75 (25.5)	1.53 (0.76,3.01)	111 (38.5)	1.8(1.34,2.55)	36 (12.4)	56.21 (13.1,341)	200 (68.6)	1.32 (0.81,2.16)	294
- P-value	0.003		0.001		0.0001		NS		
Total									1027

1. Under Nutrition = poor nutrional status as defined by score of less than 19 on the BMI; 2. Frequency of alcohol drinking as defined by the number of subjects responding yes to a question if they have drunk alcohol in the past 30 days; 3. Heavy smoking defined as a sum of 11-20 cigarets smoked each day; 4. Coffee drinking defined as consumption of a sum of 5 or more cups of coffee each day; 5. Odd's Ratio(95% Confidence Interval); 6. Reference value; 7.P-value as derived from the Mantel Haenszel Chi square Test for Trend; 8. NS= Not Significant (i.e $P \geq 0.05$)

Table 6: Khat (*Catha edulis*) Use Versus Family, Social and Economic Functions of Study Population, Adamitulu District, south central Ethiopia, 1997

Pattern of use	High Family Function[1]		Poor Social Function[2]		Economic well-being[3]		Total
	No (%)	OR (95%CI)[4]	No (%)	OR (95%CI)	No (%)	OR (95% CI)	
I. User type							
- Never	414 (78.8)	1.00[5]	395 (71.2)	1.00	259 (46.7)	1.00	554
- Previous	105 (80.8)	1.06 (0.68,1.88)	104 (70.7)	1.04(0.44,2.47	62 (42.2)	0.83(0.57,1.22)	147
- Current	269 (85.1)	1.56 (1.04,2.28)	217 (66.6)	0.81 (0.59,1.09)	128 (39.3)	0.74(0.55,0.98)	326
- P-value[6]	0.002		0.00		NS[7]		
II. Intensity							
- Never	414 (78.8)	1.00	395 (71.2)	1.00	259 (46.7)	1.00	554
- Previous	105 (80.8)	1.13 (0.68,1.88)	104 (70.7)	1.04(0.45,2.74)	62 (42.2)	0.83(0.57,1.22)	147
- Occassional	68 (82.9)	1.30 (0.68,2.52)	59 (71.1)	1.00(0.56,1.71)	33 (39.8)	0.75(0.46,1.24)	83
- Frequent	45 (80.4)	1.10 (0.53,2.33)	42 (71.2)	1.00(0.53,1.89)	21 (35.6)	0.63(0.35,1.14)	59
- Daily	156 (87.6)	1.90 (1.13,3.21)	116 (63.0)	0.69(0.48,1.00)	74 (40.2)	0.77(0.54,1.09)	184
- P-value	0.01		0.01		0.05		
III. Chronicity							
- Never	414 (78.9)	1.00	395 (71.2)	1.00	259 (46.7)	1.00	554
- Previous	105 (80.8)	1.13 (0.68,1.88)	104 (70.7)	0.98(0.64,1.49)	62 (42.2)	0.83(0.57,1.22)	147
- Since 2Yrs	23 (76.7)	0.88 (0.35,2.32)	23 (71.9)	1.04(0.44,2.47)	19 (59.4)	1.67(0.77,3.66)	32
- More than 2 Yrs	246 (86.0)	1.65 (1.09,2.49)	194 (66.0)	0.79(0.57,1.08)	109 (37.1)	0.67(0.50,0.91)	294
- P-value	0.01		NS		0.01		
Total							1027

1. High family function defined as a score of at least 8 points out of a total of 10 in the APGAR (an instrument for a test of family function); 2. Poor social functioning defined as a score of 10 or less points to the SSI (an instrument for a test of social functioning); 3. Economicwell-being defined as a score of 1 or 0 to the 5 items questioning economic difficulty; 4. Odd Ratio (95% Confidence Interval); 5. Reference value; 6. P-value obtained from Mantel Haenzel Chi square Test for Trend; 7. NS=Not significant (i.e, $p \geq 0.05$)

Discussion

Our study reveals a relatively lower prevalence of khat use (31.7%) than estimates made in other studies in Ethiopia and Djibouti, Yemen and Somalia. However, it was close to the prevalence rate of 50% found in Kenya(1). The differences in intercountry prevalence may be due to the fact that studies in other countries did not include representative sample population.

