QAT EXPENDITURES IN YEMEN AND DJIBOUTI: AN EMPIRICAL ANALYSIS

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ABSTRACT

Using household surveys from Yemen and Djibouti, the paper analyzes determinants of qat consumptions in two countries. The results confirm huge importance of qat in daily life: with between one-half (in Djibouti) and 70 percent (in Yemen) of all households reporting at least one user. But in Yemen, qat consumption is remarkably flat across income groups, age, and between rural and urban areas. Qat is a normal good and there is no indication that its use substitutes for food. In Djibouti, however, qat consumption increases with income, and appears to act as a substitute for food consumption. In both countries however there is a strong gender bias in the use: men are much more likely to use qat than women.

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"When you chew Qat, you are on the top of the planet,
but after you spit it out, the planet is on the top of you"
A Somali proverb

"We are young but we have no future. Qat lets us forget that"
A Somali youth quoted in Stevenson (1992)

1. Introduction: the case of qat

Although addictions play a large role in the life of many communities, and by definition in the lives of the addictees, there is little systemic economic research of their effects. There are several reasons for this. Some additions involve the use of illegal substances. They are, therefore, unlikely to be revealed to the interviewers, and while ultimately, when the addictees require medical help, the data on individual cases may be gathered, no large scale survey data are likely to be available. This explains why relatively little work on economics of addiction and drug production and consumption exists in the literature. For example, an EconLit (economics reference software) search of "drugs" and "addiction", and "alcohol" and "addiction" turns up a combined total of 276 references, while a search of "corruption" generates 2828 records, and "AIDS" 1319 records. [2]

The work that does exist deals mostly with various forms of addiction in developed countries, and in particular the United States. Starting with the model of "rational addiction", defined by Becker and Murphy (1988), there have been a number of studies. The Becker and Murphy model aims to explains an apparently irrational behavior (addiction) by assuming that individuals are rational, welfare-maximizing agents. The essential characteristic of an addictive good is that utility derived from its current consumption is a function of the stock of past consumption. It has generated empirical studies of tobacco consumption (Becker, Grossman and Murphy, 1991), alcohol (Grossman, Chaloupka and Sirtalan, 1998), cocaine (Grossman, Chaloupka and Brown 1996; Fryer, Heaton, Levitt and Murphy 2005), marijuana (Pacula 1997). The alternative

[2] Search done on August 15. 2006.

to the model of rational addiction questions the model's postulate of individual as a fully-informed rational decision-maker not riven by internal contradictions. Herrnstein's (1991) alternative model is grounded in behavioral psychology, where individuals' knowledge of the environment they face and the means to maximize welfare are imperfect. Instead of attempting to maximize welfare, they settle for "meliorating strategies." Going further from economics into psychology, there is a model by Ainslie (1986, 1991, 1993) where personality is decomposed into several "motivational states" or personae. Individuals therefore behave differently depending into which motivational state they find themselves in. Mochrie (1996) tries to combines Ainslie's view of individual as driven by different personae within himself with Becker and Murphy's theory of rational addiction.

Similar studies do not exist in poorer countries mostly because of lack of survey data; longitudinal surveys that are often needed are even less likely to be available. The exception are studies of tobacco use (for a review see Jha and Chaloupka, 2000; and Chaloupka, Jha, de Beyer and Heller, 2004). Dearth of work on addiction is in clear disproportion to how important different addictions are for the welfare of people, or even for the economies of many countries (Colombia, Venezuela, Yemen, Ethiopia).

This paper tries to fill parts of the gap by studying factors associated with qat consumption—based on "one-shot" household surveys from Yemen and Djibouti. The economic data from these two countries have been scant in many areas, and even more so in the area of household consumption (which requires survey information). To my knowledge, this is the first time that such data (for Yemen and Djibouti) have been collected and analyzed.[3] However, the data limitations are quite severe. The surveys, whose main objective was to estimate overall level and distribution of consumption—not to focus on qat—consider qat simply as one of the items consumed by households. Very little additional information is provided, including the fact that prices or unit values are unavailable. Some of the household characteristics, that may be regarded as possibly

[3] Actually, the Djibouti 1997 survey used here is the first representative household survey ever conducted in Djibouti.

correlated with consumption of an adductive substance, are similarly absent. Finally, the two surveys' designs are different and the findings are not directly comparable (we return to this topic in Section 2). This is why the results should be regarded rather as two separate snap-shot pictures with elements in common than a true comparative study. The objective is not to test any of the models mentioned above (which often require panel data), nor to look at the taxation policy that may be used to discourage consumption of qat, but much more modestly, to present associations between various household characteristics and consumption of qat in Djibouti and Yemen.

