Research Paper

Predictors of quit intentions among adult smokers in Mauritius: Findings from the ITC Mauritius Survey

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ABSTRACT

INTRODUCTION Mauritius has one of the highest rates of smoking in Africa. Smoking cessation is a priority for preventing tobacco-related morbidity and mortality. The purpose of this study is to identify the predictors of quit intentions among smokers in Mauritius in order to strengthen tobacco control policies and inform the development and delivery of services that may increase the likelihood of successful quitting.

METHODS Data were drawn from Wave 1 (2009) of the International Tobacco Control (ITC) Mauritius Survey, a face-to-face cohort survey of a nationally representative sample of 598 adult smokers who were randomly selected from nine geographic districts in Mauritius using a multistage sampling procedure.

RESULTS The vast majority of smokers (77.8%) had plans to quit smoking. Longer duration of past quit attempts (6 months or less), perceiving benefits of quitting, worrying about smoking damaging health in the future, and not enjoying smoking were significantly associated with quit intentions. However, socio-demographic characteristics, past quit attempts, overall attitude about smoking, and Heaviness of Smoking Index (HSI) were not associated with quit intentions.

CONCLUSIONS The predictors of quit intentions among Mauritian smokers were generally similar to those found among smokers in other high- and middle-income countries. However, in contrast to findings in those other countries, nicotine dependence as measured by the HSI was not a significant predictor of quit intentions among Mauritian smokers. These findings highlight the need to consider the predictors of quit intentions when developing and delivering smoking cessation support services in Mauritius.

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KEYWORDS (ENGLISH)
smoking, predictors, Africa, Cessation, quit intentions, Mauritius

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Tob. Prev. Cessation 2016;2(October):72 http://www.dx.doi.org/10.18332/tpc/65770

INTRODUCTION

Tobacco use continues to be the leading cause of preventable morbidity and premature death in the world. It is estimated that each year, tobacco use kills six million people (out of the one billion smokers), of which about 80% are from low- and middle-income countries[1]. Smoking cessation among adult smokers is critically important to improving public health initiatives because about 50% of smokers die from tobacco-related diseases[1]. Moreover, promoting cessation among smokers provides significant short-term and medium-term benefits to reducing smoking-attributable diseases and mortality relative to prevention among non-smoking youth[1]. However, smoking is a complex behaviour that is difficult to change, and quitting tobacco use is challenging for many and often entails multiple quit attempts[2,3].

Accordingly, numerous theoretical frameworks, including the Theory of Planned Behavior (TPB)[4], the Transtheoretical Model of Change (TTM)[5], Social Learning Theory[6], the Health Belief Model[7], and Protection Motivation Theory[8,9], have been used to explain and predict smoking behaviour and cessation. These theoretical models have identified a number of variables that influence smoking cessation such as intentions, self-efficacy, and perceived benefits, barriers, and vulnerability. Research has demonstrated that the intention to quit smoking, a core construct of models such as the TPB and TTM, is one of the strongest predictors of quit attempts[10,11]. Nevertheless,

Published by E.U. European Publishing on behalf of the European Network for Smoking and Tobacco Prevention (ENSP).

most previous studies focus on predictors of quit attempts[10-22] and successful cessation[10-12, 15-24], while fewer studies investigate the predictors of intention to quit smoking[22,25-27]. Investigating the predictors of an intention to quit is invaluable to informing future cessation programs in Mauritius.

Existing research shows that the factors that are associated with quit intentions differ to some extent from the factors that are associated with other quit-relevant outcomes such as quit attempts and quit success (i.e., sustained quitting). For example, factors associated with quit attempts and smoking cessation include being white[15, 16], well-educated[16, 22], cohabiting/married[15, 22], lower nicotine dependence[10, 11, 23], more social support[14, 23, 24], having an intention to quit[11, 12, 14, 17, 19, 21], consuming fewer cigarettes[10, 13, 17, 19], and high self-efficacy[12, 17, 18, 21, 24]. Other factors like being older[12, 16, 21, 22, 26], male[23], less exposure to smokers[15], perceived benefits of quitting[24], and previous abstinence from smoking[21] are specific to smoking cessation, while being younger[11, 14, 16] and having more negative attitudes towards smoking[11, 21] are associated with quit attempts. Known factors that are associated specifically with quit intentions include income[28], education[28], being male[22], having attempted to quit in the past[25,26], having longer duration of past quit attempts[25], having lower nicotine dependence[25], placing importance in quitting[27], having self-efficacy[27], worrying about future health, and having a bad opinion about smoking[25]. However, the vast majority of such studies on the factors that are associated with quit intentions, quit attempts, and quit success have been conducted in high-income Western countries.