Our finding on the general prevalence of khat chewing in Adamitulu District is also close to that reported for Butajira (50%). The higher prevalence of khat chewing among Agaro Secondary School Students, South Western Ethiopia (64.9%), may be due to the characteristics of the study population, being only students who do not represent the general population and the small number of students in our study (11). On the other hand a study conducted to assess the polydrug abuse status of students in Gondar College of Medical Sciences has found a lower prevalence (22.3%), which may be due to scarcity of the substance there as it is located very far away from the regions where khat is normally cultivated(10).

Except the clinical and pharmaclolgical studies on the effect of khat on health and nutrition there are only few and incomplete epidemiological studies on this area. Our

observation on the health and nutritional effects of khat appears to indicate the presence of a higher prevalence of both physical and mental problems and lower nutritional levels among khat users than the control groups.

The association of physical illnesses with khat use observed in the present study is in line with previous observations for dental problem among khat users (19); and other previous reports on the prevalence of gastrointestinal problems including constipation and duodenal ulcer in Somalia(13).

The high incidence of injuries reported among khat users may due to the behaviour of a person under the stimulant effects of khat, in that he/she may tend to be restless or hyperactive and may be over-confident and sometimes try dangerous manouvers when driving. Such behaviour could be the cause of many accidents.

No association between hypertension and khat use was observed in the present study although hypertension is said to be a common finding among chronic khat users. A laboratory-based study has shown that both systolic and diastolic blood pressures rose from basic mean values (14). Those findings were entirely on experiments involving the administration of khat, and hence differ from ours in that we do not have information on our

subjects whether they have ingested khat at the time measurements were taken. Besides this the rise in diastolic blood pressure in our case was not accompanied by simultaneous increase in systolic blood pressure.

Mental distress was significantly associated with intensity and chronicity of use. It was higher among frequent and daily users and those who chewed khat for more than 2 years. Mental distress may occur in khat users than not. This could happen more frequently as the two items in the SRQ i.e, anorexia and insomnia are the pharmacologic effects of khat consumption. On the other hand, khat users may tend to report their symptoms more transparently. It is, therefore, not possible to delineate whether the association between khat use and mental distress is actual or due to reporting differences.

Problem drinking as measured by CAGE was reported in (5.2 %) of current khat users and (3.8%) of non users, this was not significant. The finding is different from that observed in Djibouti and Somalia. Recently a study on the epidemiology of alcohol dependence and problem drinking in general population of Addis Ababa has reported a lower prevalence than ours(33). Our study population is predominantly illiterate, Muslim and rural farmers, but consumption of alcohol was found among the urban dwellers

of Zwai town and followers of the Orthodox Christian denomination which appears to be liberal on taboos against the use of alcohol. As duration of use increases there appears to be a decrease in frequency presumably reflecting the state of adaptation to the use of khat without concomitant alcohol consumption.

It has been shown that there is a significant association of sexual dysfunction with intensity of use in that the risk was higher among daily users. Our finding is consistent with observations by others, though prevalence of male impotence was reported to be as high as 60% in Somali khat users (12) and again 60% in Djibouti (25). The study in Djibouti was not a community-based one, rather it was observation made predominately among male habitual users, which may explain the higher prevalence. On the other hand, it has been shown that habitual khat use has deleterious effects on semen parameters. All parameters including semen volume, sperm count, motilty, and proportion of normal morphologies were lower among compulsive khat users (22). Some reseaechers have considered that the negative consequences of khat chewing on family harmony stated by observers in Djibouti could be further worsened by khat-induced infertility. However,

this needs to be further substantiated by a study at a community level.

