

Perceived Risk of Tobacco Products among Adult Tobacco Users in Bangladesh and India

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

There is considerable evidence demonstrating that smokers underestimate or minimize their own perceived risk of harm from smoking, and that smokers' perceptions of risk play a key role in their behaviour, notably quitting. However, the majority of this research has been conducted in high-income countries and on cigarette smokers only. Much less is known about the relationship between risk perceptions of tobacco products other than cigarettes and the influence of these beliefs on behaviour, such as maintaining tobacco use, switching products, or quitting. This is particularly important in countries like India and Bangladesh, where multiple tobacco products are prevalent and there are high rates of tobacco use, including some of the highest rates of smokeless tobacco use in the world. The main goals of this dissertation were to evaluate risk perceptions of three common tobacco products in India and Bangladesh (cigarettes, bidis, and smokeless tobacco), to compare risk perceptions across different types of tobacco users, and to determine the function of these risk perceptions in relation to behaviour. The data for this study was from the International Tobacco Control (ITC) Bangladesh and India Surveys, which are large, prospective cohort face-to-face surveys of adults. The Bangladesh Wave 1 (W1; 2009) Survey was conducted among a nationally representative sample of 3109 tobacco users and 2658 non-users, Wave 2 (W2; 2010) included 3108 users and 2554 non-users, and the Wave 3 sample consisted of 3275 tobacco users and 2247 non-users. The India Wave 1 Survey (2010-11) included 8051 tobacco users and 2534 non-users in four states. Respondents were asked a variety of measures of perceived risk, including perceptions of the harm of their product, perceptions of the health risks they face, and perceptions of the harmfulness of one product in comparison

to another. Analyses on the data from these surveys suggested an optimistic bias among tobacco users in India and Bangladesh, both about their tobacco use in general and their specific tobacco product. Cross-sectional analyses revealed that the majority of tobacco users recognized the harms of tobacco use but underestimated the damage that would occur in the future, supporting previous evidence that tobacco users demonstrate an optimistic bias about the risks they face from their behaviour. In addition, this study found evidence of another type of optimistic bias that was present among the majority of tobacco users, which was underestimating the risk of their own tobacco product compared to others. While the majority of non-users and mixed users perceived different tobacco products to be no different in harm, the majority of users of a specific product perceived it to be less harmful than other products and less harmful compared to the perceptions of users of other products. Longitudinal findings from cigarette smokers at Wave 1 in Bangladesh who were recontacted at Wave 2 demonstrated that while cigarette smokers generally said bidis are more harmful at Wave 1, after switching to bidis at Wave 2, the majority then said there is no difference in harm. Analyses on these product switchers suggested that tobacco users who change products are more likely to subsequently change their perceptions of risk of those products to be more in line with their behaviour, supporting theories of cognitive dissonance and motivated reasoning. These findings were not replicated within the smaller samples of respondents who switched products between Waves 2 and 3, but certainly deserve further research as the majority of data from this dissertation suggest that product risk perceptions represent a biased cognition to justify one's harmful tobacco use behaviour, which may also inform tobacco cessation interventions.

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Dedication

To my family, who has taught and inspired me in countless ways.

To Albert Seed, who was an exemplar of strength, courage, and optimism.

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1.0 Dissertation Introduction and Rationale

There's no question today that smoking is harmful; in fact, there is overwhelming scientific evidence demonstrating that tobacco is the greatest preventable cause of death in the world, and when used as directed, the only consumer product that kills up to one half of its users (IARC, 2004; Mackay & Eriksen, 2002; World Health Organization, 2009c). Cigarette smoking has been proven to cause diseases of almost every organ in the body, including many types of cancers, as well as stroke, blindness, coronary heart disease, diabetes, chronic obstructive pulmonary disease, and adverse reproductive outcomes (U.S. Department of Health and Human Services, 2014). Not only does smoking harm the health of the smoker, but second-hand smoke contains many known carcinogens that cause the premature deaths of over 600,000 people each year (Öberg, Jaakkola, Woodward, Peruga, & Prüss-üstün, 2010). The enormity of the impact of tobacco use is represented in World Health Organization (WHO) projections that if current trends continue, tobacco will kill more than 8 million people annually by the year 2030, and one billion people in the 21st century (World Health Organization, 2008).

As evidence about the harms of tobacco has grown along with the strength of tobacco control policies and education campaigns, public awareness of these harms has also increased in many countries. In fact, tobacco companies often argue that with the vast amount of information now available to smokers about the harms of tobacco use, especially via warning labels on tobacco packages, smokers today are fully informed of the risks they take when they begin smoking. By maintaining that smokers know the risks when they start, the tobacco industry can argue that they should not be held legally responsible for smokers' death and disease later on (Chapman & Liberman, 2005; Romer & Jamieson, 2001b; Slovic, 2000b).

If it is true that everyone knows about the dangers of smoking, why then are over 4

million Canadians and over 1 billion people worldwide currently smokers (Health Canada, 2013; World Health Organization, 2014)? Certainly, the extremely addictive nature of cigarettes and difficulty of quitting play a major role: many smokers regret starting smoking, want to quit, and have made quit attempts in the past, but very few quit attempts are actually successful (Centers for Disease Control and Prevention, 2011; Fong et al., 2004; Hyland et al., 2004). However, there is also a considerable amount of evidence demonstrating that smokers are actually not fully aware of the risks, despite the tobacco industry's arguments to the contrary. Research has shown that when adolescents start smoking, they do not accurately appreciate the nature of addiction, the cumulative risks of smoking, or the severity of diseases caused by smoking (Slovic, 1998), and even adult smokers show inaccurate perceptions of the risks and health effects of smoking (Slovic, 2001b). In addition, smokers tend to underestimate their own personal risk of becoming addicted or suffering health effects from smoking in comparison to others (Slovic, 2001b; Weinstein, Marcus, & Moser, 2005). These biased or inaccurate risk perceptions can inhibit quitting, but on the other hand, smokers who have more accurate perceptions of the health risks of smoking are more likely to attempt to quit (Romer & Jamieson, 2001b).