Although research on the predictors of quitting in low- and middle-income countries (LMICs) is limited, there is evidence to suggest that on the whole, predictors of making quit attempts in LMICs are fairly similar to those found in high-income Western countries. For example, five studies examined quitting behaviours among smokers in Malaysia, Thailand, Hong Kong, and China[17, 21, 22, 25,26]. Findings from these studies showed that, as in Western countries, quitting behaviours were associated with being male, having lower levels of nicotine dependence, having attempted to quit in the past, having higher levels of self-efficacy, having a history of longer previous quit attempts, having perceived benefits of quitting, and having concerns about the health effects of smoking.

But our knowledge of the factors that are associated with quit intentions and behaviours in Sub-Saharan Africa is almost non-existent. Although the mean prevalence of tobacco smoking among adults in the African Region is the lowest of all six WHO Regions (15.8% in 2010), smoking is projected to rise considerably[29, 30]. In one simulation study[29], smoking prevalence in the African Region will experience the largest increase in smoking prevalence by 2030 (21.9%, representing a relative increase of 39%). This is crucial because some countries in Africa have a prevalence of up to 48% for males and 20% for females[31]. Among the factors that will fuel this increase is the tobacco industry, which is increasing its efforts to build new markets in Africa. It is therefore critically important to understand the factors that are associated with smoking and with intentions to quit in Africa.

We know of only two studies in the African Region that have examined the predictors of intentions to quit. One study of adult smokers in Ethiopia found that smokers who had no intention to quit smoking had high nicotine dependence and low self-efficacy[32]. A second study of youth smokers in Nigeria showed that youth who had at least one smoking parent and perceived that smoking was socially acceptable were significantly less likely to have intentions to quit cigarette smoking[33]. Both of these studies were limited because study participants were drawn from community-based[32] and school-based[33] convenience samples, thus the findings are not generalizable to the general population.

The present study focuses on the predictors of intentions to quit in the Sub-Saharan African country of Mauritius. It uses data from an ongoing national longitudinal cohort study of tobacco use and of the impact of tobacco control policies. This Mauritius study is part of the ITC Project, which has conducted similar cohort studies across 28 countries. The sampling design allows generalization of results to the entire country.

Mauritius has one of the highest smoking rates in Africa[34]. The most recent Non-Communicable Diseases Survey (2015) showed that adult smoking prevalence was 19.3%, with higher smoking prevalence in men (38.0%) than in women (3.9%). Smoking prevalence was especially high among young adult males—more than 50% of males between the ages of 19 to 24 reported that they were smokers[35]. In 2012, it was estimated that respiratory tract, oral, and stomach cancers – among the many cancers causally related to smoking – accounted for 24% of all new cancers among males, and 40% of male cancer mortality in Mauritius[36]. The Mauritius Ministry of Health and Quality of Life reported that each year there are 1,400 new cases of cancers and 950 deaths in Mauritius and about a quarter (21%) of these deaths are attributable to smoking[37].

The WHO Framework Convention on Tobacco Control (FCTC) was signed by Mauritius on June 17, 2003 and ratified on May 17, 2004[38]. In 2008, Mauritius launched a National Action Plan on Tobacco Control with goals to reduce tobacco-related mortality and morbidity through prevention of tobacco use among non-smokers, promotion of cessation

among current smokers, and protection from exposure to secondhand smoke[39]. On November 29, 2008, the Ministry of Health and Quality of Life passed the Public Health (Restrictions on Tobacco Products) Regulations, which are the principal regulations governing tobacco control in Mauritius[40]. These Regulations were implemented in two phases. Phase 1 (March 1, 2009) included regulations to strengthen policies banning smoking in public places, banning the sale of single cigarettes, and banning tobacco advertising, promotion, and sponsorship. Phase 2 (June-October 2009) regulations included the implementation of eight pictorial warning labels on cigarette packages, and banning misleading descriptors and product constituent yields on cigarette packages.