Insomnia is a common problem after the use of khat. This is a finding similar to those reported by many pharmacologic studieson khat. Our study indicates in general that sleep disturbances are highly prevalent among current khat users compared to those who never used and previous users. Similarly observations in Somalia (12) show that insomnia was a common cause for referral to hospitals and use/abuse of psychotropic substances to abolish its effects. Apart from the underlying causes of overstimulation, sleeplessness in itself may lead to more serious psychological complications. In an attempt to overcome the considerable side-effects of cerebral stimulation, various means, depending on the local situation may be used, such as indulgence in alcohol and the abuse of sedatives and hypnotic drugs(1).

Sleep disturbance is a component item in the SRQ contributing to the high prevalence of mental distresses among our cases. Nevertheless, sleep disturbance per se, can exert effects on the socio economic dynamics of the individual and his family. It is obvious that a person who sleeps late is expected to wake up late in the

morning, or wakes up early with fatigue and apathy so that both productivity and social interactions may adversely be affected. In Djibouti where there are few industries, existing services are known to suffer from absenteeism and inefficiency. Office work though officially supposed to be carried out for six hours a day, the reality is that there are only 3 hours of effective work(25)

Under nutrition was associated with intensity and duration of khat use. Besides the appetite supressant effect of khat which has been repeatedly confirmed by pharmacological studies both in human and animal subjects; there are substantial evidences to implicate khat use as detrimental to community nutrition where its use is rampant. Animal studies have shown that fetal growth was significantly retarded in khat-injected rats.

Moreover it was also shown that the active ingredient of khat was found in the breast milk of lactating human mothers (17). On the other hand, recently a study has conclusively shown that gastric emptying of a radio-labelled semi-solid meal was significantly retarde $P<0.02$) in human subjects(21). Our BMI level found in current users was sufficiently low to support the above evidences. This poor nutritional level will undoubtedly put the habitual user susceptible to infections which further

aggravate the situation resulting in a higher level of morbidity among khat chewers. The higher level of physical illnesses among our subjects could also be explained by the poor nutritional status found among habitual users.

Smoking was strongly associated with both previous and current use of khat. This is similar to other studies conducted in Somalia and Djibouti in which a high rate of smoking was found among khat users. A study in Gondar has also showed that smoking was a common accompaniment to other drug uses including khat.

In contradistinction to observations by others in Djibouti and Somalia the result of our family function tests derived from five major areas of family function indicators(APGAR), was significantly better among khat users. This may be related to the long hours of khat session at home, the consistence and frequency of this long contact time with family members and relatively higher proportion of Moslems and rural and uneducated subjects that account for the differences observed in urban settings of Djibouti and Somalia. Nevertheless, in view of the negative consequences of the habit on family economy and health it is unlikely that khat users could have a better family function.

On the otherhand, sexual difficulty among men though reported by few in this study is another problem against family harmony which has been increminated as a factor for marital estrangements in Djibouti. The low level of reporting of sexual difficulties in this study could be the result of under-reporting by our community as the question is a very sensitive one for many that openess can not be expected by all. On the otherhand, the relatively strict religious faith, the low level of educational status and the of our study population are also indicators of poor compliance for this information. The practice of polygamy among Moslems and the rural uneducated majority of wives together with cultural taboos that prohibit the disclosure of these secretes tend to keep the family within the wedlock and hence the low level of reporting of sexual difficulties.

On the otherhand, social functions were found to be better among habitual khat users compared to non users. This is generally in agreement with observations by others. The habitual user usually spends substantial amount of time on the khat session, so that he is in continous interaction with others who participate in the khat party. Neverthless the scarce amount of time available for interaction with those who don't chew and

economic inadequacies due to the continuous demands posed by the habit, the social interactions may be limited to a minimum because of the routine of life style followed by habitual users. The social effects of khat has been viewed from the perspective of the producer and consumer. The consumers are those who are exposed to economic and social harm than the producers. It is true that both the farmers and the dealers consume khat but consumption is not the sole motive in cultivating and selling it.

In Djibouti the habit is said to be rampant among the poor and unemployed where it was viewed by many observers as socially harmful(22). On the other hand, in Yemen khat appears to be socially important in that it is tolerated both by the religious and political leaders. According to some observers, the rewards of khat use for the people of Yemen is more than the psychic effects in that it has a significant role in social interaction.