Given the magnitude of health risks and suffering that smokers face and the significant role of perceived risk from smoking on smoking outcomes such as initiation and quitting, it is important to understand more about the nature of perceived risk and its relationship with behaviour. Much of the research to date has been conducted in high-income countries where the majority of tobacco users are cigarette smokers, but 80% of the world's tobacco users currently live in low- and middle-income countries (LMICs), where the burden of the tobacco problem is greatest, and where many other tobacco products besides cigarettes are common (World Health Organization, 2008). Very little is known about risk perceptions in LMICs such as India or

Bangladesh, especially risk perceptions of other tobacco products such as bidis or smokeless tobacco, which is what this dissertation aims to examine.

2.0 Background

2.1 Awareness of the Harms of Smoking

Before smokers can appreciate their own risk of harm from smoking, they must first be aware that smoking does indeed cause harm. While it may be easy for tobacco companies to argue that smokers today are fully aware of the harms caused by tobacco, this type of general statement does not reflect the differences in knowledge across countries, across different segments of the population within a country, and across all the many health effects caused by tobacco.

Many surveys of smokers' beliefs about tobacco are conducted in high-income countries, but public awareness and knowledge of the harms of tobacco can differ considerably according to which country is being evaluated. While knowledge of certain tobacco-related diseases is generally high in Western, high-income countries (HICs) where anti-smoking campaigns and tobacco control policies such as pictorial warning labels are well executed, awareness can be much lower in low- and middle-income countries (LMICs) with higher social acceptance of smoking and weaker measures in place to warn consumers about the harms of tobacco. For example, a 2002 International Tobacco Control (ITC) Survey of smokers in Canada, United States, United Kingdom, and Australia found that 94% of smokers agreed that smoking causes lung cancer, 89% said smoking causes heart disease, and 73% believed it causes stroke (Hammond, Fong, McNeill, Borland, & Cummings, 2006), while a 2009 study from the ITC Project in China found that only 68%, 36%, and 16% of smokers in China believed that smoking causes lung cancer, heart disease, and stroke, respectively (Yang, Hammond, Driezen, Fong, & Jiang, 2010).

Of course, knowledge of the vast array of diseases caused by tobacco use isn't perfect

even in HICs. While many smokers admit that smoking causes lung cancer, they may be less aware that smoking also causes many other forms of cancer including bladder, throat, and stomach cancers, along with a host of other diseases and health problems including chronic obstructive pulmonary disease, stroke, cataracts, impotence in males, low birth weight babies born after smoking during pregnancy, and lung cancer and heart disease among non-smokers exposed to second-hand smoke. In addition to the specific diseases caused by smoking, many smokers are unaware of the specific chemicals and toxins in cigarettes and other tobacco products themselves; when a cigarette burns, it releases more than 4000 chemicals, such as arsenic and benzene, over 70 of which are carcinogenic (Cancer Research UK, 2012). The aforementioned ITC survey of nationally representative samples of smokers in Canada, US, UK, and Australia found significant gaps in smokers' awareness of the health risks of smoking. While the majority (over 85%) of smokers in all four countries agreed that smoking causes lung cancer and heart disease in smokers, knowledge of three other health effects that were asked about was much lower: more than a quarter of smokers did not believe that smoking causes lung cancer in non-smokers, and more than half did not believe that smoking causes impotence. In addition, smokers demonstrated low knowledge of the constituents of tobacco smoke (Hammond et al., 2006).

While knowledge of all health effects is generally lower in LMICs where tobacco control efforts to educate the public about the harms of tobacco use have often been weaker (though not in all countries), the same pattern of even lower knowledge of more specific health effects seems to hold. In a 2006 survey of adult smokers and non-smokers in China, a country with only weak text-based health warnings on cigarette packages, 73% of all respondents agreed that smoking causes lung cancer (68% of smokers and 92% of never smokers). While this level is lower than

that reported in Western countries, it was still much higher than knowledge for other health effects in China: only 59% of all respondents agreed that smoking causes lung cancer in non-smokers, 40% agreed that smoking causes heart disease, 20% said it causes stroke, and only 19% said it causes impotence (Yang et al., 2010). The 2010 Global Adult Tobacco Survey (GATS) in Vietnam - another country with high rates of smoking and only text-based health warning labels - found that while 96% of respondents (93% of smokers and 97% of non-smokers) agreed that smoking causes lung cancer, knowledge was much lower for stroke (59% of smokers and 70% of non-smokers) and heart attacks from smoking (54% of smokers and 63% of non-smokers) (Centers for Disease Control and Prevention, 2010). Despite many smokers around the world being generally aware that smoking is harmful or causes lung disease, complete knowledge of the many proven harmful effects of smoking is clearly lacking among smokers in many countries.

In addition to differences in knowledge of the risks of smoking according to which specific health effects smokers are asked about, it is also important to consider differences in risk perceptions by socioeconomic status (SES). Research from smokers in HICs such as the United States and Canada has found that smokers with higher levels of education and income (common measures of SES) generally show higher awareness of the harms of smoking, including lung cancer and heart disease (Siahpush, McNeill, Hammond, & Fong, 2006). For example, Siahpush et al. (2006) evaluated ITC data from nationally representative samples of smokers in four HICs (Canada, US, UK, Australia) and found that, consistent with other studies, lower SES (measured by both income and education) was associated with lower knowledge of both the health effects of smoking (including lung cancer, heart disease, stroke, and impotence) and the toxic constituents of tobacco smoke (Siahpush et al., 2006). Cummings et al. (2004) examined data

from a nationally representative survey of adult smokers in the United States that included measures to evaluate beliefs about the health risks of smoking, and found that knowledge (as measured by an index of responses to seven questions) was significantly lower among the lowest education group (less than 12 years of completed schooling) compared to all three higher education groups; among Black, Hispanic, and Other races compared to White, non-Hispanic respondents; and among those aged 55 or older compared to those aged 18-25 years (Cummings et al., 2004). Similar patterns also hold in LMICs and countries with weaker tobacco control policies. Yang et al. (2010) found that among smokers in China, knowledge of the harms of smoking was higher among older smokers, more educated smokers, and smokers with lower daily cigarette consumption (with no significant differences by sex or income). An ITC survey of smokers in India revealed higher levels of health knowledge among male versus female smokers, smokers in urban areas compared to rural areas, and those with higher education compared to the lowest education category (G. C. Sansone et al., 2012).