Mauritius has also made efforts to develop capacity and facilities to promote smoking cessation in Mauritius. In December 2008, a pilot smoking cessation clinic was launched. Seven cessation clinics were launched in the five regional hospitals in 2011. A July 2014 evaluation study showed an 18-20% success rate (i.e., stayed quit 6 months or more) for participants who completed the program in the cessation clinics[41].

Previous research in other countries has identified a wide range of factors associated with smoking cessation, but to our knowledge, there are no population-based studies of predictors of quit intentions in the African region. The present study is the first to examine predictors of quit intentions among a nationally representative sample of smokers in Sub-Saharan African country of Mauritius. The inclusion of individual-level predictors of quit intentions used in previous research in other ITC countries[11, 12, 17, 21, 25] allows for the opportunity to identify predictors of quit intentions that are specific to the Mauritian context, as well as those that are similar across countries.

METHODS

Study design

The ITC Mauritius Wave 1 Survey is the first wave out of three nationally representative cohort surveys of the adult smokers and non-smokers in Mauritius. This survey is designed to evaluate the psychosocial and behavioural impact of tobacco control policies[42, 43]. A multistage cluster sampling procedure was used to select the respondents from all the nine geographic districts of Mauritius: Black River, Flacq, Grand Port, Moka, Pamplemousses, Plaines Wilhems, Port Louis, Riviere du Rempart, and Savanne. A detailed description of the sampling and study design is available in the ITC Mauritius Wave 1 Technical Report[44].

Participants and survey procedures

The respondents for this study were 598 adult smokers aged 18 years and older. Smokers were defined as those respondents who had smoked at least 100 cigarettes in their lifetime and smoked at least once a week at the time of the survey. Face-to-face interviews (about 60 minutes) were conducted in Mauritian Creole by trained interviewers between April and May 2009. The overall survey response rate was 89.8%. Research ethics approval was obtained from the University of Waterloo Human Research Ethics Committee and the National Ethics Committee of Mauritius.

Measures

Dependent variable

Intentions to quit were based on responses to the question:"Do you plan to quit smoking?" Respondents who selected "in the next month", "in the next 6 months", or "sometime in the future after 6 months" were defined as having an intention to quit, and those who responded "not at all" were defined as having no intention to quit.

Independent variables

Socio-demographic variables were gender (male, female), age at the time of the survey (18-24, 25-39, 40-54, 55 years and older), income (those with a monthly household income of <10,000 Mauritian Rupee (MUR) were coded as low, those between 10,000-24,000 MUR as moderate, and those ≥25,000 MUR as high). Education was categorized as no education, low (primary education/Form 1 to 4), moderate (School Certificate [SC]/Higher School Certificate [HSC]/Vocational), and high (University degree or higher).

Quitting history variables assessed were: tried to quit smoking within the last year (yes, no), and longest time off smoking (never, less than 1 month, between 1-6 months, 6 months, or more). Nicotine dependence was measured using the Heaviness of Smoking Index (HSI; 7 levels, 0=least addicted to 6=most addicted), which was based on the sum of two categorical variables: number of cigarettes smoked per day (CPD), 0 = 0-10, 1 = 11-20, 2 = 21-30, 3 =>30), and time to first CPD (0 =>60 minutes, 1 = 31-60 minutes, 2 = 6-30 minutes, 3 = 5 minutes or less).

Motivational variables assessed were outcome expectancy of quitting, worries about health in the future, enjoyment of smoking, and overall attitude about smoking. Outcome expectancy of quitting (benefit from quitting in the next 6 months) was measured using the question: "How much do you think you would benefit from health and other gains if you were to quit smoking permanently in the next 6 months?" Response categories included: "not at all", "a little", and "very much". Worries about health in the future were measured by

asking: "How worried are you, that smoking will damage your health in the future?" Response categories included: "not at all", "a little", and"very much."

Enjoyment of smoking was measured by asking for rating of agreement with the statement: "You enjoy smoking too much to give it up". The variable was coded into a three-category variable: disagree (strongly disagree or disagree), neutral (neither disagree nor agree), and agree (agree or strongly agree). Overall attitude about smoking was measured by asking: "What is your overall opinion of smoking?" This variable was also coded as a two-category variable: Good (Very Good/Good/Neither Good Nor Bad), and Bad (bad/very bad). This measure is consistent with social psychological theory defining attitude as an evaluative judgment about a person, object, or issue[45, 46].

