

Original investigation

# Assessing Preferences for a University-Based Smoking Cessation Program in Lebanon: A Discrete Choice Experiment

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## Abstract

**Introduction:** Smoking prevalence rates in Lebanon are among the highest in the Eastern Mediterranean region. Few smoking cessation programs are offered in Lebanon and little is known about the preferences of Lebanese smokers for cessation treatment programs.

**Objective:** To establish which attributes of smoking cessation programs are most important to Lebanese smokers.

**Methods:** Smokers at the American University of Beirut were surveyed to elicit their preferences for, and tradeoffs between the attributes of a hypothetical university-based smoking cessation program. Preferences for medication type/mechanism, risk of benign side effects, availability of support, distance traveled to obtain medication, and price of complete treatment were assessed using the discrete choice experiment method.

**Results:** The smokers' responses ( $N = 191$ ) to changes in attributes were statistically significant. Smokers were willing to make trade-offs between attributes. On average, smokers were willing to pay LBP 103,000 (USD 69) for cessation support. Respondents were willing to give up LBP 105,000 (USD 70) to avoid an additional 10% risk of minor side effects and LBP 18,000 (USD 12) to avoid an additional kilometer of travel to the nearest pharmacy. Heavy smokers were the least responsive group and had the lowest demand elasticities.

**Conclusions:** Student smokers were willing to participate in a relatively complex exercise that weighs the advantages and disadvantages of a hypothetical smoking cessation program. Overall they were less interested in the pill form of smoking cessation treatment, but they were willing to make tradeoffs to be smoke-free.

## Introduction

Lebanon ranks second in the Eastern Mediterranean region for adult cigarette smoking prevalence, with rates of 46% among males and 31% among females.<sup>1</sup> By the time Lebanese students enter university,

65% have tried smoking cigarettes, 34% are current smokers, and 7% smoke 11 or more cigarettes per day.<sup>2</sup> Among Lebanese university students, 37% are current cigarette smokers, with a higher prevalence among males (44%) versus females (25%).<sup>3</sup> In addition

to cigarette smoking, waterpipe use has gained wide acceptance among youth, before and during college.<sup>4,5</sup> According to the Global Youth Tobacco Survey, 56% of young smokers in Lebanon wanted to quit smoking and 51% had unsuccessfully tried to quit in the previous year.<sup>6</sup>

These alarming smoking prevalence rates suggest that there is a pressing need to offer smoking cessation programs to students attending Lebanese universities. Lebanon is a 2005 signatory to the World Health Organization Framework Convention on Tobacco Control (FCTC) which stipulates that smoking cessation programs be made available. While some Lebanese hospitals provide smoking cessation programs, there had been no such programs offered at college or university campuses in Lebanon prior to 2011. The American University of Beirut (AUB) launched the first university-based smoking cessation program in Lebanon in 2011. Due to the scarcity of such programs in Lebanon, it is important to assess the demand for them. Therefore, the objectives of this study are to gain additional knowledge about Lebanese student smokers and establish which attributes of smoking cessation programs are most important to Lebanese smokers.

Using a discrete choice experiment (DCE), we analyzed the willingness of student smokers to quit when presented with a variety of hypothetical smoking cessation programs. The basic premise of a DCE is that a good or service, such as a smoking cessation program, can be broken down into a set of attributes. Respondents are given various sets of hypothetical situations in which they must choose between several alternatives. This survey tool allows researchers to assess respondents' stated preferences for health goods or services as well as which attributes they deem most important. Because choices in a DCE are hypothetical, it is unknown whether they reflect actual choices in real life. However, findings from a DCE are still important since they shed light into plausible tradeoffs and can inform policy.

While DCEs have been extensively used to study medical interventions,<sup>7,8</sup> there are still a limited number of publications using DCEs in the area of smoking cessation. Preferences for specific smoking cessation options may be associated with smokers' nicotine dependency, past experiences, or attitudes about price and efficacy of the intervention.<sup>9,10</sup> Although studies from other countries have used the DCE approach to explore preferences for smoking cessation, to our knowledge none have examined smoking cessation preferences in Lebanon or the region.