The aforementioned studies have used surveys with closed-ended questions to assess knowledge, in which smokers are asked about a health outcome and whether or not it is tied to smoking. However, Weinstein (2004) has suggested that such prompted recall makes it easier for smokers to identify illnesses caused by smoking, and a more accurate way of assessing knowledge is through unprompted recall, as measured by open-ended questions. He reasons that if individuals cannot identify the most severe health effects caused by smoking without prompting, they would be unable to use information about the harms in real life when deciding whether to smoke. Using 2000-2001 data from the Annenberg telephone survey of 776 adult and adolescent smokers and non-smokers, Weinstein and colleagues found that when respondents were asked to simply name which illnesses, if any, are caused by smoking cigarettes, lung cancer

was the only illness that a majority identified. Only about half of respondents named emphysema, around a quarter mentioned heart disease and oral cancer, and less than 5% listed stroke (Weinstein, Slovic, Waters, & Gibson, 2004). In addition, when asked about the severity, life expectancy, and amount of pain and suffering expected for lung cancer and emphysema, the majority of respondents underestimated the fatality rate and overestimated the longevity of people diagnosed with lung cancer, and over half of respondents said they knew little about the suffering experienced by people with emphysema. This demonstrates that even if people can recognize that a specific illness is related to smoking, they may not in fact understand the true nature and severity of that illness.

2.2 What Does It Mean To Be Fully Aware or Informed of the Risks of Smoking?

Chapman and Liberman (2005) have expanded upon Weinstein's argument in their attempt to define what makes a "fully informed" smoker. They make the case that there are four levels of being "informed" about the risks of smoking, beginning with Level 1, in which smokers are generally aware that smoking is harmful. Level 2 expands this awareness to the specific diseases that are caused by smoking, such as lung cancer and emphysema, and Level 3 encompasses an accurate appreciation of the meaning and severity of such diseases, including the probability of developing them and likelihood of survival. Even with that level of awareness, however, many smokers may not reach Level 4, which involves personally accepting that the risks understood in Levels 1-3 apply to one's *own* personal risk of contracting such diseases (Chapman & Liberman, 2005). Indeed, there is considerable research evidence demonstrating that when asked about their own chances of developing a disease from smoking, many smokers dismiss or underestimate their risk of harm.

Chapman and Liberman's model is similar to Weinstein's earlier model of the Precaution

Adoption Process, which he introduced in 1988 and refined in 1992. This model identifies seven stages that people must pass through before they will commence a health-protective behaviour, whether it be adopting a precautionary behaviour or ending a risky behaviour; as such, it would apply more to quitting smoking than starting smoking. The model proposes that at Stage 1, the person is still unaware of the health issue, which would likely not apply to most smokers. At Stage 2, the individual is aware of the hazard and believes that others are at risk from it, but they do not acknowledge their own personal susceptibility to harm. By Stage 3, they have accepted their personal risk of harm and are in the decision-making process of whether or not to take action. If they decide to take action, they move forward to Stages 5 through 7 (Stage 4 is deciding not to take action). According to this model then, accepting one's personal risk of harm is an important step towards taking a health-protective action, such as quitting smoking (Weinstein, Sandman, & Blalock, 1992; Weinstein, 1988).

Along the same line, Paul Slovic has argued that being knowledgeable about the risks of smoking means more than just providing an estimate of disease probability; it means appreciating the cumulative nature of risks that smoking presents, the severity of diseases caused by smoking, and the difficulty of stopping the harmful behaviour once it has been started (Slovic, 2000b).

2.3 Perceived Risk and Cognitive Biases

2.3.1 Defining Risk Perception

It is important, then, to not only evaluate and consider smokers' awareness of the harms of smoking, but also how they perceive these risks as applied to their own smoking behaviour. There are two dimensions of risk: the probability of a negative event occurring given exposure to a hazard, and the extent of harm that would be associated with the adverse event (Breakwell,

2007). Research within the psychometric paradigm has conceptualized risk perceptions of hazards as the degree to which the hazard is unknown and uncontrollable, and the degree to which the hazard is dreaded and expected to result in severe and unavoidable consequences (Slovic, 2001b). Following these conceptualizations, smoking or using tobacco would be a hazard, and the risk associated with tobacco use is what must be estimated by the individual. Risk perception is the subjective process whereby people estimate the likelihood and severity of risk, and it is during this process that cognitive biases can interfere with accurate risk assessment (Breakwell, 2007).

Perceived risks of smoking may include many dimensions, including perceived risk of addiction, financial risk, health risk, social risk (how smoking would affect interpersonal interactions or perceptions of oneself), or time risks (amount of time allocated to the habit) (Rindfleisch & Crockett, 1999), but this dissertation will be focused on perceived health risks of tobacco use.

2.3.2 Affect Heuristic in Risk Perception

While some individuals may approach risk estimation and decision making systematically, using logic and scientific reason (sometimes referred to as “risk as analysis”), when facing more uncertain situations and complex decisions, people tend to rely more on “risk as feelings”, using intuition or heuristics to make a decision (Peters, McCaul, Stefanek, & Nelson, 2006; Slovic & Peters, 2006). One such mental shortcut is the affect heuristic, in which people consult the positive and negative associations they have created with images in their mind in order to guide their risk estimation. These affective cues are often automatically accessed and not necessarily consciously perceived (Slovic, 2010). Paul Slovic and others have argued that the decision to smoke is most often not a rational, informed decision but rather an affect-based

choice relying more on immediate, positive feelings of fun and excitement associated with smoking rather than analytic assessments of poorly understood disease (Romer & Jamieson, 2001b; Slovic, 2001a).

