

Full Length Research Paper

Determinants of khat chewing among urban households of Wolkite Town, Gurage Zone, Ethiopia

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Khat is the second largest export item with great economic value in Ethiopia, but the ongoing increased number of chewers in the country indirectly affects economic productivity by decreasing work-hours, household's economic production, diversion of money to buy khat, absenteeism from work and unemployment. The study aimed at analyzing the status of khat consumption and identifying the determinants of consumption level of khat in Wolkite town of Ethiopia. Primary and secondary data sources were used to obtain relevant data required for this study. A total of 110 sample respondents were used to collect primary data. Double hurdle model was employed to identify the determinants of khat consumption. The Probit part of the model result revealed that age of respondents, religion, educational level, peer- influence and perceived benefit of khat determine consumption decision as expected. Results from truncated part of Double hurdle showed employment status, perceived benefit, education level, khat price and work environment susceptibility determine the level of khat consumption in the study area. It is recommended to strengthen the provision of formal education, encourage youths' knowledge through different training and experience sharing, facilitate a program to provide especial education on socio- economic and health consequences of khat chewing to primary, secondary, preparatory and university students, reduce unemployment through providing job opportunities, strengthen the provision of a choice of sport station and facilities to the society, and enhance safe working environment for khat chewing to be done by required stakeholders.

Key words: Consumption, double hurdle model, Khat, Wolkite.

INTRODUCTION

Khat (*Catha edulis Forsk.*) is an evergreen flowering tree or shrub mainly cultivated in east Africa horn and peninsula area. It originated from Ethiopia and was imported to Djibouti, Somalia, Kenya, Uganda, Tanzania, Zimbabwe, Zambia, South Africa and Yemen (Berhanu et al., 2014). It is a naturally occurring stimulant that is

consumed by plucking off the leaves of the khat tree and could it be used for a recreational purpose for its effects such as euphoria and increased alertness (Axel et al., 2012).

Khat is estimated to be chewed by more than five to ten million people each day, although its use is largely in East

African countries and South-western Arabia (Erica et al., 2009). In Ethiopia, khat chewing is becoming habitual and the proportion of people chewing khat has significantly risen over the years and chewers' population in Ethiopia is now 16% from the country's population (Gebrie et al., 2018). Moreover, the percentage of khat chewing among regions of Ethiopia ranges from 1.1 to 53.2% with the overall prevalence of 15.3% (Haile et al., 2015; Amsalu et al., 2017).

Private home, shops, cars and workplaces are among places where khat is largely chewed in the country and chewers become talkative, elated, and get a feeling of wellbeing and power and elevated self-esteem (WHO, 2015). Khat chewing results in social isolation, family breakdown, loss of one's responsibilities and reduces overall economic production. It also causes mental, physical, and reproductive health consequences (Berhanu et al., 2014; Omur et al., 2015; Gebrie et al., 2018). Furthermore, chewing of khat has serious socio-economic effect on households' income to fulfill nutritious food, home improvement, education or other family needs and finally leads to financial problem and family breakdown. It also affects working hours, causes absenteeism from work, absenteeism from class and poor academic performance of the students and unemployment (Amsalu et al., 2017; Beyene et al., 2017; Ng'ethe, 2015; Muluneh, 2018).

The consumption of khat leaves is mostly practiced by adults in all regions and ethnic groups. Hence, most khat chewers are adults and exist in the active production stage, country labor force economic production, and chewers' livelihood situation remains questionable. This implies reducing number of chewers through identifying and reducing determinants is essential.

Literature has revealed that a number of factors cause the increased khat consumption in different regions of Ethiopia. Among them are normalization in the community, social mobility to most khat chewing community, perceived non -side effect, affordability, type of occupation and availability of khat leaf in the whole year (Haile et al., 2015; Megerssa et al., 2014). Likewise, joblessness, less family level control of khat chewing, absence of social banned mechanism, khat chewing as indicator of city boy at higher educational institutions, lack of interest to work and family dependence are factors that increase the number of chewers (Muluneh, 2018). Besides, limited attention on the socio-economic and health consequences and absence of government

interference to control consumption cause the expansion of khat in Ethiopia.