## Methods

### Theoretical Framework

The DCE technique is based on the theory of value<sup>11</sup> and assumes that individual decisions about a good or service are determined by its attributes.<sup>8</sup> Analysis of DCEs relies on Random Utility Theory, in which individuals know the nature of their utility functions but the researcher cannot observe them.<sup>12</sup> As such, the utility function is modeled using a systematic component and a random (unexplainable) component.<sup>13</sup> In this study, the systematic component in the smoker's utility function was estimated to reveal the relative importance of attributes involved in choosing a smoking cessation program. We included a price of treatment proxy in our choice sets in order to calculate willingness to pay, a monetary measure of value that is useful in determining the relative ranking of attributes and the trade-offs between attributes. The random component of the utility function requires probabilistic analysis of the DCE to predict how changes in attributes affect choices.<sup>13</sup> In this paper, we estimate

the probability of choosing different hypothetical university-based smoking cessation services.

### Development of the Discrete Choice Experiment

We initially developed a list of attributes about smoking cessation treatment programs from the literature that seemed most relevant to our research goals: treatment type, price, efficacy, length of treatment, risk of benign side effects, mitigation of weight gain, distance traveled to nearest pharmacy, and availability of cessation support.<sup>10</sup> We conducted a focus group with five participants enrolled in the newly launched AUB smoking cessation program. We ranked these attributes in order of importance to the participants and decided to exclude length of treatment and mitigation of weight gain because the focus participants ranked them low. We then assigned realistic values to levels of each attribute. Treatment type and availability of cessation support have dichotomous levels whereas the other three attributes have continuous levels.

All attributes and their respective levels are presented in [Table 1](#). The two levels for medication type were *patch* and *pill*. There were three levels used for risk of benign side effects (10%, 33%, and 50%) and for distance traveled (1 km, 5 km, and 10 km). The price for the complete treatment was assigned one of four values in each scenario: LBP 90,000, LBP 250,000, LBP 400,000, or LBP 600,000 (approximately USD 60, USD 167, USD 267, and USD 400 respectively). This price range was reflective of enrollment costs in similar programs offered by clinics in Lebanon.

### Survey Instrument Design

The data for the study were collected using a survey consisting of two parts: the choice experiment and the collection of demographic information and smoking history. For each choice set in the DCE, respondents were presented with two alternative smoking cessation programs, in addition to an opt-out option. The full factorial design included 144 potential hypothetical programs (one 4-level attribute, two 3-level attributes, and two dichotomous attributes;  $4 \times 3^2 \times 2^2$ ). We used a fractional factorial design of 16 distinct choice sets that were divided into 2 blocks of 8 choice sets. Respondents were then randomly assigned to one of the two blocks. An example of a choice set is presented in [Table 1](#).

In addition to the choice questions, the questionnaire collected information on the demographic characteristics of respondents. The demographic measures in the survey included gender (male vs. female), age in years, and student type (undergraduate vs. graduate). We asked participants to report the daily number of cigarettes smoked and information about previous quit attempts. This included the number of prior quit attempts, whether the respondent received help to quit, and a score that represented the respondent's motivation to quit (1 = very low to 10 = very high). Respondents were also classified as light (1–10 cigarettes/day), moderate (11–20 cigarettes/day), or heavy smokers (21+ cigarettes/day).

### Survey Administration

We recruited a convenience sample of students from six designated smoking areas on the AUB campus during a 10-day period in June 2012. Potential participants were approached as they smoked and were provided verbal and written details of the study. Upon consent, participants were asked to complete the survey while they were in the smoking areas and return to one of several brown envelopes. A research assistant was always available in each smoking area

**Table 1.** Discrete Choice Experiment: Example of a Choice Set; and List of Attributes and Levels

Attributes	Treatment A	Treatment B	Neither
Treatment type	Pill	Patch	No Treatment
Risk of minor side effects	33%	10%	0%
Cessation support service	No	No	No
Distance traveled	10 km	10 km	0 km
Cost to you	LBP 90,000	LBP 600,000	LBP 0
Which treatment would you prefer ( <i>X in one box only</i> )?	Prefer Treatment A <input type="checkbox"/>	Prefer Treatment B <input type="checkbox"/>	Neither <input type="checkbox"/>

  

Attributes	Levels	Opt out
Mechanism (medication type)	Patch, Pill	No medication (cold turkey)
Side effects: risk of benign side effects	10%, 33%, 50%	0%
Availability of support	Yes, No	No
Distance traveled to obtain medication	1 km, 5 km, 10 km	0 km
Price for the complete treatment	LBP 90,000, LBP 250,000, LBP 400,000, LBP 600,000	LBP 0

to answer questions and collect surveys. Surveys were available in English or Arabic and participants were provided with the questionnaire in the language of preference. Inclusion criteria were as follows: (a) adults  $\geq 18$  years old who self-identified as current smokers and (b) physically, mentally able, and willing to participate. The study was approved by the AUB Institutional Review Board.