Statistical analysis

Weights were constructed with respect to smoking prevalence estimates by district. Logistic regression models were conducted to assess the predictors of intentions to quit, first in bivariate models, with each of the predictors of interest, and then in a multivariate model where the association between each predictor and the dependent variable was adjusted for all other variables in the models. Analyses were conducted using SAS 9.3.

RESULTS

Table 1 presents the socio-demographic characteristics of the sample. Most of the smokers (94.0%) who were interviewed were men. Respondents were predominantly in the 25–39 (30.7%) and 40–54 years (38.0%) age groups, with an average age of 44.2 years (SD=14.1). The majority (88.8%) of respondents had an average monthly household income of less than 25,000 MUR (about 625 €). About one-quarter (24.4%) had no education and few (5.9%) had a high level of education.

The vast majority (90.8%) of respondents were daily smokers, with an average cigarette consumption of nine cigarettes per day (data not shown). More than two-thirds of Mauritian smokers (77.8 %) had plans to quit smoking. Of those planning to quit, almost one-quarter (23.5%) planned to quit within 6 months. More than half (64.4%) of respondents had tried to quit smoking at least once, and 53.2% anticipated that they would smoke less one-year post-survey.

Table 2 presents the results of the analyses that examined predictors of intentions to quit smoking. There were no significant differences in the percentage of smokers with quit intention across gender, income levels, and education in the

Table 1: Characteristics of the sample of Mauritian smokers

Variable	Frequency N = 598	Percentage %
Gender		
Male	562	94.0
Female	36	6.0
Age Group		
18–24	47	7.9
25–39	184	30.7
40–54	227	38.0
≥ 55	140	23.4
Monthly Household Income (MUR)		
< 10,000 (low)	274	45.8
10,000–24,000 (moderate)	257	43.0
≥ 25,000 (high)	58	9.7
Not Stated	9	1.5
Level of Education		
No education	146	24.4
Low (up to Form 1-4)	287	48.0
Moderate (School Certificate/ Higher School Certificate/ Vocational)	130	21.7
High (University Degree or higher)	35	5.9
Marital status		
Married	451	75.4
Divorced or Separated or Widowed	36	6.0
Single	111	18.6
Intention to quit		
Does not plan to quit	127	22.2
Plans to quit	446	77.8
Time to intention to quit		
Within the next month	50	8.7
Within the 6 months	85	14.8
Beyond 6 months	311	54.3
Not planning to quit	127	22.2
Ever tried to quit smoking		
Yes	385	64.4
No	213	35.6
Smoking how much 1 year from now		
A lot more than now	16	2.7
A little more than now	21	3.6
The amount as now	206	35.3
A little less than now	174	29.9
A lot less than now	136	23.3
Not smoking at all	30	5.2

Table 2: Factors associated with intentions to quit smoking among Mauritian smokers

			Univariate analysis		Multivariate analysis	
	N	Intentions to quit (%)	Odds Ratio	95% CI	Odds Ratio	95% CI
Gender						
Male	417	76.9	Ref		Ref	
Female	29	76.3	0.972	0.403–2.342	0.867	0.250–3.007
Age Group						
18–24	39	86.1	Ref		Ref	
25–39	141	79.5	0.626	0.221–1.772	1.091	0.241–4.944
40–54	174	78.3	0.584	0.211–1.621	0.716	0.172–2.977
≥ 55	92	67.1	0.330	0.124–0.877	0.464	0.103–2.097
Household Income in MUR						
< 10,000 (low)	210	78.3	Ref		Ref	
10,000 – 24,000 (moderate)	185	74.5	0.809	0.488–1.341	0.955	0.479–1.905
≥ 25,000 (high)	46	82.8	1.334	0.595–2.988	1.419	0.435–4.627
Not reported	5	64.1	0.496	0.128–1.925	1.258	0.156–10.123
Level of Education						
No education	104	71.7	Ref		Ref	
Low (Primary school / Form 1 to 4)	221	79.4	1.526	0.852–2.733	0.925	0.406–2.109
Moderate (School Certificate / Higher School Certificate / Vocational)	94	75.1	1.193	0.617–2.306	0.545	0.181–1.637
High (University level or higher)	27	81.4	1.726	0.680–4.377	0.985	0.181–5.354
Tried to quit within past year						
Yes	201	91.0	Ref		Ref	
No	243	68.1	0.211	0.126–0.353	0.413	0.164–1.043
Longest time off smoking						
Never quit	122	59.1	Ref		Ref	
Less than 1 month	139	86.2	4.330	2.506–7.483	3.824	1.682–8.695
1–6 months	113	87.5	4.841	2.580–9.083	3.476	1.513–7.986
6 months or more	69	82.9	3.360	1.629–6.931	1.692	0.663–4.320
Heaviness of Smoking Index (HSI)						
0–6	413	*	0.838	0.735–0.955	1.016	0.805–1.283
Outcome expectancy (benefits) of quitting						
Not at all/ Slightly	85	58.0	Ref		Ref	
Benefit Moderately	47	76.0	2.294	1.050–5.009	1.614	0.629–4.140
Benefit Very much / Extremely	313	87.7	5.166	3.025–8.824	4.503	2.273–8.919
Worries about health in the future						
Not at all	62	56.1	Ref		Ref	
A little / Moderately	237	75.9	2.464	1.410–4.305	1.173	0.553–2.488
Very much	143	94.5	13.489	5.649–32.205	5.260	1.163–23.792
Enjoyment of Smoking						
Strongly Agree / Agree	140	64.4	Ref		Ref	
Neutral	73	78.2	1.979	0.991–3.954	2.905	0.818–10.312
Disagree / Strongly Disagree	230	86.9	3.669	2.080–6.472	3.592	1.699–7.592