2.3.3. Familiarity and Fluency Biases

Research on the mere-exposure effect has demonstrated that people perceive previously seen, familiar stimuli to be more safe than novel ones, which are associated with uncertainty (Zajonc, 1968). More recent findings have expanded upon this effect, as well as the “risk as feelings” approach, by demonstrating that processing fluency - affected by familiarity, visual presentation, and even semantic primes such as how difficult the name of a stimulus is to pronounce - affects risk judgments. Stimuli that are more quickly and fluently processed are perceived to be more familiar, eliciting a more positive affect response, resulting in lower perceptions of risk; disfluently processed stimuli are seen as more risky (Song & Schwarz, 2009). Though not often applied to smoking research, this bias may influence risk perceptions of unfamiliar tobacco products.

2.3.4 Optimistic Bias in Risk Perception

Another cognitive bias that influences the decision to start smoking is the optimistic belief that one can quit smoking at any time, and thus avoid any serious health risks before they occur. This optimism has been found to be a significant predictor of smoking trial among adolescents, who are more likely to try smoking if they believe that people can quit at any time (Romer, Jamieson, & Kirkland Ahern, 2001).

Optimistic bias also plays a major role in allowing smokers to continue smoking once they have already started. Optimistic bias, also referred to as unrealistic optimism, is a perceived invulnerability to harm, where one perceives their own risk of experiencing a negative event to

be less likely than the risk that other people face. This bias may be the result of cognitive heuristics or failure to understand that the same factors that affect others also apply to oneself, or it may be a defensive mechanism used to deny a risk of harm to oneself (Weinstein, 1980, 1989). Optimistic biases have been found to influence risk perceptions of many health and safety problems from the chance of getting cancer to being in a car accident, and there is also evidence that these biases significantly influence decision making (Breakwell, 2007). When applied to smoking, optimistic biases allow a smoker to perceive their own risk of harm from smoking to be lower than that of other smokers, even if they acknowledge that smoking in general is harmful. Indeed, researchers have repeatedly demonstrated the phenomenon whereby smokers perceive their own risk of harm to be lower than that of not only other smokers, but sometimes even non-smokers' risk of developing disease (Weinstein et al., 2005).

2.3.5 Cognitive Dissonance Theory

An optimistic bias may also result from the beliefs that smokers maintain in order to continue smoking with less psychological discomfort. Leon Festinger first introduced the Theory of Cognitive Dissonance in 1957, which holds that when there is a discrepancy between one's beliefs and behaviour, such as a smoker who knows the harms of smoking and wants to quit but has been unsuccessful in doing so, the result is an uncomfortable psychological state known as cognitive dissonance (Festinger, 1957). In order to reduce the dissonance, the individual must adjust either their beliefs or behaviour to be more in line with each other, and when the behaviour is very difficult to change (such as quitting smoking), one will choose to adjust their beliefs instead, such as by endorsing a belief that justifies the function of the behaviour (e.g., "smoking reduces stress or manages weight") or minimizes the negative effects of the behaviour (e.g., "the health risks of smoking are overestimated") (Fotuhi et al., 2013).

Endorsing a belief that one is less vulnerable to the risks of smoking because he or she exercises often and eats well, for example, would result in an optimistic bias that would reduce dissonance from smoking.

2.3.6 Theory of Motivated Reasoning

Ziva Kunda's (1990) Theory of Motivated Reasoning expands upon Cognitive Dissonance Theory by explaining how people go about changing their beliefs or attitudes to serve their cognitive needs. The theory holds that when people are motivated to hold a particular attitude or belief, they engage in motivated reasoning, or a biased search for prior attitudes or information that will confirm this belief. However, Kunda notes that motivated reasoning is only possible when the person can come up with reasonable justifications for their desired belief, as we are constrained by reality such as knowledge of our true (prior) attitudes. If there is strong information that clashes with one's goals, for example, the individual cannot ignore it and change their attitude completely, but they can still find enough justification to change their attitude to be more in line with the one they want to have (Kunda, 1990).

2.4 Evidence on Perceived Health Risks of Tobacco Use

Consistent with theories about perceived risk, scientific research on smokers' risk perceptions has demonstrated that smokers tend to underestimate the health risks of smoking, especially their own personal risk of disease from tobacco use. In a review of research on smokers' risk perceptions, Weinstein (1998) concluded that though smokers acknowledge some risks to smoking, they minimize their personal health risks, that is, they tend to believe that they are less likely to become addicted and to suffer the health effects of smoking compared to other smokers. His review found several mechanisms by which smokers minimize their personal risk of harm from smoking, including believing that their own brand of cigarettes is less harmful than

others, adjusting their estimate of the number of years of smoking needed to produce health effects based on how long they have been smoking, and believing that they are less addicted (and could more easily quit) compared to other smokers (Weinstein, 1998).

Research with adolescents has found that both smokers and non-smokers have an optimistic bias regarding the nature of addiction and health risks of smoking. In a survey of adolescent smokers, Slovic found that even though they could acknowledge that extensive smoking is eventually harmful to health, adolescent smokers perceived themselves to be at little or no risk from smoking because they expected to stop smoking before any damage to their health occurred (Slovic, 1998). Adolescent smokers are especially likely to deny the short-term risks of smoking, which may lead them to believe there is no harm from starting smoking, and that they can stop before the long-term consequences of smoking take effect (Slovic, 2000b). In a nationally representative phone survey of adolescents aged 14 to 22, both smokers and non-smokers overestimated the risk of contracting lung cancer for smokers, but most underestimated how often lung cancer is fatal and underestimated the total mortality risk of a smoking-related death. In addition, a large proportion of smokers viewed smoking as less risky for themselves compared to the average smoker (Romer & Jamieson, 2001a). In another study of both adolescents and adults, optimistic bias was found to be present among smokers, that is, smokers acknowledged that smoking is addictive and causes death in the long term but doubted that they themselves would die from smoking, and this bias was stronger among adolescents than adults. Adolescents were especially more likely to believe that they could quit smoking in a few years if they wished, suggesting that optimistic bias regarding addiction may play an important role in starting smoking (Arnett, 2000).