### Statistical Analysis

We calculated percentages for categorical variables, and means and standard deviations for continuous variables. For the choice experiment, we took each choice between three-way options as a specific observation. Hence each respondent provided a maximum of 24 observations. Given the non-independence of the data provided by the same respondent we used conditional logit models. We estimated an overall model for all respondents in addition to alternative models for each of the three smoker types (i.e., light, moderate, high) and gender-specific models (i.e., females and males). In each model, the choice among alternatives depended on the five attributes: medication type and availability of support (dichotomized); and risk of side effects, distance traveled, and price (continuous). We calculated the willingness to pay for marginal improvements in risk of side effects, availability of support, and distance traveled. These were calculated as the ratio of the coefficient of interest to the negative of the coefficient on medication cost. The experimental design and data analyses were performed using SAS software (version 9.3; SAS Institute Inc.).

### Results

Our final sample for analysis included 191 participants (Table 2). Approximately 39% were female and the mean age was 23 years (standard deviation [SD], 6). The majority of respondents were undergraduate students (71% vs. 29% graduate). We had smoking history (cigarettes/day) for 91% of the sample. Light smokers (1–10 cigarettes/day) constituted 35% of the sample, with 39% considered moderate smokers (11–20 cigarettes/day), and 26% considered heavy smokers (21+ cigarettes/day). Overall, 72% of smokers in the survey attempted to quit at least once, and the mean number of previous quit attempts was 2.2 (SD, 1.2).

Table 3 shows the results of regression models estimating student preferences for cessation program characteristics, for the full sample and for subsamples by smoker type (light, moderate, and heavy) and gender. In general, smokers were averse to the pill form of treatment

in the overall model and in models restricted to moderate smokers and females. Smokers were averse to higher risk of minor side effects and higher cost of treatment across all models. They were also significantly averse to distance to the nearest pharmacy in all models except the model restricted to heavy smokers. Meanwhile, they were favorable to cessation support services in the overall model and in the males-only model. Choosing the nicotine patch was not a statistically significant predictor in any of the models.

Marginal willingness to pay estimates are reported for the full sample and for subsamples by smoking history and gender (Table 4). Overall, smokers were willing to trade LBP 105,000 (approximately USD 70) for a 10% reduction in the risk of minor side effects and LBP 103,000 (approximately USD 69) for the availability of cessation support. They were also willing to trade 18,000 (approximately USD 12) to avoid an additional kilometer of travel. Heavy smokers had the lowest demand elasticities toward these attributes compared with light and moderate smokers. Also, males had lower demand elasticities, compared with females, across all attributes.

### Discussion

Smokers in a Lebanese university setting were willing to participate in the relatively complex exercise of discrete choice experimentation to evaluate the benefits and risks of competing smoking cessation options. To our knowledge, our study is the first to elicit preferences for smoking cessation treatment from smokers in a university setting and the first such study in the Eastern Mediterranean region. A novel feature of our study is the use of the block randomized design which allowed us to minimize the number of choice sets to eight despite the large number of attributes and levels chosen.

At least two prior studies used DCEs to assess patient preferences for smoking cessation. A Japanese study found that price played a great role for smokers with lower nicotine dependence, while short term health risks and health risks caused by passive smoking had a strong impact for smokers of moderate and low dependency.<sup>9</sup> Another study from Switzerland focusing on the choice of smoking cessation medication found smokers were most interested in lower prices and greater efficacy. Researchers have also examined the time and risk preference predications that cause relapse among smokers attempting to quit.<sup>14</sup> They demonstrated that those who emphasized future rewards and placed more importance on certain rewards were more likely to continue abstaining from smoking. The results from our study show