Qat is a very popular hallucinogen. Qat is produced in the South of the Arabian peninsula, mostly in Yemen, and East Africa (Ethiopia and Somalia). "Qat is a 10 to 20-foot flowering evergreen shrub or small tree native to East Africa and Southern Arabia. The fresh young leaves of the Catha Edulis shrub, have traditionally been consumed where the plant is cultivated, primarily in East Africa and the Arabian peninsula. Chewed in moderation, qat alleviates fatigue and reduces appetite. Compulsive use may result in manic behavior with grandiose delusions or in a paranoid type of illness, sometimes accompanied by hallucinations (see Pantelis, Hindler, and Taylor 1989). It contains a number of chemicals among which are two controlled substances, cathinone (Schedule I) and cathine (Schedule IV). As the leaves mature or dry, cathinone is converted to cathine which significantly reduces its stimulatory properties. Cathinone is approximately 10 more times more potent than cathine and is only present in fresh leaves."[4]

Map below shows the area where qat is produced and consumed. The use of qat predates coffee, which was also originally from the same area, and qat is used in a similar social context. The qat consumption, however, generally takes longer than that of coffee, and sessions often extend for several hours. "Qat is used by the lowliest goatherd and loftiest government minister. It defines the rhythms of the day. Government offices close at 2 p.m., allowing plenty of time to chew .... [qat chewers] sprawl on cushions, puffing on water pipes or cigarettes and sipping from water bottles to combat the dehydration

[4] Quoted http://www.streetdrugs.org/khat.htm. Both cathinone and cathine are "controlled" (not banned) under the United Nations Convention on Psychotropic Substances 1971.

that is one of the qat's side effects. Conversation, which flows rapidly at the outset, wanes as the qat begins to take effect and the chewers approach "Solomon's hour", an introspective time that is often accompanied by the playing of the oud. The typical session lasts from three to four hours, after which the chewer spit out his wad of qat-mulch and goes home." (Lancaster, 1997). "Qat chewing begins in the early afternoon and extends well into the night. After a good long chew, punctuated by gossip, locally bottled cola drinks and imported cigarettes, qat users can find themselves wide awake into the wee hours, and groggy when morning comes and duty calls" (Cross, Najafi, no date).

Qat's international status is ambiguous: in the United States, France, Sweden etc. it is considered a drug and is illegal, but is not on the UN's "Single convention of narcotic drugs" (even if both key chemicals contained in qat are "controlled"). In some countries, like the UK, it is on the list of "watched substances": its imports are free, but its consumption is "watched" meaning that it is considered acceptable so long as it is consumed within the traditional foreign communities (e.g. Yemenis in the UK). In the Horn of Africa, qat is accepted, the way that alcohol, for example, is accepted in the West. Yet qat production and consumption statistics are either not included, or included only in part, in countries' national accounts. Because of the importance of qat production and consumption in Yemen, Ethiopia, and Somalia, this imparts a downward bias to their GDPs.[5] Moreover, qat often represents one of key exports. [6]

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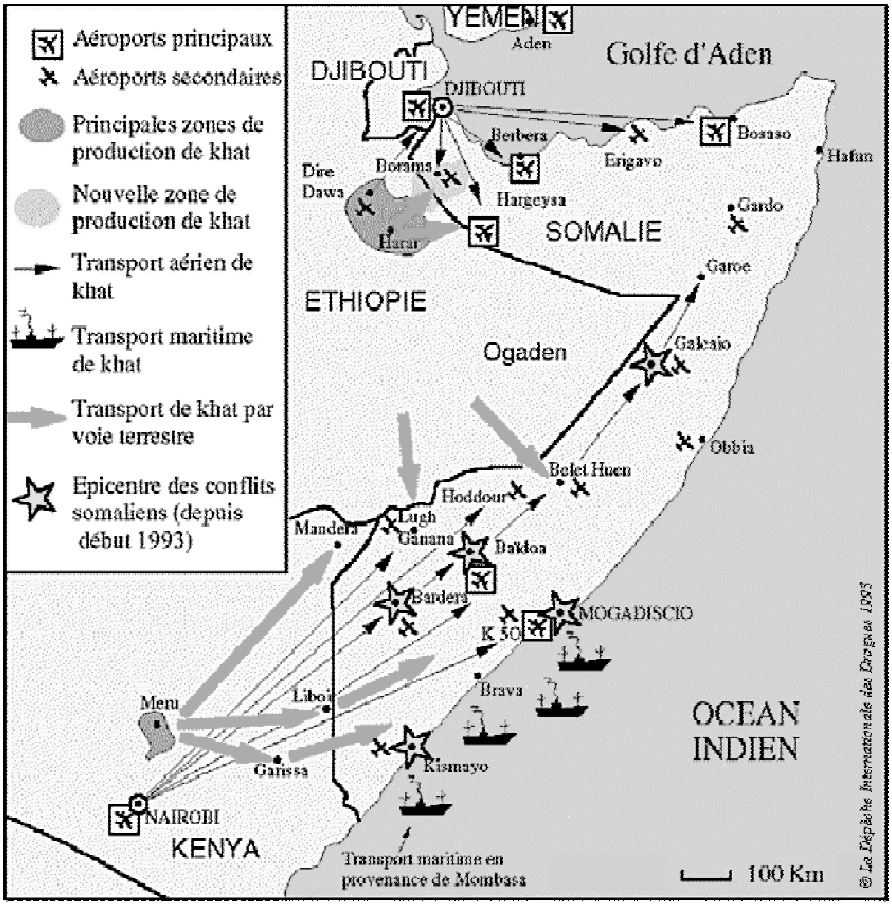
[5] The World Bank 2001 estimate for Yemen was that qat production amounts to up to a quarter of registered GDP and 16 percent of employment (see World Bank, 2001, p. 7; Ward 2000, p. 19). Qat is grown on more than 50 percent of cash-crop agricultural land (see World Bank Yemen Office, 2001, p. 6).

[6] In Ethiopia, recorded qat exports account for 12-14 percent of all exports (see International Monetary Fund, 2000, p. 53).