Gurage Zone, which is one of the large khat producers in the country, is one of the potential areas in which khat is largely produced and consumed in Ethiopia; it has many chewers in both urban and rural areas. Wolkite, which is the capital town of Gurage zone, has a great number of chewers. A lot of chewers are observed in the town. As a result, it is essential to study the causes of the increased number of chewers and provide information for the required stakeholder. Therefore, this study was aimed at identifying factors influencing the increased khat consumption habit of households in Wolkite town, Guragea Zone, Ethiopia.

MATERIALS AND METHODS

Description of the study area

The study was conducted in Gurage Zone. Its geographical location is from 7° 44' 46" to 8° 28' 29" N latitude and 37° 27' 30" to 38° 42' 42"E longitudes. Wolkite town is located in Guragea zone of Southern Nations, Nationalities and Peoples Regional State (SNNPRS), Ethiopia (Figure 1). It is the capital town of the zone and located at 158 km South of Addis Ababa on the way to Jimma town and 427 km from the regional city, Hawassa. The population is estimated to be 41988 (GZEDD, 2015). Khat is chewed in Wolkite town among all regions and ethnic groups. Khat is easily accessible to the users; the users are able to get it at low cost and whenever needed and it leads to the prevalence of khat chewing in the study areas (Figure 1).

Data source and collection methods

Both primary and secondary data sources were used to conduct the study. Primary data were collected by using pre-tested semi-structured interview schedule. The primary data collected were on khat prices, amount of expenditure for khat purpose, monthly income, educational level of respondents, employment status, influence of peers for khat chewing, perceived benefit from khat, and other socioeconomic variables assumed to affect khat chewers' chewing decision and level of khat consumption. Likewise, secondary data were used for cross checking the study result from previous empirical literature and that obtained from different journal and websites.

Sampling method and sample size

The target populations for this study were individual khat chewers, khat traders and producers who participate in khat market in Wolkite town. A random surveying at khat chewing houses and

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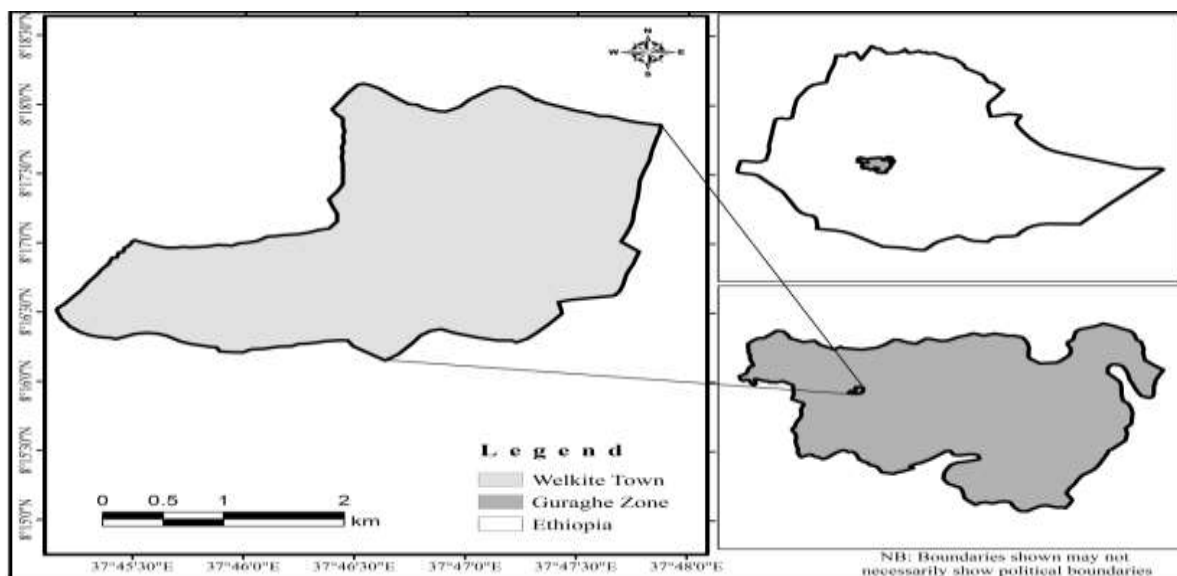


Figure 1. Location map of the study area.

market place in Wolkite town was used to collect primary data. The sample size for this study based on what most statisticians and econometricians consider to determine optimal sample size for regression (sample size (m) is 10 or more times the number of relevant independent variables) in a given model (Green's, 1991). Thus, based on the above justifications, a sample size of 110 sample respondents was drawn for generalized findings.