**Table 2.** Sample Characteristics (*N* = 191)

	Definition	% (N)
<b>Smoker type</b>		
Light	1–10 cigarettes/day Mean number of cigarettes/day ( <i>SD</i> )	35.1% (67) 7.0 (3.1)
Moderate	11–20 cigarettes/day Mean number of cigarettes/day ( <i>SD</i> )	38.8% (74) 17.1 (2.9)
Heavy	21+ cigarettes/day Mean number of cigarettes/day ( <i>SD</i> )	26.2% (50) 32.1 (7.8)
Missing	Missing smoking history	8.9% (17)
<b>Smoking cessation</b>		
Quit	Respondent ever tried to quit	72.2% (138)
Attempts <sup>a</sup>	Mean number of previous quit attempts ( <i>SD</i> )	2.2 (1.2)
Help	Respondent ever received help to quit	25.3% (48)
Motivation <sup>b</sup>	Mean score of motivation to quit ( <i>SD</i> )	5.1 (2.7)
<b>Respondent characteristics</b>		
Female		38.7% (74)
Age	In years ( <i>SD</i> )	23.0 (6.0)
Undergraduate student		71.2% (136)
Graduate student		28.8% (55)

<sup>a</sup>Among those who have tried to quit<sup>b</sup>Range (1 = very low to 10 = very high)**Table 3.** Estimation Results: Conditional Logit Models of Student Preferences for Cessation Program Characteristics, by Heaviness of Smoking and Gender

	Model 1: any smoker	Model 2: light 1–10 cigarettes/day	Model 3: moderate 11–20 cigarettes/day	Model 4: heavy 21+ cigarettes/day	Model 5: females	Model 6: males
Patch	–0.0282	–0.0329	0.0572	0.1058	0.0888	–0.1151
( <i>SE</i> )	(0.1569)	(0.2650)	(0.2567)	(0.3926)	(0.2599)	(0.1994)
Pill	–0.3940 <sup>b</sup>	–0.4908	–0.4968 <sup>a</sup>	–0.2191	–0.5778 <sup>b</sup>	–0.2875
( <i>SE</i> )	(0.1583)	(0.2692)	(0.2602)	(0.3818)	(0.2632)	(0.2016)
Risk	–1.9264 <sup>c</sup>	–1.9081 <sup>c</sup>	–2.4690 <sup>c</sup>	–2.1179 <sup>c</sup>	–2.5669 <sup>c</sup>	–1.6498 <sup>c</sup>
( <i>SE</i> )	(0.2664)	(0.4516)	(0.4379)	(0.6495)	(0.4390)	(0.3408)
Support	0.1879 <sup>b</sup>	0.1771	0.1958	0.1792	0.2132	0.2048 <sup>a</sup>
( <i>SE</i> )	(0.0933)	(0.1582)	(0.1558)	(0.2326)	(0.1569)	(0.1187)
Distance	–0.0328 <sup>c</sup>	–0.0378 <sup>c</sup>	–0.0377 <sup>c</sup>	–0.0106	–0.0308 <sup>c</sup>	–0.0368 <sup>c</sup>
( <i>SE</i> )	(0.0067)	(0.0115)	(0.0113)	(0.0159)	(0.0111)	(0.0086)
Cost	–0.0018 <sup>c</sup>	–0.0016 <sup>c</sup>	–0.0016 <sup>c</sup>	–0.0028 <sup>c</sup>	–0.0015 <sup>c</sup>	–0.0020 <sup>c</sup>
( <i>SE</i> )	(0.0002)	(0.0004)	(0.0004)	(0.0006)	(0.0004)	(0.0003)
<i>N</i>	4,584	1,608	1,776	792	1,751	2,784

<sup>a</sup>Significant at 10%<sup>b</sup>Significant at 5%<sup>c</sup>Significant at 1%

that, in general, Lebanese student smokers were significantly averse to using the pill in their smoking cessation treatment. This may be due to medication aversion and expectations of adverse side effects, as reported by smokers in prior studies.<sup>15,16</sup> Smokers in this study were willing to make monetary tradeoffs to lower the risk of minor side effects, reduce distance traveled to the pharmacy, and secure cessation support services. Our findings can be used by clinicians, policymakers, and health care managers to help patients choose among smoking cessation options; knowing about the preferences of other smokers might help patients to clarify their own thoughts. Choosing a treatment that is more patient-centered may increase the success rate of the cessation program. Such trade-offs are made by smokers who want to quit every day, and discrete choice experimentation could gain some insight into the way patients make this difficult choice.