Of course, there is ample evidence that adult smokers also have inaccurate perceptions of

the risks they face from smoking, as summarized by Weinstein (1998). For example, smokers rate their own risk of lung cancer, heart disease, and lung disease to be lower than the average smoker (Lee, 1987); even among heavy smokers (who smoke at least 40 cigarettes a day), less than half perceive themselves to be at a higher personal risk of heart disease or cancer compared to their peers (Ayanian & Cleary, 1999); and even when smokers perceive themselves to be at higher risk for cancer, heart attack, and stroke compared to non-smokers, they still underestimate their own risk of each outcome compared to the actual risk (Strecher, Kreuter, & Kobrin, 1995).

Evidence from the ITC Project supports research findings that smokers tend to perceive their own personal risk of harm from smoking to be lower than others and that they may underestimate their risk of harm when they start smoking. An ITC Four Country Survey of nationally representative samples of smokers in four high-income countries – Canada, United States, United Kingdom, and Australia – asked respondents: “Let’s say you continue to smoke the amount that you do now. How would you compare your own chance of getting lung cancer/heart disease in the future to the chance of a non-smoker?”, with response options divided into low, moderate, and high risk. Only 35.6% and 33.5% of smokers perceived themselves to be at high risk of developing lung cancer and heart disease, respectively, compared to a non-smoker, and around 20% perceived themselves to be at low risk (Costello, Logel, Fong, Zanna, & McDonald, 2012). In addition, when asked the extent of their agreement with the statement: “If you had to do it again, you would not start smoking”, over 90% of smokers in each of the four countries agreed (Fong et al., 2004). The almost universal experience of regret for smoking among smokers in those countries suggests that smokers do not make a rational decision taking into account future consequences when they decide to start smoking. As Slovic (1998) has suggested, when individuals start smoking, they may base their decision more on immediate

affect and the more easily accessed benefits of smoking, they may underestimate their own personal risk of harm, or they may believe that they will quit before any harm is done, failing to account for the addictive nature of cigarettes. In another ITC study of four Asian countries, prevalence of regret in three countries (South Korea = 87%, Malaysia = 77%, China = 74%) was lower than that found by Fong et al. (2004) in the USA, Australia, Canada, and the UK, but was higher in Thailand (93%) (N. Sansone et al., 2013). So while the majority of smokers around the world appear to later regret their decision to start smoking, suggesting that they do not accurately perceive the risks of smoking when they choose to start, overall levels of regret among smokers is lower in countries with weak tobacco control policies and positive social norms toward smoking, demonstrating that it is still important to educate smokers about the harms of smoking.

2.5 Function of Biased Perceived Risks of Smoking

Knowledge and beliefs of the harms of smoking have not been found to be consistent predictors of the onset of smoking, which appears to be more strongly influenced by socioeconomic status and social variables (Conrad, Flay, & Hill, 1992). It is unlikely then, that individuals who perceive less risk from smoking are those that choose to smoke, and then maintain those beliefs. Rather, the evidence summarized above suggests that smokers adjust their perceptions of the risks of smoking after they have taken up the addictive habit. Drawing from Cognitive Dissonance Theory, adjustments to perceived risk may be used as a means of adjusting beliefs to be more in line with behaviour in order to reduce dissonance.

The beliefs that smokers maintain as means of dissonance reduction have been referred to as justifications or rationalizations (e.g., Festinger, 1957; Fotuhi et al., 2013), as well as risk-minimizing beliefs (Borland et al., 2009; Weinstein, 1998) or self-exempting beliefs (Chapman, Wong, & Smith, 1993; Oakes, Chapman, Borland, Balmford, & Trotter, 2004), all of which refer

to the psychological mechanisms smokers employ to reduce their perception of their own vulnerability to harm from smoking so that they can continue to smoke. Oakes et al. (2004) have identified four classes of these beliefs: “bulletproof” beliefs, through which smokers think they have some personal immunity to smoking’s harms (e.g., “I think I must have the sort of good health or genes that means I can smoke without getting any of the harms”); “skeptical” beliefs, which discount evidence about the harms of smoking and disease (e.g., “The medical evidence that smoking is harmful is exaggerated”); “jungle” beliefs, which normalize the dangers of smoking because of the ubiquity of risks in life (e.g., “Everything causes cancer these days”); and “worth it” beliefs, which argue that the benefits of smoking outweigh the risks (e.g., “You have got to die of something, so why not enjoy yourself and smoke”) (Oakes et al., 2004). The authors found that all four types of beliefs were related to interest in quitting, with “worth it” beliefs being especially strong predictors of not planning to quit. Borland et al. (2009) later examined the same four types of risk-minimizing beliefs among smokers in the ITC Four Country Project (Canada, US, UK, Australia) and found that when controlling for demographic variables, only three types of risk-minimizing beliefs (skeptical, jungle, and worth it) were negatively associated with intention to quit and making quit attempts at a follow-up wave (that is, those who held those beliefs were less likely to make a quit attempt), but self-exempting beliefs (bulletproof beliefs) were not associated with quitting. In addition, none of the beliefs were related to sustained quitting later on (Borland et al., 2009).