Method of data analysis

Two types of data analysis methods, namely descriptive statistics and econometric models were used for analyzing the data collected from individual khat chewer, khat traders and market supplier producers. Stata software version 13 was used to analyze the data.

Discriptive method of analysis

Descriptive and inferential statistical analysis method such as mean, proportions, percentages, t-test and chi-square test were used in the process of examining and describing farm households' socio-demographic variable and to evaluate the existence of significant difference in these variables among khat chewers and non-chewers.

Econometric model specification

The dependent variables analyzed in this study are to determine the consumption decisions of individuals and intensity of consumption, simultaneously. Heckman two-stage approach Tobit model and double hurdle model have been mostly used to determine such type of response variable (Komarek, 2010).

Heckman regression is made for incidental truncation, where zero reflecting missing value, that is, unobserved value or not

selected (Ricker-Gilbert et al., 2011). However, zero value in market, consumption and agronomic conditions revealed households' rational choice rather than missing value which is contrary to what is assumed by Heckman (Byron et al., 2012). Likewise, in this study zero value represents respondents' rational choice to chew rather than missing values.

Tobit regression model is applicable when the dependent variable is available only for some observation and when the consumption decision and intensity of consumption assumed to be interdependent. Recent empirical analyses have shown the inadequacy of the standard Tobit model in cross-sectional analysis of special commodity like tobacco consumption, stressing the relevance of a double hurdle approach for microeconomic analysis of such commodity consumption (Garcia and Labeaga, 1996; Yen and Jones, 1996). This may be due to the reason that in special commodity like khat and tobacco, the consumption decision may not depend on price and income and in this case the determinants of the two decisions are allowed to differ.

As stated in Cragg (1971) Double-hurdle model assumed that two separate hurdles must be passed before a positive level of consumption can be observed. This implies Double hurdle model is the right choice if the two decisions are determined by different sets of explanatory variables. Due to this reason Double hurdle model was chosen for analyzing the determinants khat consumption decision (first hurdle) and intensity of khat consumption (the second hurdle). Likewise, according to Berhanu and Swinton (2003) log-likelihood ratio test that compares the tobit and the sum of Probit and truncated regression model showed Double hurdle as best fit than Tobit.

For this study, the intensity of khat consumption was measured by the amount of money spent for khat chewing purpose per month by individual's chewers. Therefore, this variable is taken as continuous limited dependent variable. It can be zero or some value greater than zero.

The econometric specification of the Double hurdle model assumed that both hurdles are to be linear in the parameters (α , β),

Table 1. Definition and hypothesized variables to influence probability and level of khat consumption.

Dependable variable	
Probit Model (1 = chewed, 0 = otherwise)	Excepted sign
Truncated Model (Amount of money spent for khat consumption per month in birr)	
Independent Variable	
Age of respondents (Age)	Negative
Sex of respondents (1 if male, 0 Otherwise)	Positive
Educational status (Education in formal years of schooling)	Negative
Income (Income)	Positive
Marital status (1 if married, 0 if not)	Positive/ negative
Religion (1 if Muslim, 0 if others)	Positive
Employment status (1 if employed, 0 unemployed)	Negative
Perceived benefit (1 if perceived, 0 otherwise)	Positive
Price of Khat (ETB)	Negative
Peer influence (1 if yes, 0 if not)	Positive
Work environment (1 if susceptible, 0 otherwise)	Positive
Family acceptance (1 if okay, 0 otherwise)	Positive

Source: Literature reviewed.