Figure 1. Production and distribution of qat in the Horn of Africa



Source: http://www.ogd.org/fr/21ASORLA.html.

Importance of qat in Djibouti and Yemen. As Djibouti is not producer of qat, it imports qat from Yemen, Ethiopia and Somalia. It is estimated that imports from Ethiopia (through the sole authorized Djibouti importer *Sofic*) are approximately 10 tons of qat daily. [7] The price of qat is set by an inter-governmental accord between Ethiopia and Djibouti. As of 1998, the ex-factory price was $3 per kilo, which is less than 1/10th of the US street price: the latter ranges between $30 and $60 per kilo. There are also large imports from Yemen (about 2 planeloads by week). Total Djiboutian imports for

[7] "Qat commerce in Ethiopia is booming" from http://www.telecom.net.et/~usis-eth/wwwhekha.htm.

domestic use (i.e. excluding large re-exports out of Djibouti) are about $200 million annually. Thus qat imports account for about 1/10th of total country's imports.

Despite the obvious importance of qat consumption in several countries in the Horn of Africa, there are no empirical studies on its consumption: who are the consumers, how much they spend on it, how consumption of qat is related to income of households etc. This lacunae can now begin to be filled thanks to the existence of two recent household surveys conducted in Yemen and Djibouti. The organization of the paper is as follows. Section 2 reviews the data base—household budget surveys conducted in Yemen in 1998 and Djibouti in 1997. Section 3 provides a profile of qat users in the two countries. Section 4 focuses on the distribution of qat expenditures and income. Section 5 derives demand functions for qat consumption, and looks at the substitution between qat and food consumption. Section 6 presents the conclusions.

2. Data sources

There are two detailed sources of data for our analysis: Yemen household survey conducted in 1998, and the Djibouti household budget survey conducted between February and July 1997. In both cases, we have access to micro data, although in the case of Yemen, we have access to only a limited number of questions, and the accompanying documentation (including the questionnaire) is very weak. While the Djibouti survey is more detailed so far as qat-related questions and nutritional and schooling information are concerned, the Yemeni survey covers more extensively household characteristics, incomes and expenditures. This unbalance in surveys' coverage has necessitated that some issues be discussed for one country only. However, special effort was made to focus on the issues that are common to both and thus to gain additional insight—although a number of caveats regarding comparability exist.

The Yemeni household survey includes 13,641 households or 97,544 individuals (the average household size is 7.15). This represents about 0.6 percent of the country's population. The survey is nationally representative. Households are interviewed over the period of four weeks during which they report their expenditures and income. However,

as already mentioned, on the issue of qat consumption the survey is not very extensive. There is only one question on the value of household monthly qat purchases. Money expenditures on qat represent 5.7 of total money food expenditures (or 5.2 percent of all food: purchased, own consumed, or received as gift). There is no information however on qat that may be produced and consumed at home nor on qat received as gift. There is thus underestimation of true qat consumption. The underestimation may be significant. An idea how large the underestimation may be is provided by the share of purchased in total food consumption which is 91 percent.[8] Another serious source of underestimation (both in Yemen and Djibouti) may be the reluctance of those who are interviewed to provide information about qat use or to intentionally claim lower consumption.

In Djibouti Household Income Survey (*Enquête Djiboutienne auprès des menages*, EDAM), conducted by the Djibouti Bureau of Statistics between February and July 1997, we have a truly unique source of information on the use of qat. The survey is nationally representative of the sedentary population of Djibouti, and includes 2,380 households from rural areas, urban areas outside the capital, and the capital. There are in total 15,701 individuals (average household size 6.6) which is almost 2½ percent of the total population of Djibouti.[9] The data are available at the household and individual level. The survey questionnaire contains information typical for priority surveys. It includes data on expenditures by ten expenditure categories, sources of income, and quite a lot of data on school attendance, housing conditions, visits to doctors. Several attitudinal questions were asked as well: household members were asked to assess how satisfied they are with education, health system, household amenities etc. As for the qat consumption, respondents were asked how many qat users there are in their household, what is their sex, and how much they consume.[10] Individual qat users are not identified however. Food consumption variable does not include qat consumption.

[8] The questions on food ask for (i) total amount spent on food, (ii) estimated value of home-produced food, and (iii) estimated value of food received as gift. Only the first question is asked for qat.

[9] The population of Djibouti is estimated at between 550,000 and 600,000 persons. The uncertainty is due to a significant number of nomads in the East.

[10] More exactly, the interviewee is asked to give the number of boxes of different values (100 Francs, 300 Frances etc.) consumed over the period of one week.

There are several important differences in the set-up of the surveys that (even if everything else were the same) impose sharp limits to direct comparisons of Yemeni and Djibouti results. The first is the difference between purchased (Yemen) and consumed qat (Djibouti). The latter will be, generally, greater because it includes self-produced qat and gifts received, although it would exclude qat that might have been purchased for later use or given as gift. Second, the consumption reference period in Djibouti is only one week while it is a month in the case of Yemen. In principle, shorter reference period leads to estimates of higher inequality (see Gibson, Huang and Rozelle, 2001) and, in some case, also higher mean (Deaton, 1997, pp. 24-26). Higher inequality stems from many recorded zero consumptions; higher average occurs because people, when asked about consumption over a longer time-period, fail to recall all of it.[11] Third, in Yemen, household (probably household head) is supposed to keep track of (among other things) qat purchases, and in Djibouti, individuals are asked for their own consumption.[12] While the difference in the third element seems minor, the first two will tend to bias both mean consumption and inequality down in the case of Yemen (compared to Djibouti). This point needs to be kept in mind in the rest of the analysis.