Smoking cessation programs are most successful when situated within a comprehensive national tobacco control program. In signing the FCTC, Lebanon agreed to develop such a national program, but this has yet to be implemented. Thus far, Lebanon has only partially succeeded in meeting WHO tobacco control measures.<sup>17</sup> Smoking prevalence remains high, and despite the implementation of smoke free policies, serious compliance measures do not exist. Even though some healthcare givers are providing cessation services to their patients, national cessation guidelines are yet to be established. The costs of cessation services are not covered by the healthcare system and there is no national quit line. Advertising bans have been recently implemented, but compliance is low, advertising can still be found in media print, and taxation is minimal.<sup>18</sup> Thus, smoking cessation programs will have limited success until national smoking

**Table 4.** Marginal Willingness to Pay Estimates by Smoking History (in LBP 1,000s)

Smoker type	Model 1: all	Model 2: light 1–10 cigarettes/day	Model 3: moderate 11–20 cigarettes/day	Model 4: heavy 21+ cigarettes/day	Model 5: females	Model 6: males
Risk of benign side effects	-1052.9 (-1521.8; -701.7)	-1176.2 (-2440.2; -550.6)	-1544.0 (-3084.6; -846.6)	-748.1 (-1450.4; -277.6)	-1717.8 (-3544.7; -988.1)	-826.8 (-1337.3; -468.8)
Availability of support	102.7 (3.8; 232.0)	109.2 (-74.0; 420.5)	122.5 (-61.4; 438.5)	63.3 (-92.8; 279.4)	142.6 (-54.2; 459.2)	102.7 (-10.7; 227.7)
Distance traveled	-17.9 (-29.0; -10.0)	-23.3 (-54.3; -8.5)	-23.6 (-55.0; -8.5)	-3.8 (-18.1; 7.6)	-20.6 (-48.9; -5.5)	-18.4 (-30.6; -9.7)

Note. LBP = Lebanese Pounds, 95% Krinsky-Robb confidence intervals in parentheses.

cessation guidelines are implemented as part of a national tobacco control strategy. In addition, Lebanese smokers trying to quit smoking tobacco products will face an environment that does not encourage or support cessation.<sup>18,19</sup>

Smokers on the AUB campus were willing to make certain tradeoffs to be smoke free. The size of the tradeoffs are based on hypothetical scenarios and should be treated with caution because smokers may have indicated different preferences if actual smoking cessation programs had been presented to them. Given that DCEs depend on responses to hypothetical scenarios, it is important to test the external validity of results using subsequent evaluation of policies and interventions.<sup>7</sup> Further, the DCE approach assumes that attributes are independent and ignores potential interactions across attributes.<sup>9</sup> Nonetheless, we carefully developed attribute levels for medication costs and travel distances, motivated by results from the focus group. Even though willingness to pay is a commonly used measure that provides useful information about the ranking of attributes in DCEs, we recognize that the levels of the cost attribute can affect our estimates. While this study focused on students who presumably have not been exposed to smoking cessation services, it would be interesting to elicit the preferences of those who are currently enrolled in such programs. Due to the scarcity of such programs in Lebanon, such a study would not be feasible at this time. Also, the DCE results were averaged across the sample and so there is inevitable variation among smokers. Therefore, careful assessment of individual patient preferences in a clinical setting is needed. Finally, the study was conducted at a private Lebanese university during summer term, and its results may not be generalizable to students who do not enroll in summer courses and to those enrolled at other universities in Lebanon. However, we believe this is the first study of its kind in Lebanon and the region and could be used as a model to elicit the preferences of students and other smoker groups for smoking cessation programs.

Despite recent tobacco control legislation,<sup>18</sup> smoking in Lebanon is predicted to kill more people over the next 30 years than its 16-year civil war.<sup>20</sup> While Lebanon and the surrounding Arab region suffer heavily from the tobacco epidemic, policy responses are hampered by industry efforts and unaccountable governing systems.<sup>21</sup> In this study, we present a policy tool that is relevant to tobacco control efforts and the first of its kind to use a novel experimental approach to understand smoking cessation behavior in Lebanon and the surrounding region.

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## Declaration of Interests

None declared.

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