with disturbance terms u and v randomly distributed with a bivariate normal distribution. The matrices z and x include the variables that are assumed to influence consumption decisions and intensity of consumption, respectively. According to Jones and Pudney (1989), the bivariate model can be written as:

i) Observed consumption

$$Y_i = d \cdot y_i^{**} \quad (1)$$

ii) Participation in chewing decision

$$w_i = Z_i' \alpha + u_i ; u_i \sim N(0, 1) \quad (2)$$

$$d = \begin{cases} 1 & \text{if } w > 0 \\ 0 & \text{otherwise} \end{cases}$$

iii) Level of Khat consumption equation

$$Y_i^* = X_i' \beta + v_i, v_i \sim N(0, \delta_1^2) \quad (3)$$

$$Y_i^{**} = \begin{cases} Y_i^*, & \text{if } Y_i^* > 0 \\ 0, & \text{otherwise} \end{cases}$$

Where: w_i is unobserved (latent) variable for the participation decision in Khat Chewing practices, d is the observed discrete decision of the individuals whether he/she has participated or not in Khat chewing practices.

The subscript i refers to the i^{th} household, Z_i 's are the index of explanatory variables determining the participation decision of the individuals in Khat chewing practices, α 's refers to the index of parameters related with explanatory variables determining participation decision of the individuals, u_i is the error term of the participation equation which is normally distributed ($u_i \sim N(0, 1)$), with zero mean and variance one, Y_i^* is unobserved (latent) variable for the level of Khat consumption, Y_i^{**} is the observed amount of money spent for khat chewing purpose per month, X_i 's

are the index of explanatory variables determining the level of Khat consumption by the chewers, β 's refers to the index of parameters related with explanatory variables determining level of Khat consumption by the chewers, v_i is the error term of the level of Khat consumption, which is normally distributed (level of Khat consumption by the chewers, $v_i \sim N(0, \delta_2^2)$) with zero mean and constant variance.

As shown above, a positive level of Khat consumption y is observed only if the respondent is a potential chewer ($d = 1$) and actually consumes khat (y^{**}). In this respect double-hurdle model is different from Heckman selection model (Heckman, 1979), in which zeros are not affected by the consumption decision, observed zero expenditures are the result of both consumption decisions and potential chewer may have zero khat expenditure.

Definitions and hypothesis of variables

Dependant variables

Khat consumption decision: A limited dependent variable taking value of 1 if the individuals chew khat and 0 if not. It is used to identify the factors determining the khat consumption decisions.

Intensity of Khat consumption: It is a continuous variable measured in the average amount of money (expenditure) that individuals (chewers) used up for Khat chewing purpose. It represents the actual average monthly amount of money incurred for purchasing Khat in Birr (ETB) by sampled individuals in surveyed year.

Explanatory variables

Based on economic theory and empirical studies conducted before, the following explanatory variables were hypothesized to affect consumption level of individuals and summarized in Table 1.

Table 2. Summary statistics, mean comparison and proportion test (chi-square test) among chewers and non-chewers.

Total observation =110		Non-chewer =28	Chewer =82	T- value	
Continuous variable		Mean	Mean	Mean	
Age		37.97	42.85	36.30	6.55***
Income (ETB)		2664	2848	2598.76	249.51
Education		5.009	7.55	4.03	3.51***
Dummy variable		Percentage	Percentage	Percentage	Chi² value
Sex (Male %)		90.09	85.71	92.68	-0.069
Marital status (Married %)		70.90	53.57	76.82	-0.232**
Religion (Muslim %)		70.00	60.71	73.17	-0.124
Employment status (Employed %)		64.54	85.71	57.31	0.283 ***
Peer influence (Influenced %)		50.09	42.85	64.63	-0.217**
Family acceptance in khat (positive %)		51.18	42.85	54.87	-0.120
Work environment (Susceptible %)		62.72	42.85	69.51	-0.266**
Perceived benefit (Beneficial)		47.27	28.57	53.65	-0.250**