A recent study by Fotuhi et al. (2013) examined longitudinal data from the ITC 4-Country Survey to assess whether smokers change their beliefs and rationalizations as their smoking behaviour changes. The authors simplified smokers’ types of rationalizations for smoking into two: functional beliefs, which emphasize the functions or benefits of smoking, and

risk-minimizing beliefs, which minimize the risks or harms of smoking. The authors found that smokers' rationalizations were strongest when they were smoking (at Time 1) and lowest when they quit (at Time 2), but when a quit attempt failed and an individual returned to smoking, their rationalizations would return to original or close to original levels, providing further evidence that rationalizations are used as a means of justifying one's smoking behaviour when quitting (changing the behaviour) is too difficult or unsuccessful. In addition, the authors found that functional beliefs (e.g., smoking relieves stress) showed a greater amount of change than risk-minimizing beliefs, likely because they are harder to counter-argue with factual evidence, which supports Kunda's Theory of Motivated Reasoning (Fotuhi et al., 2013).

2.6 The Role of Perceived Risk on Behaviour

The way in which smokers perceive the risks of smoking - including the accuracy of the perception and how it applies to themselves - clearly has an important effect on behaviour. Major models of health behaviour, such as the Health Belief Model (Becker, 1974), Theory of Reasoned Action (Ajzen & Fishbein, 1980), and Protection Motivation Theory (Rogers, 1983) all include perceived risk as an important factor in the decision to start or stop a risky behaviour.

2.6.1 Perceived Risk and Quitting

While risk-minimizing beliefs and inaccurate perceptions or knowledge of the harms of smoking can allow smokers to more easily maintain their behaviour (and thus inhibit quitting), there is also evidence that greater perceived health risks from smoking can promote quitting (e.g., Romer & Jamieson, 2001). In one of the most rigorous tests of the relation between perceived risk and smoking cessation, Costello et al. (2012) examine longitudinal data from the ITC Four Country (US, UK, Canada, Australia) survey of adult smokers, which included the following measure of perceived risk, which was designed to minimize measurement error: "Let's

say you continue to smoke the amount that you do now. How would you compare your own chance of getting lung cancer (or heart disease) in the future to the chance of a non-smoker?” Perceived risk was evaluated at Time 1 and Time 2, along with plans to quit at both times and Time 2 attempts to quit and sustained quitting. The researchers found that when controlling for previous quitting plans and quit attempts, greater perceived risk predicted stronger plans to quit and more attempts to quit, with a weaker relation to sustained quitting, a more complex behaviour. This demonstrates the important role that perceived risk plays in motivating quitting behaviour among smokers (Costello et al., 2012).

2.6.2 Perceived Risk and Other Behaviours

Beyond the relationship between perceived risk from cigarette smoking and quitting behaviour, however, it is also important to consider the roles of other types of risk perceptions and behaviours. While smokers 50 years ago had only a handful of unfiltered cigarette brands from each major manufacturer to choose from, today there are over a thousand different brand styles and types of cigarettes available (Cummings, 2004). As cigarette manufacturers became aware of smokers’ concerns about the health risks of smoking and growing cognitive dissonance from smoking, they began to design and market cigarettes aimed at reducing smokers’ concerns and internal conflicts through their supposed low content of tar, nicotine, and other harmful smoke constituents (Pollay & Dewhirst, 2002). With the widespread promotions from cigarette manufacturers for “less harmful” cigarettes, it is now easier for smokers to adjust their behaviour in line with their beliefs (reducing psychological conflict) by simply switching to an alternative product rather than quitting smoking altogether. It should be noted that evidence has consistently found “light” cigarettes to be no less harmful for health than regular cigarettes, due to compensatory behaviours of smokers to reach their desired dose of nicotine, such as blocking

ventilation holes and increasing puffs per cigarette or cigarettes per day (Benowitz, 2001; Hammond, Fong, Cummings, & Hyland, 2005)

Nevertheless, research has shown that many smokers believe the marketing lies told by the tobacco industry that so-called “light” or “low tar” cigarettes are less harmful than regular cigarettes. A 2001 nationally representative survey of adult smokers in the United States, for example, found that the majority of smokers were not knowledgeable about low-tar and filtered cigarettes, with 64% and 65% saying “yes” or “don’t know” when asked if the reduction of tar and filters, respectively, makes cigarettes less dangerous to smokers (Cummings et al., 2004). Using data from the ITC Four Country survey, Borland et al. (2004) also found that the majority of smokers in all four countries (except Canada, 43%) held at least one of three beliefs that “light” cigarettes confer some sort of benefit to the smoker. These misperceptions are even higher in other countries, with 71% of adult smokers in China believing that “light” or “low tar” cigarettes are less harmful than full-flavoured cigarettes (Elton-Marshall et al., 2010). The majority of smokers in these studies also state that more than one “light” cigarette is needed to equal the amount of tar in a regular cigarette, suggesting that smokers believe that using these products serves as a harm-reduction strategy (Cummings et al., 2004; Kozlowski et al., 1998).

However, research has also shown that while smokers who switch from higher tar to “light” cigarettes may have a stronger desire to quit, they are no more likely to make quit attempts or be successful in quitting compared to regular cigarette smokers, suggesting that light cigarette smokers have a type of optimistic bias concerning their smoking behaviour (Borland et al., 2004; Hyland, Hughes, Farrelly, & Cummings, 2003). With the recent rise in popularity of electronic cigarettes (e-cigarettes) and the increased marketing of this product today as a safe alternative to cigarettes, it is likely that some smokers may begin to switch to e-cigarettes as a

new harm-reduction strategy to alleviate their concerns about the harms of smoking and any cognitive dissonance felt from their inability to quit smoking altogether. If the opportunity for smokers to switch to a different cigarette brand or type to reduce their cognitive dissonance prevents them from quitting altogether, this is undesirable from a public health perspective.

2.7 Perceived Risk of Other Tobacco Products

Almost all of the research on perceived risk and tobacco use has been conducted with cigarette smokers, estimating the risks of smoking or of lower harm alternatives to cigarettes such as “light” cigarettes or e-cigarettes. Relatively little research has examined perceptions of tobacco products that are commonly used in other parts of the world, such as smokeless tobacco or hand-rolled forms of smoked tobacco, or examined tobacco user’s risk perceptions of products that they do not use rather than only their own product.