3. Who are the users of qat in Yemen and Djibouti?

Table 1 gives the share of households with the presence of qat users by welfare decile. In both cases, the welfare level is determined by dividing total household expenditures by the number of equivalent adults units. The exact formula of welfare of each household member is

$$individual\_welfare = \frac{household\_expenditure}{(household\_size)^{\theta}}$$

[11] Of course, calculated over the same time period. Thus a weekly consumption will be multiplied by 4.3 to obtain a corresponding monthly consumption.

[12] Although in practice it does not seem to have been followed: rather household heads gave their estimates of how much other members consumed.

where the economies of scale parameter (θ) is taken to be equal to 0.75. The θ=0.75 parameter is the scale used in the World Bank Djibouti Poverty assessment (1997), and is thought appropriate for large households (6 to 7 members) which is, as we have seen, characteristic of both Yemen and Djibouti. We use expenditure as the welfare indicator in preference to income because the former is considered a better indicator of household actual welfare, and because underreporting is less of a problem with expenditures than with income. However, for simplicity the terms welfare level (which would be strictly speaking appropriate because we deal with expenditures) and income level will be used interchangeably.

Table 1 shows that in Djibouti, there is a clear trend of increase in the number of qat users with income. While among the bottom decile, only 7 percent of households report spending anything on qat, the percentage rises to more than three-quarters among the richest households. In Yemen, however, there is less variability in the incidence of use by welfare level. Although the share of users goes up with welfare, it never falls below 62 percent, and never exceeds 81 percent. On average, 50 percent of households in Djibouti, and almost 70 percent in Yemen report using qat. The high registered incidence in Yemen is still somewhat of an estimate because of likely existence of households that use only self-produced qat. Clearly, we are dealing, in both countries, with a major social phenomenon affecting lives of most of the population. The table also shows the food shares across deciles. They range from 65-69 percent for the poorest decile in both countries, to 28 percent for the richest decile in Djibouti and only 17 percent for the richest decile in Yemen. With the exception of the poorest decile, food shares are always higher in Djibouti than in Yemen (for a given decile) implying that, at a given decile level, people are likely to be better off in Yemen than in Djibouti. This is confirmed by looking at mean expenditures in dollar terms: they amounted to $2,558 per capita annually in Yemen and $1,230 in Djibouti. In $PPP terms, Yemeni mean per capita expenditures are twice their US dollar amount (that is, they are a bit over $5,000 per year). Consumption PPPs for Djibouti are not available. Yet the price level is unlikely to be lower than in Yemen and a significant real difference, to the order of 2-1 in favor of Yemen, is likely to persist.

Table 1. Food shares and incidence of households with the presence of qat users by welfare decile

Welfare decile (according to expenditures per equivalent adult)	Yemen		Djibouti	
	Food share in total expenditures	Incidence of qat users	Food share in total expenditures	Incidence of qat users
First (poorest)	0.69	0.62	0.65	0.07
Second	0.54	0.64	0.58	0.29
Third	0.43	0.63	0.51	0.34
Fourth	0.35	0.66	0.48	0.42
Fifth	0.30	0.69	0.46	0.52
Sixth	0.26	0.68	0.42	0.57
Seventh	0.24	0.70	0.41	0.64
Eighth	0.21	0.74	0.39	0.70
Ninth	0.18	0.76	0.35	0.75
Tenth (richest)	0.17	0.81	0.28	0.71
Average share	*0.26*	*0.69*	*0.46*	*0.50*

Note: Expenditure per equivalent adult are defined as: total expenditures divided by (household size) $^{0.75.}$

Table 2 makes clear that there is very little difference in the incidence of qat use between rural and urban areas of Yemen. The habit seems to be almost equally prevalent and to be only mildly increasing with income level in both areas. The most frequent users are rich urban and rural households with the incidence of about 80 percent.

Table 2. Incidence of qat users in households in rural and urban Yemen

Deciles (according to expenditures per equivalent adult in each area)	Urban	Rural
First (poorest)	0.63	0.62
Second	0.63	0.64
Third	0.59	0.65
Fourth	0.62	0.66
Fifth	0.65	0.70
Sixth	0.69	0.65
Seventh	0.69	0.73
Eighth	0.69	0.75
Ninth	0.74	0.77
Tenth (richest)	0.78	0.84
Average share	*0.67*	*0.70*

Note: Equivalent adults calculated using economies of scale parameter 0.75.

Does use vary with the size and type of household? Table 3 shows that the incidence of use increases with household size. This is expected because with a larger household size, there are clearly more potential users. It is, however, striking that the percentage of users among single-person households in Djibouti is quite small (30 percent). Such households represent only 2.8 percent of all households and their importance is therefore limited.

Table 3. Incidence of use by family size and gender

Household size	Yemen	Djibouti
1	0.38	0.30
2	0.60	0.40
3	0.62	0.40
4	0.68	0.42
5	0.69	0.46
6	0.67	0.49
7	0.71	0.43
8	0.72	0.53
9	0.72	0.61
10+	0.73	0.67
Among all males		0.26
Among all females		0.02
Male-headed households	0.72	
Female-headed households	0.30	

Note: In the Yemen survey, we have no information on the sex of individuals, but only of household heads.