Attitude (Overall opinion) about smoking						
Very Good / Good / Neither Good Nor Bad	42	61.6	Ref		Ref	
Bad / Very Bad	403	79.2	2.370	1.390–4.042	1.037	0.456–2.359

Ref: Reference category
Values in bold are those where the difference is statistically significant (p < 0.05).
*** Heaviness of Smoking Index (HSI): See Method Section for the construction of this index. For smokers who had intentions to quit, the mean HSI was 1.36; for smokers who did not have intentions to quit, the mean HSI was 1.76.**

analyses. Age, past quit attempts (within the past year), HSI (nicotine dependence), and an overall negative opinion about smoking were significant in the univariate model but they were no longer significant once we controlled for other covariates in the multivariate analysis.

Smokers who reported some duration (i.e., time they went without smoking) of a past quit attempt were more likely to have a quit intention. Specifically, smokers who had a previous quit attempt lasting one to six months, were more likely to have a quit intention in comparison to those who had never quit.

Perceiving benefits from quitting, worrying about smoking damaging health in the future, and not enjoying smoking were also found to be significantly associated with quit intentions. This association was strongest among smokers who worried very much about their health in the future compared to smokers who were not worried at all.

DISCUSSION

This is the first study to examine the predictors of quit intentions among smokers in Mauritius and one of the very few that has examined this important topic among smokers in African countries. A number of studies have shown that socio-demographic characteristics such as age, gender, education, and income level are associated with intentions to quit smoking[22,26-28]. In our study, quit intentions were not independently associated with these socio-demographic characteristics. Our findings are consistent with previous research that has also failed to find an association between age, education, and income level and quit intentions[14, 25, 47-49], and may be due in part to the effectiveness of the Mauritian national media campaigns that focus on educating the public on the harmful effects of smoking, the implementation of smoke-free policies in public venues, and the introduction of smoking cessation services in Mauritius.

Mauritian smokers have a high level of interest in quitting. Results from the present study showed that more than two-thirds (77.8%) of Mauritian smokers had intentions to quit. This finding is comparable with the intention to quit rates (64.7% to 81.5%) from four high-income ITC countries (Canada, USA, UK, and Australia)[11], and higher than quitting rates from several other ITC countries including China (24%)[25], India (33%)[50], Thailand (40%), and Malaysia (58%)[28, 49]. This finding highlights the need in Mauritius to strengthen cessation services to support smokers who are interested in quitting.

Consistent with Feng et al.'s study of smokers in China[25], smokers in Mauritius who had a longer duration (time) off smoking, specifically, those who reported having a previous quit attempt lasting one to six months or less were more likely to have an intention to quit smoking in comparison to those who had never quit. This finding points to a need for health providers to design strategies to motivate smokers to quit in the knowledge that even if that quit attempt does not succeed, subsequent quit attempts will have a greater likelihood of succeeding. Additionally, health providers need to consider strategies that encourage smokers to have a longer duration off smoking i.e., lasting at least 6 months because it increases a smoker's likelihood of quitting smoking.