Some research has evaluated perceptions of other tobacco products among U.S. samples, and found that tobacco risk perceptions vary by product. A 2005 study using a nationally representative sample of high school seniors in the U.S. examined the relationship between current smoking status and perceived risk of harm from smoking or smokeless tobacco use. Overall, the majority (74%) of high school seniors perceived a ‘great risk’ of harm from smoking cigarettes, and 45% perceived smokeless tobacco to carry a great risk of harm. When comparing evaluations for the two products, non-smokers were more likely to rate the two products equally in harm, and smokers who smoked a pack or more per day were more likely than those who smoked fewer cigarettes per day to perceive a greater risk from using smokeless tobacco compared to cigarettes (Tomar & Hatsukami, 2007). This suggests that heavier smokers rate a different product as more harmful than their own product, perhaps as a form of risk-

minimization, but the study was limited by not evaluating the perceptions of smokeless tobacco users or asking respondents to directly compare the risk of harm of different products.

A 2007 study using ITC data from tobacco users in Canada, the U.S., U.K., and Australia examined both use of and beliefs about the harmfulness of cigars, pipes, smokeless tobacco, factory-made cigarettes, and roll-your-own cigarettes among current cigarette smokers, and found that beliefs about the harmfulness of other products depended on whether one uses those products. That is, those who used exclusively factory-made cigarettes were the most likely group to rate cigarettes as the least harmful of all products, those who used cigars (in addition to cigarettes) were more likely to rate cigars as the least harmful product compared to those who didn't use cigars, those who used pipe tobacco were more likely to rate pipes as least harmful, and so on. The authors suggested that this tendency to perceive other products as less harmful than your own might be a type of risk-minimizing belief or rationalization (O'Connor et al., 2007).

One of the only studies to compare risk perceptions of various products across user types who exclusively use different products was conducted using 2008 survey data from adults in the United States who used either cigarettes, smokeless tobacco, or both, and evaluated perceptions that smokeless tobacco is more or less harmful than cigarettes. Of those who said that smokeless tobacco is more harmful, the majority were cigarette smokers, the majority of those who said smokeless is less harmful than cigarettes were smokeless tobacco users, and the majority of those who said they're equally harmful were dual users of both products (McClave-Regan & Berkowitz, 2011). Again, this suggests that risk perceptions of tobacco products are influenced by the product one uses, and perhaps used as a means of justifying use of that product by

perceiving it to be less harmful than alternatives. However, none of these studies have looked at tobacco product risk perceptions outside of the United States, or longitudinally.

It is clearly important to more fully understand the relationship between perceived risk and behaviour, especially concerning risk perceptions of different products and product switching. Much of the research on risk perceptions has been conducted in high-income countries with relatively strong tobacco control policies compared to low- and middle-income countries, which often have weaker resources and political power to enact policies, as well as higher smoking rates, lower knowledge of the harms of tobacco use, and wider variation in types of tobacco products consumed. Considering that over 80% of future deaths from tobacco-related illnesses will occur in LMICs, it is important to understand perceptions of risk as it relates to tobacco products and behaviour in these areas.

2.8 Tobacco Use in India and Bangladesh

India and Bangladesh are two nations in Southeast Asia with high rates of tobacco use, including some of the highest rates of smokeless tobacco use in the world (Eriksen, Mackay, & Ross, 2012). While both nations are parties to the Framework Convention on Tobacco Control (FCTC) and have enacted various tobacco control policies, overall rates of tobacco use remain high at 35% of adults in India and 43% of adults in Bangladesh. Smokeless tobacco is the most common type of tobacco used in both countries, with bidi prevalence slightly higher than cigarettes in India and cigarette prevalence higher than bidis in Bangladesh (see Table 1 for current prevalence rates).

Table 1. Adult Tobacco Use Prevalence (%) in India and Bangladesh

	India			Bangladesh		
	Total	Males	Females	Total	Males	Females
Current tobacco users (all forms)	34.6	47.9	20.3	43.3	58.0	28.7
Current cigarette smokers	5.7	10.3	0.8	14.2	28.3	0.2
Current bidi smokers	9.2	16.0	1.9	11.2	21.4	1.1
Current smokeless tobacco users	25.9	32.9	18.4	27.2	26.4	27.9

Sources: (World Health Organization, 2009a, 2009b)

2.7.1 Prevalence Rates

The ITC Surveys in India and Bangladesh have found similar prevalence rates for tobacco use. The 2009 ITC Bangladesh Wave 1 Survey - a nationally representative survey of 3107 adult tobacco users and 2,656 non-users - found that smokeless tobacco had the highest prevalence rate (29.8%) among adults, while 22% of adults used smoked tobacco. Of those who reported using smoked tobacco, 9.4% smoked cigarettes only, 9.4% smoked both cigarettes and bidis, only 3.1% used bidis, and 1% reported smoking hookah (ITC Project, 2010). The 2010-2011 ITC India Wave 1 Survey - a survey of adult tobacco users and non-users in four major cities and their surrounding rural districts in the states of Bihar, West Bengal, Madhya Pradesh, and Maharashtra – also found that smokeless tobacco was the most commonly used tobacco product in all four states. More than half of tobacco users in each state reported using smokeless tobacco only (ranging from 52% in West Bengal to 84% in Maharashtra), which was consumed most often in the form of chewing tobacco, including khaini, gutka, and plain chewing tobacco. Powdered forms of smokeless tobacco applied to the teeth and gums, including lal dantmanjan and mishri, were also commonly reported among smokeless users. The percentage of tobacco

users who reported using smoked tobacco ranged from 6% to 33% across the four states, with cigarettes being the most commonly smoked product in three states, followed by bidis and hookah, and bidis being most common in Madhya Pradesh. Only a small proportion (less than one quarter) of tobacco users in all four states reported using both smoked and smokeless tobacco. (ITC Project, 2013)