** and ***, shows significant at 5 and 1% level.

Source: Own computation from survey data, 2017

RESULTS AND DISCUSSION

Socioeconomic characteristics of sample respondents

The collected data from 110 sample respondents are analyzed to depict the demographic, economic and characteristics of khat chewers in Wolkite town. Among the sampled respondents, 74.55% were khat chewers while 25.45% were non – chewers. The mean age of non-chewers was 42.85 years and that of chewers was 36.30 years; there was a significant mean difference between the non-chewers and chewers and was significant at 1% significant level. Based on the result the mean age of non-chewers was higher as compared to chewers and most chewers' were youths in the study area. Regarding educational level, the average educational level of respondents in year of schooling for non-chewers was 7.55 years, which is greater than chewers which were about 4.03 years; it was significant at 1% significant level (Table 2). This is due to the reason that individuals become wise in making decision and allocating income as they spent more years in formal education.

About 53.57% of the non-chewers and 76.82% of the chewers were married. The result revealed there were proportion difference between chewers and non-chewers in terms of marital status and it was significant at 5%. Likewise, the analysis on proportion of households on employment status implied that about 85.71% of non-chewers and 57.31% of chewers were employed and

there is mean proportion difference between two groups and it was significant at 1 % significant level. Moreover, there is significant mean proportion difference regarding peer-influence, working environment susceptibility and perceived benefit from khat chewing between chewers and non-chewers and it was significant at 5% significant level

Factors affecting consumption decision of Khat

The result presented in Table 3 shows the output of double hurdle model (probit part) estimated. The probit regression result showed that out of the ten explanatory variables, five explanatory variables namely respondent's age, religion; educational status, peer influence and perceived benefit from chewing were found significantly determining the consumption decision of the individuals in Khat chewing at different significance levels.

Age of respondent

This variable had negative and significant effect on the household decision to chew khat and it was significant at 5%. An increase in the respondents' age by one year decreases likelihood of khat consumption by 4.8%, other factors being constant. It implies older individuals may be deciding to wait for not chewing in order to deal with their family cases unlike younger that may be sensitive to do

Table 3. Estimated part of double hurdle model.

Variables	1 st hurdle Coefficient	Rob Std. Err.	Marginal Effect	2 nd hurdle Coefficient	Robust Std. Err.	Z
Sex	0.65	0.542	0.656	0.001	0.19	0.01
Age	-0.04**	0.019	-0.048	-0.003	0.005	-0.64
Marital status	0.43	0.358	0.431	0.04	0.112	0.36
Religion	0.58*	0.345	0.584	-	-	-
Education	-0.10***	0.041	-0.108	-0.02**	0.011	-2.05
Employment	-0.38	0.360	-0.380	-0.28**	0.113	-2.54
Family acceptance	0.05	0.339	0.046	-	-	-
Work environment	0.46	0.337	0.467	0.19*	0.102	1.95
Peer influence	0.54*	0.321	0.536	0.01	0.099	0.14
Perceived benefit	0.77**	0.333	0.773	0.15*	0.092	1.67
Income (log)	-	-	-	0.22***	0.075	2.98
Khat price(log)	-	-	-	-0.68***	0.208	-3.28
Constant	1.19	1.005		7.13***	1.153	6.19
N		110				
Wald chi2(10)		30.35				
Prob > chi2		0.0007				
Log likelihood		-80.495				

*, ** and *** indicates significant at 10 and 1% respectively.

The 1st hurdle in the above table refers probit part and the 2nd hurdle refers the truncated part of double hurdle model.

Source: Own computation from survey data, 2017.

what they observe in their life and khat chewing. Study by Awel et al. (2016) is in confirmation with this finding.

Religion of respondent

It had a positive and significant effect on the decision of respondent to chew khat and it was significant at 10%. Thus, a shift from Christianity to Muslim religion would increase the likelihood of khat consumption by 58.4%, keeping other factors being constant. This result is in line with those of Berhanu et al. (2014).