The gender differences are substantial. In Yemen, almost three-quarters of male-headed households (which represent 92 percent of all households) report some spending on qat. Less than a third of female-headed households do the same. It is not inconceivable, moreover, that the gender differences are even larger because the actual users in female-headed households could be men (e.g., sons). The Djibouti data, where we can better distinguish the sex of users, show gender difference to be substantial. More than a quarter of all males are *khateurs,* and only 2 percent of all women.[13]

Table 4 shows the number of male qat users per household (for Djibouti only). There are almost 20 percent of households with more than 1 male qat user per household.

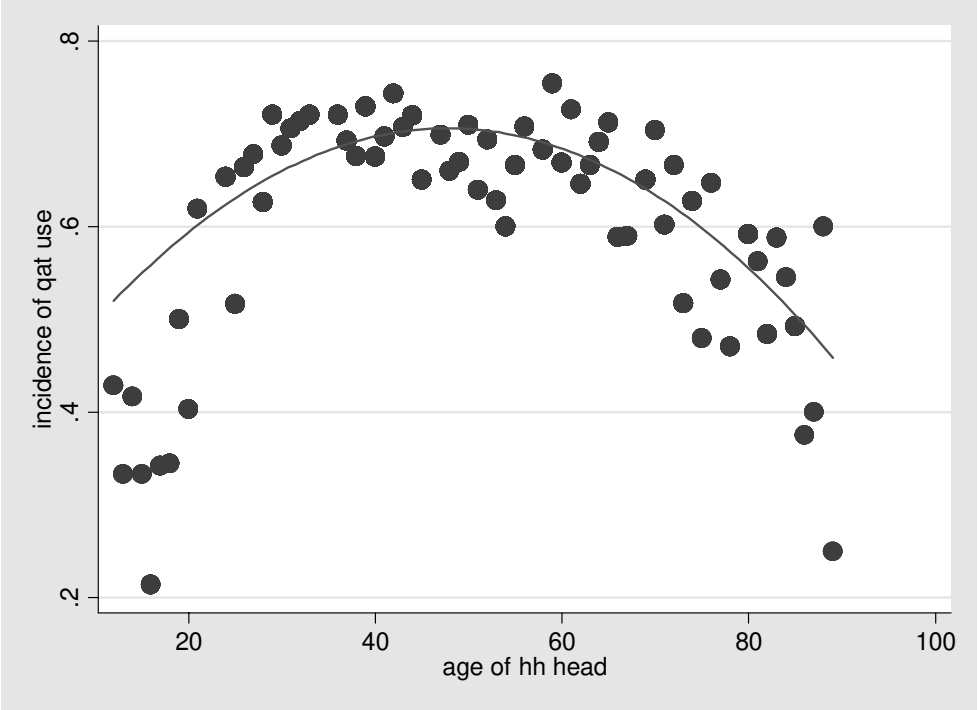
[13] "Khateur" is a French term, used in Djibouti, for a qat-chewer.

Table 4. Djibouti: number of male qat users by household

Number of qat user by household	Percentage of households
0	43.4
1	40.3
2	8.8
3	4.0
4	1.8
5	0.8
6	0.1
More than 6	0.9

The incidence of qat use increases with age and around 40 years of age begins to flatten out. However, the results shown in Figure 2, which refers to Yemen, are based on the age of *household head*. In other words, we are bound to underestimate qat use among young males who live with their parents. One can conjuncture that, if we had data on actual users, the incidence curve in Figure 2 would be flatter. Thus, both the incidence by age, and the incidence by income class, seem high and fairly flat in Yemen.

Figure 2. Incidence of qat use by age of household head (Yemen)



Source: Yemen household survey 1998.

4. Distribution of welfare and qat expenditures

The distribution of welfare (proxied by expenditures), and the distribution of qat use and qat expenditures in Yemen and Djibouti display different patterns. Distribution of welfare is much more unequal in Yemen than in Djibouti: the Gini coefficient of expenditures per equivalent adult (using the same scale with theta=0.75) is 52.3 in Yemen, and only 37.4 in Djibouti.

We have already noticed that in Yemen the incidence of qat use varies but little with income. Therefore the concentration coefficient of qat use is very low: between 3 and 4 points (Table 5). [14] It is not significantly different from the value of 0 which indicates an equal incidence across all income groups. In Djibouti, the situation is markedly different. The incidence of use is more equal than the distribution of income, but is still, in absolute terms, pro-rich (the concentration coefficient of 20).