Mauritian smokers' perceptions regarding the benefits from quitting smoking (outcome expectancy), worrying about the health effects of smoking in the future, and not enjoying smoking were significantly associated with intention to quit smoking, consistent with studies conducted in other countries[25, 26, 51]. There is a need to sensitize Mauritian smokers on the harmful effects of smoking and the benefits of quitting, e.g., using sustained mass media campaigns.

While nicotine dependence as measured by the HSI is an important predictor of smoking cessation in ITC high-income countries[11,52,53], this study found that HSI was not associated with intentions to quit smoking among Mauritian smokers. A plausible explanation for this finding is the fact that the average daily consumption of cigarettes (CPD) in Mauritius is low (nine cigarettes per day) compared to the consumption in other ITC countries[25, 50], except for Mexico (8.6 cigarettes per day)[54]. Perhaps this low consumption level (CPD < 10) of cigarettes among Mauritian smokers is not an incentive to quit because they may not perceive themselves as addicted to

tobacco and do not recognize the health risks associated with "low level" smoking. Moreover, light ("low level") smokers are less likely than heavier smokers to be advised about cessation when they visit health providers because they do not identify themselves as smokers[55]. It is interesting that this lack of association between dependence and quit intentions has been found in other smoker populations with lower levels of consumption including among Latino smokers in the US[56,57]. Our study findings suggest that anti-smoking programs in Mauritius need to emphasize the danger of tobacco use even at low levels[58]. The absence of an association between HSI and intentions to quit smoking among Mauritian smokers supports Siahpush et al.'s[28] observation that the existing knowledge (e.g., predictors of quit intentions) from high-income countries about disparities in smoking should not be generalized readily to LMICs.

This study has some limitations. The sample size of the female smokers is small. However, the impact of this limitation is minimized because the female sample was randomly selected and thus representative of the population of female smokers in Mauritius. In addition, the weights were constructed in such a way to remove or greatly diminish any bias that could have existed. It is also possible that responses may have been subject to recall bias due to self-reporting[59]. However, it is important to note that some of the usual sources of bias in the typical survey were likely fairly minimal in the ITC Mauritius Survey since our results are largely consistent with other ITC surveys[25]. The cross-sectional analyses, limits conclusions about causality. Finally, quit intentions play an important role in getting smokers to make a quit attempt, which is a key step in the process of smoking cessation. However, it is worth noting that while the intention to quit smoking is associated with making a quit attempt, the success of a quit attempt is predicted by other factors such as nicotine dependence, self-efficacy and genotypes of the nAChR gene[60-63]. Moreover, there is evidence that intentions do not always translate into behaviours[64, 65]. Further study of the multiple factors that affect smokers' attempts to quit and stay quit in different cultural contexts is warranted.

CONCLUSIONS

The predictors of quit intentions among Mauritian smokers were generally similar to those found among smokers in other high- and middle-income countries namely reporting a longer duration of past quit attempts, perceiving benefits of quitting, worrying about smoking damaging health in the future, and not enjoying smoking. However, in contrast to findings in those other countries, nicotine dependence as measured by the HSI was not a significant predictor of quit intentions among Mauritian smokers. These findings highlight the need to consider the predictors of quit intentions when developing and delivering smoking cessation support services in Mauritius.

CONTRIBUTOR STATEMENT

GTF and PB were involved in the design of the study. DR and MY were responsible for the data analyses reported in this paper. SK, JCH, and MCS wrote the paper with contribution from GTF, ACKQ, MY, PB, and LM. All authors approved the final manuscript.

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ACKNOWLEDGMENTS

The authors would like to acknowledge J. Ouimet (ITC Project Manager for the ITC Mauritius Wave 1 Survey) and the members of the ITC Mauritius team – D. Mohee, V. LeClezio, and V. Pitchamootoo – for their contributions in planning and implementing the ITC Mauritius Survey, and the fieldwork team who conducted the interviews.

CONFLICT OF INTEREST

The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

FUNDING

This work was supported by the International Development Research Centre. Additional support was provided to GTF from a Senior Investigator Award from the Ontario Institute for Cancer Research and a Prevention Scientist Award from the Canadian Cancer Society Research Institute. The funding sources had no role in the study design, in collection, analysis, and interpretation of data, in the writing of the report, or in the decision to submit the paper for publication.

PROVENANCE AND PEER REVIEW

Not commissioned; externally peer reviewed