In Ethiopia too, (36) khat appears to be economically important to those who grow it, and in one study that attempted to assess the nutritional effects of income in Hararge Region, families of khat growing community have been found significantly better in their economic levels than those who do not grow khat, though nutritional status were not different in the two communities. Hence, khat

appears socially acceptable probably due to the economic benefits derived from it sale. Conclusions on adverse effects of khat derived from experiences of countries such as Djibouti which entirely obtain their khat by importation may not be applicable to countries like ours which produce, consume and export khat.

The association of khat use with economic well-being in our study may be due to enhanced efficiency with which khat users undertake their business ventures. It could also be due to the better educational attainment of khat users following a longer period of intense study using khat.

Attempts have been made to look into different factors ranging from socio-demographic characteristics to patterns of khat use and the health, nutrition, and socio-economic consequences. However the list of items included in each are not complete that important variables which might contribute to the associations may be quite substantial. Absence of tested instruments in the areas of physical health, social, family and economic status have forced us to develop our own and use others developed for different surveys. Measurement of blood pressure was carried out by non health workers and in unstandardised home environment that

the quality of data may not be reliable. Inavailability of similar studies for comparability of results is also another limitation.

Subject were selected based on probability sampling method so that selection bias would be very minimal. The size of our sample which is fairly large will take care of the few non-responses and so that the information collected is adequate. It is unlikely that there was interviewer bias as they were non-health workers, besides this the question on the use of khat was put on the final section of the questionnaire so that respondents were not initially aware of the presence of khat questions. Hence information bias was unlikely. Potential confounders was controlled by running logistic regression analysis.

The number of peasant associations included in the study would be representative of the whole district. Therefore, the results could be generalizable to similar rural districts and towns in the country.

Conclusion

It has been shown in this study that:

1. A fairly large segment of the adult population of the District consumes khat on habitual basis. This is the productive force of the community which is adversely affected by khat use;

2. Physical ill-health, injuries, and under-nutrition were associated with khat use;

3. Mental distress, sleep disoder and problem drinking were associated with khat use and;

Recommendation

The following recommendations are forwarded on the basis of our observation:

1. Incorporation of the subject of khat in existing elementary and high school cariculli such as biology and chemistry so that the nature of the substance and its harm could be felt by the student at earlier time;

2. Introduction of an effective and sustained anti-khat education in existing health promotion and prevention services;

3. Seeking the support of religious institutions in educating general public and assisting them in

establishing councilling services by providing staff with training opportunities;

4. Creating favourable conditions for the participation of non-governmental organizations in the establishment of services in areas where the prevalence is known to be high;

5. Introductionof programmes for control of its production through a strategy of subsidizing the production of alternative but equally rewarding cash crops;

6. Imposition of heavy taxes to dicourage widespread use;

7. Banning the use of khat in all schools and work place;

8. Conducting a similar community-based study with longitudinal design.

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Annex 1

Family APGAR: The acronym APGAR stands for Adaptability, Partnership, Growth, Affection and Resolve which are designed to test the important areas of family function (33)

1. Adaptability- is the utilization of intra and extra familial resources for problem solving when family equilibrium is stressed during a crisis.

2. Partnership- is the sharing of decision making and nurturing responsibiities by family members.

3. Growth- is the physical and of mental maturation and self-fulfilment that is achieved by family members through mutual support .

4. Affection- is the carrying or loving relationship among family members.

5. Resolve- is the commitment to share time, to assist members of the family for physical and emotional nurturing. It also usually involves a decision to share wealth and space.

The test comprises of a maximum of 2 scores for each item of family function which total to 10.

A score of 7-10 suggests a highly functional family

A score of 4-6 suggests of moderately functional family, and A score of 0-3 suggests a severely dysfunctional family.

Social Support Index : used in this study was adapted from the material Social Support Index (MSSI), which consists of 7 items measuring interactions with in the home environment, the immediate surroundings, and the interactions with social organizations(34).

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.

Name: Mesfin Belew, MD

Signature: 

Place: Addis Ababa

Date of submission: _____

This thesis has been submitted for examination with my approval as University Advisor.

Dr. Derege Kebede 

Advisor