Table 5. Inequality of welfare distribution and qat consumption

	Yemen			Djibouti
Gini or concentration coefficient	All	Urban	Rural	
Gini of expenditures per equivalent adult (XPEA)	52.3	51.5	51.8	37.4
Concentration coefficient of qat use (ranking acc. to XPEA)	3.9	3.6	4.4	20.3
Concentration of qat expenditures per eq. adult (ranking acc. to XPEA)	26.4	21.3	27.3	47.3

People with higher income are not only more likely to consume qat, they also consume more of it. Thus the concentration coefficients of qat expenditures is much greater than the concentration coefficient of qat use. It is, as shown in Table 5, 26.4 in Yemen and a very high 47.3 in Djibouti (on an equivalent adult basis). The concentration

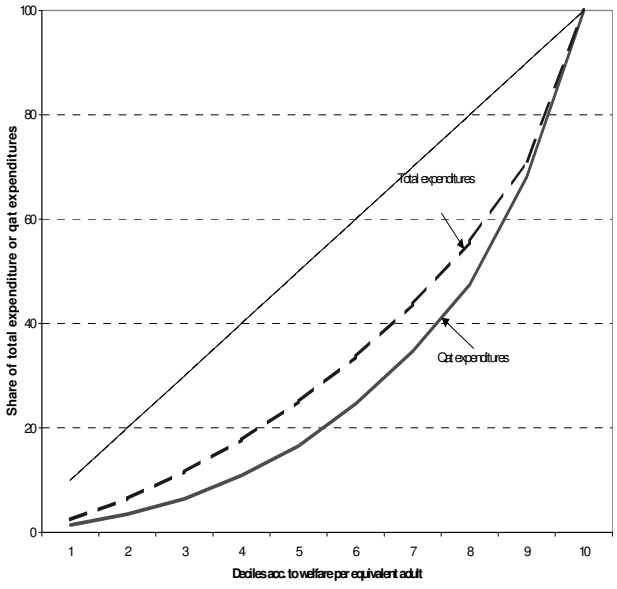
[14] The concentration coefficient describes inequality with which a variable (say, use of qat or expenditures on qat) is distributed when recipients are ranked, from the lowest to the highest, according to another variable (say, their household per capita welfare). The Gini coefficient is a special case of the concentration coefficient when both variables (the ranking criterion one, and the one into whose distribution we are interested) are the same.

curves for qat expenditures are shown in Figure 3. The fact that the concentration curve for Djibouti lies outside the Lorenz curve implies, on average, greater than unitary income elasticity of qat expenditures; the reverse is true for Yemen where the qat concentration curve lies inside the Lorenz curve implying an average income elasticity between 0 and 1 (see Yitzhaki and Lewis, 1996; Yitzhaki and Slemrod 1991). [15] It is another way of saying that qat in Djibouti is a luxury while in Yemen it is a normal good.

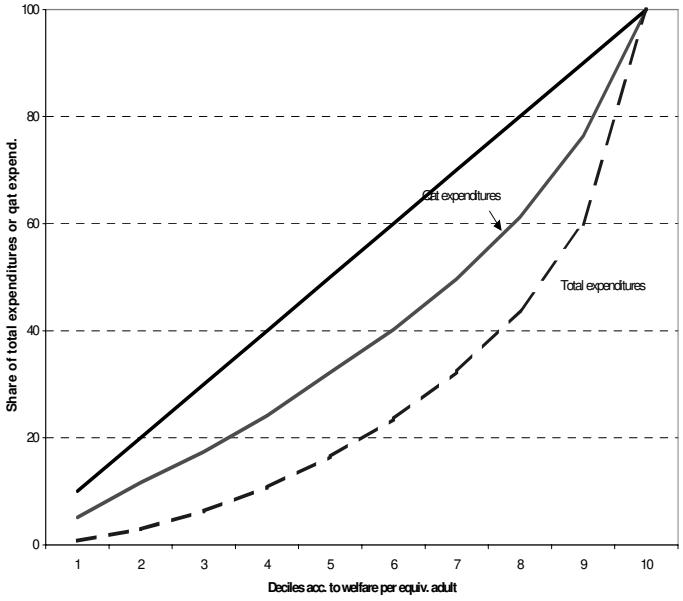
In conclusion, the main difference in qat consumption between the two countries is that in Yemen, compared to Djibouti, consumption is more widely spread, is less sensitive to income level, and is much more equally distributed than income. In Djibouti, in contrast, qat expenditures are more unequally distributed than income.

Figure 3. Lorenz curve and concentration curve of qat expenditures

Djibouti 1997



Yemen 1998



[15] A tax rate applied to a good whose concentration curve lies below the Lorenz curve will be, on average, progressive. This feature was used by Yitzhaki and Lewis (1996) to derive in a multi-commodity framework the rules of taxation and subsidization (or differently, rules for increasing and lowering the existing tax rates) such that the result would be Dalton-improving (that is, the outcome will be such that incomes of poorer individuals increase by at least as much as incomes of richer individuals decrease).

5. Demand functions for qat

The simplest demand functions for qat consumption across households (*i*'s) can be written as

$$Q_i = \beta_0 + \beta_1 Y_i^* + \beta_2 H_i + \sum_j \gamma_j Z_{ji} + e_i \qquad (1)$$

where Q_i = household qat consumption (in logs), Y_i^* = "true" welfare indicator of household (also in logs), H_i = number of household members, and Z_j are other variables of interest (e.g., education of household head, sex of household head etc). We approximate "true" household welfare by expenditures per equivalent adult using, as before, θ=0.75 for both Yemen and Djibouti.