Educational levels of respondent

As expected, it affects khat consumption decision of individuals negatively and significant at 1%. A unit increase in educational level in formal years of schooling decreases the likelihood of khat consumption by 10.8%, keeping other factors being constant. The result implies education enhances individual knowledge in social, economical and health related cases and those educated individuals may be keeping them from chewing khat. This is in line with the finding of Muluneh et al. (2018) who revealed that integrate education of the potential

health problems of khat chewing is important to reduce the number of chewers.

Peer influence

As hypothesized, it had positive and significantly influenced the khat consumption decision at 10% significant level. The result revealed that as individuals become influenced by peers would increase the likelihood of khat consumption by 53.6% compared to those not individuals not influenced, keeping other factors being constant. This is in line with the finding of Awell et al. (2016).

Perceived benefit from chewing

Expected benefit from chewing khat significantly determined khat chewing decision and it was significant at 5% probability level. Individuals who perceived benefit from chewing khat, about 77.3% more likely to chew khat relative to individuals who did not perceive any benefit from chewing khat, keeping other factors being constant.

The truncated part of Double hurdle model regression result in Table 3 showed that out of the ten explanatory

variables, six explanatory variables namely employment status, working environment/condition; educational level, monthly income, average price of khat and perceived benefit from chewing were found significantly determining the intensity of khat consumption.

Educational level

As hypothesized the educational level of chewers negatively and significantly influences the intensity of khat consumption at 5% significant level. As educational of individual is increased by one year in formal education, the intensity of khat consumption decreases by 2%. It implies that as educational level of respondent increases, knowledge on socio-economic effect and associated effect of khat is enhanced and this discourages them from chewing.

Employment status

As expected of individual employment condition is significantly and negatively determining the intensity of khat consumption and it was significant at 5%. The amount of expenses of khat increases by 28% if the chewers are employed as compared to its counterpart. The result implies as chewers become employed, less time available for chewing and thereby the amount of money spent for khat chewing purpose may decrease.

Working environment

It affects the intensity of khat consumption positively and significantly at 10% probability level. The amount of money expense for khat chewing purpose is increased by 19% if the individuals are employed in environment susceptible for khat as compared to its counterpart. It implies that building safe working environment that is not susceptible for chewing has the great potential on reducing khat chewing expenditure and thereby has high potential for increased production by increasing working hours and reducing absenteeism.

Perceived benefit from chewing

As expected perceived benefit from chewing was found to positively and significantly affect intensity of khat consumption at 10% probability level. The amount of money spent on khat increases by 15% if the chewers perceive any benefit from chewing khat as compared to its counterparts. This result implies that individual

who expects benefit from khat chewing may always tend to chew khat to do something and his psychology would become khat dependent and this increases expenditure on khat.

Income (log)

Monthly income of individuals significantly and positively affects the intensity of khat consumption and it was significant at 1% significant level. The result revealed that, 1% increase of income of chewers is associated with 0.22% increase in amount of money spent on khat consumption, holding all other factors constant. This implies that chewers with larger monthly income were more likely to engage in khat market frequently as buyers.

Khat price

Average price of khat per punch also positively and significantly affects the extent of khat consumption at 1% significance level. One percent increase in the price of khat decreases the amount of money spent for khat consumption by 0.68%. The higher the price of khat, the less the amount allocated for khat chewing thereby decreasing the intensity of khat consumption, all other factors being kept constant.

CONCLUSION AND RECOMMENDATIONS

Khat chewing (*Catha edulis* Forsk) is dominantly known in certain areas of Ethiopia including Wolkite town. The study found that the decision to chew khat was negatively influenced by age and education level of respondents and also positively influenced by religion, peer- influence and perceived benefit from chewing. And also the intensity of Khat consumption was negatively influenced by employment status, educational level and khat price while positively influenced by, working environment, monthly income and perceived benefit from chewing.

It is recommended to strengthen the provision of formal education, encourage youths' knowledge through different training and experience sharing, facilitate a program to provide especial education on socio-economic and health consequences of khat chewing to primary, secondary, preparatory and university students as done for HIV AIDS, reduce unemployment through providing option job opportunities, strengthen the provision of a choice of sport station and facilities to the society, and enhance safe working environment for khat chewing to be done by required stakeholders.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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