The question is what is the most appropriate way to estimate the regression. Qat, despite its widespread use and tolerance, is not a truly essential food item. It is therefore sensible to model the decision to use qat as a two-step process where people, based on some characteristics, first select to consume (or not), and then, in the second step, decide how much to consume (subject, of course, to having decided to consume at all). This approach makes sense particularly since we are interested in what are the correlates of consumption, once the decision to consume is taken. The regression is estimated using a maximum likelihood Heckman procedure where the first ("selection") regression models the dichotomous decision to engage in the consumption of qat, and the second ("consumption") regression estimates the consumption across those who report positive values of consumption. It is very difficult to find instruments (particularly among the few household-level variables collected by the two surveys) that would affect participation but not consumption. Thus, the same explanatory variables are used in both equations. In principle, the identification is "read off" the difference in the functional form since the selection regression is a probit, and the consumption regression an OLS. [16]

[16] This is, of course, less than ideal since we would prefer to have variables that satisfy the exclusion restriction and thus not to have the identification depend on the assumption about the functional form. Yet, given the data limitation, this is not feasible.

The results of the consumption regressions are shown in Table 7. First, note that, as expected, income elasticity of qat consumption is much greater in Djibouti than in Yemen (about 0.83 vs. 0.25). The former value, however, is less than implied by the concentration curve (Figure 3). The difference is due to the fact that the regression is run only among households that decide to participate (to use qat) while the concentration curve covers all households. The poor people, as we have seen before (Table 1), are much more likely to abstain from qat use altogether and hence across all population qat does acquire some features of a luxury (superior) good which it lacks among consumers only.

Each additional household member increases qat expenditures by 6 percent in Yemen and 7.4 percent in Djibouti (both are statistically significant at less than 1 percent). Male household head (as opposed to female) is associated with large increase of expenditures both in Yemen and Djibouti, ranging between 20 percent (in Djibouti) and close to 40 percent (in Yemen). Clearly, households headed by women are, as we have observed before, mush less qat-dependent.

Due to a richer data basis available in the Yemeni survey, we can include other variables in the regression for Yemen. Age of the household head has a predictable inverted U shape. Urban households in Yemen spend on average one-third more on qat than rural households. This may be due to the omission of data on qat consumption from own production (which is bound to be much more important in rural areas) since the incidence of qat use between urban and rural areas is practically the same (see Table 2).

As for the education level of household head, more education is associated with higher expenditures (holding all other factors, including income, constant). This can be seen from the fact that, compared to those who are illiterate (42.5 percent of household heads in Yemen), most other education categories spend either more or the same. Higher education, perhaps because it involves more socialization, tends to be associated with greater consumption of qat. We certainly see no evidence in these data that higher education levels may be associated with a more wary approach to the use of qat.

A similar picture is provided by the observation that the self-employed and employer household heads tend to spend more on qat than wage workers (the omitted category). Their spending is between 30 and 60 percent greater than that of wage-workers (holding, of course, everything else, including income, constant). Again, we conjecture that this may be because these two categories of people are socially more prominent than wage workers. Employment status might proxy for some characteristics which are not included in the welfare variable. This may be household wealth or household social status that might oblige it to host qat sessions more often. Participating in qat sessions may be also more important for the self-employed and employers in order to establish business contacts or garner "good-will." A picture that thus emerges is not only of a good that is income-elastic but also "social position elastic", *viz.*, whose consumption is associated with a higher socio-economic status, and possibly desire to show it off by entertaining more.

Table 7. Explaining qat consumption

Dependent variable: ln of qat consumption		
	Yemen	Djibouti
ln of expenditures per equivalent adult (=welfare level)	0.250** (0)	0.834** (0)
Household size	0.060** (0)	0.074** (0)
Age of household head	0.013** (0.004)	
Age squared (x100)	-0.0001** (0.001)	
Urban	0.335** (0)	
Male household head	0.382** (0)	0.203** (0)
Educ2 (reads and writes)	0.160** (0)	
Educ3 (primary)	0.082 (0.14)	
Educ4 (unified primary)	-0.135 (0.39)	
Educ5 (preparatory)	0.132* (0.015)	
Educ6 (pre-secondary)	0.273** (0.004)	
Educ7 (secondary)	0.292** (0)	
Educ8 (post-secondary)	0.138 (0.06)	
Educ9 (academic)	0.382** (0)	
Empst2 (self-employment)	0.282** (0)	
Empst3 (employer)	0.582** (0)	
Empst4 (household worker with no pay)	0.023 (0)	
Empst5 (working for others; no pay)	0.783 (0.15)	
Constant	3.74** (0)	0.837 (0.10)
Wald Chi-squared	1806.5 (0)	598.8 (0)
λ	0.004	-0.021
Number of uncensored observations (households)	8087	1151

Note: Yemen: The omitted category is illiterate (for education), and wage workers (for employment status). P values in brackets. Heckman maximum likelihood procedure. The first (selection) regression not shown here but available from the author on request.

A question often asked is whether there may be substitution between food and qat consumption. The reasons lie not only in the fact that greater consumption of qat reduces the amount of money households can spend on food but also that the reduction does not affect all household members the same; namely, fathers who are the main users of qat may deprive their young children of food (through lack of money). Another channel may run through the already mentioned fact that qat acts as an appetite suppressant. It may reduce consumption of food with all the attendant negative effects on the ability to concentrate and work. Indeed it is one of the most commonly alleged problems with qat: that it leads to underconsumption of food and lethargy among its users.

Table 8 tries to estimate whether there is substitution between presence of qat users and food consumption. We do this using several formulations. In formulation (1) for Yemen, we look at the household use of qat (regardless of the amount). We find no evidence that incidence of qat use is negatively related to food consumption. On the contrary, we find a complementary relationship: compared to the households without qat users, the ones with qat users spend some 17 percent more on food consumption (after controlling for household size and income level of household). All the other variables have the expected sign. Similar results are obtained (see regression 2 in Table 8) if we replace the binary variable indicating the presence of qat users by consumption of qat: each percent increase in qat consumption raises other food consumption by 3.2 percent. For Djibouti, on the contrary, we find the evidence of a substitution effect: presence of qat users reduces food consumption (everything else being the same) by 8.7 percent, and each additional percent of spending on qat reduces food consumption by 0.8 percent (see regressions 3 and 4 in Table 8). Perhaps, this is because the income level in Djibouti is lower at almost any percentile of income distribution. Under such exiguous circumstances, increased spending on anything (including qat) might translate into cuts in food consumption. In other words, the margin left for "discretionary" spending (including food) is very narrow. However, we need to stress, as before, that one needs to be very cautious with comparative results since the survey designs are different, and so is the number of household characteristics that we can use as controls.

Table 8. Substitution between expenditures on food and qat
Dependent variable = ln(household food consumption)

	Yemen		Djibouti	
	(1)	(2)	(3)	(4)
ln of expenditures per equivalent adult (=welfare level)	0.149** (0.01)	0.141** (0)	0.653** (0)	0.659* (0)
Household size	0.087** (0)	0.085** (0)	0.108** (0)	0.108** (0)
Age of household head	0.020** (0)	0.019** (0)		
Age squared (x100)	-0.0002** (0)	-0.0001** (0)		
Urban	0.076** (0)	0.066** (0)		
Male household head	0.033 (0.40)	0.003 (0.07)		
Educ2 (reads and writes)	0.274** (0)	0.271** (0)		
Educ3 (primary)	0.273** (0)	0.280** (0)		
Educ4 (unified primary)	0.294** (0)	0.322** (0)		
Educ5 (preparatory)	0.406** (0)	0.411** (0)		
Educ6 (pre-secondary)	0.455** (0)	0.455** (0)		
Educ7 (secondary)	0.541** (0)	0.541** (0)		
Educ8 (post-secondary)	0.547* (0)	0.552** (0)		
Educ9 (academic)	0.801** (0)	0.797** (0)		
Empst2 (self-employment)	0.164** (0)	0.152** (0)		
Empst3 (employer)	0.486** (0)	0.468** (0)		
Empst4 (household worker with no pay)	0.312** (0)	0.313** (0.002)		
Empst5 (working for others; no pay)	0.189 (0.58)	0.162 (0.63)		
Ln(household qat consumption)		0.032** (0)		-0.008** (0)
Qat incidence (0-1)	0.167** (0.01)		-0.087** (0)	
Constant	7.234** (0)	7.317** (0)	4.086 (0)	4.008 (0)
F-value	262.5 (0)	277.0 (0)	1613.33 (0)	1621.46 (0)
Adj R-squared	0.31	0.32	0.68	0.68
Number of observations (households)	11370	11370	2253	2253

Note: Yemen: The omitted category is illiterate (for education), and wage workers (for employment status). Qat incidence takes value of 1 if there is any positive qat consumption. P values in brackets.

6. Conclusions

We have analyzed the results of two household surveys, for Yemen and Djibouti, that both ask households questions related to qat use. Qat is widely consumed in both countries (although it is produced only in Yemen) with between 50 percent (in Djibouti) and almost 70 percent in Yemen reporting at least one qat user per household. This is fully consistent with anecdotic evidence regarding the huge importance of qat in daily life in both countries. Men or men-headed households use it much more than females or female-headed households.

Important differences between the two countries emerge when we move to a more detailed analysis. In Yemen, qat incidence does not vary much with income or age nor does it vary between rural and urban population. We also find no evidence that in Yemen qat consumption depresses consumption of food. The situation in Djibouti is different. Income elasticity of qat use is much greater. Indeed qat is more expensive in Djibouti than in Yemen (due to transportation costs) and Djibouti is a poorer country than Yemen with many poor people who apparently cannot afford it. Unlike in Yemen, we find that in Djibouti qat and food consumption appear to be (mild) substitutes.

The implication of these results, preliminary as they are, is that the use qat is much more widespread and part of social intercourse among all classes and ages in Yemen than in Djibouti. Perhaps because Djibouti is poorer and qat more expensive, it does not seem to have acquired the importance that it has in Yemen. Although our data do not allow us to test any of the different theories of addiction, the findings as well as the reading of the literature on qat in Yemen, suggest that the use of qat cannot be fully understood as an individual decision to use an addictive substance. If the "drug" has so much impregnated society and become part of social relations, refusing to take qat is tantamount to accepting ostracization. This is because social life is organized around qat seances. Thus, the decision not to use qat is not equivalent to the decision to decline drinks at a dinner party; it is much more important because it excludes the person from many social contacts that are necessary for his business or private life, The decision

whether one wants to take qat at first, and later continue its use, becomes indissolubly linked with other decisions about one's way of life. This is also why all action on reducing its use is so difficult.

It is important to underline that because of data limitations and differences in the survey designs, the analysis should rather be seen as a side-by-side picture of characteristics and factors associated with qat use in Djibouti and Yemen rather than a straight comparison between the two. The differences between the two countries clearly need to be investigated further. One may hope that further analytic work may not only help better inform policies of the two governments but make them also more willing to collect and share information with researchers both at home and internationally.

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