2.7.2 Types of Tobacco Products Used

Though there is no such thing as a safe tobacco product, different products can carry with them different risks from use. Bidis, which are commonly used among people of lower socioeconomic status in South Asian countries including India and Bangladesh, are thin hand-rolled cigarettes containing tobacco wrapped in a tendu or temburni leaf and tied with string. The bidi is a very dangerous product, with higher concentrations of nicotine (thus making them highly addictive), tar, and carbon monoxide than conventional cigarettes, and bidi smoking is associated with several types of cancer and other diseases (Centers for Disease Control and Prevention, 2013a; Rahman & Fukui, 2000). Smokeless tobacco, on the other hand, is generally considered to be less harmful than conventional cigarettes, but there are many different types of smokeless tobacco and all carry with them various health risks. Smokeless tobacco can be chewed, sucked, or applied to the teeth and gums, depending on the product, with the most commonly used form in South Asia being betel quid or paan - a mixture of betel leaf, areca nut, slaked lime, and flavourings, which when combined with tobacco is known as gutka and is a highly addictive and carcinogenic product. Smokeless tobacco use in South Asia is a significant contributor to mortality and is associated with many types of cancers, especially oral cancers, and adverse reproductive outcomes among pregnant women. (Gupta & Ray, 2003)

2.7.3 Awareness of the Harms

Relative to high-income Western countries, little is known about awareness of the harms of tobacco use in India and Bangladesh, especially awareness of the health effects of products other than cigarettes. Data from the TCP¹ India Pilot Study Survey, a precursor to the Wave 1 Survey which was conducted in 2006 among 764 respondents in two states - Maharashtra and Bihar – suggested overall low awareness of the health effects of both smoked and smokeless tobacco products. Among smokers (of both cigarettes and bidis) in India, only 60% believed that smoking causes lung cancer and only 21% believed it causes stroke and coronary heart disease. In addition, the majority of smokers were not concerned about the negative consequences of smoking on their personal health and stated that smoking has not damaged their health (G. C. Sansone et al., 2012). Among smokeless tobacco users in the same survey, 77% believed that smokeless tobacco causes mouth cancer, 66% believed it causes gum diseases, and 56% believed it causes difficulty in opening the mouth. In addition, the majority of smokeless tobacco users in Maharashtra (72%) and 44% in Bihar said that smokeless use has ‘not at all’ damaged their health (Raute et al., 2011). Knowledge of the health risks was slightly higher in Bangladesh, though still lower than many high-income countries, with 85% of smokers at Wave 2 stating that smoking causes lung cancer and around three-quarters believing it causes heart disease (79%) and mouth cancer (74%) (ITC Project, 2011).

2.7.4 Perceived Risk of Tobacco Use

Even less is known about risk perceptions of tobacco use in India and Bangladesh; there have been no studies to date on risk perceptions of the various tobacco products that are consumed in these countries. Given the serious health risks of all forms of tobacco products, the

¹ In India, the ITC Project is referred to as the TCP (Tobacco Control Project) to prevent confusion with ITC Limited, an Indian tobacco company.

high prevalence of tobacco use in South Asia, especially India and Bangladesh, along with low knowledge of the risks of using these products, it is important to understand more about perceptions of the risks of tobacco products that are used there. In view of the previously discussed evidence demonstrating the important role that risk perceptions play in maintaining tobacco use and the consequences that risk perceptions have on future behaviour, including quitting and possibly switching to other products, it is even more critical to understand the relationships between perceptions of products and tobacco use behaviour in India and Bangladesh.

3.0 Research Objectives and Hypotheses

3.1 Research Objectives

The main purpose of this dissertation is to evaluate risk perceptions of tobacco products in India and Bangladesh and the effects these perceptions may have on behaviour. Specifically, the following research objectives are addressed:

1. Evaluate health risk perceptions of tobacco use and differences in risk perceptions associated with specific tobacco products that are commonly used in India and Bangladesh. This includes the following research questions:
 - a) What are tobacco users' and non-users' perceptions of the riskiness of tobacco use?
 - b) Do general health risk perceptions from tobacco use differ across different types of tobacco users?
 - c) What are tobacco users' and non-users' perceptions of the riskiness of specific tobacco products in comparison to other tobacco products?
 - d) Do these product risk perceptions differ across different types of tobacco users?
2. Determine if certain factors can predict a tobacco user's risk perceptions of various tobacco products, that is, whether they perceive one product to be more or less harmful than another. Factors to evaluate as possible predictors of product risk perceptions in both India and Bangladesh include:
 - a) Type of tobacco user (controlling for demographic variables);
 - b) Demographics variables, including state or division, urban or rural residence, gender, age group, income, and education;
 - c) Heaviness of tobacco use and perceived addiction to one's tobacco product;

- d) General health risk perceptions of using tobacco.
3. Test the direction of the association between product risk perceptions and behaviour change. Specifically, this involves exploring if product risk perceptions predict whether a tobacco user continues using their product, switches to a different tobacco product, or quits using tobacco; or, if changes in use of tobacco products result in changes to product risk perceptions. As this objective involves longitudinal data analysis, it can only be explored in Bangladesh.

This final objective concerning product switching is particularly important, as its purpose is to disentangle the question of whether tobacco users choose their product based on their risk perceptions of that product, or if risk perceptions are adjusted as a means of justifying or rationalizing the product they are already using. For example, if a survey respondent switches products between survey waves and also adjusts their risk perceptions in line with the product they are now using, this would suggest that risk perceptions are a psychological mechanism for justifying one's behaviour.

3.2 Research Hypotheses

Taking into account previous research on perceived risk of tobacco use and products, hypotheses concerning each of the research objectives described above are as follows:

- 1) Perceptions of the health risks for tobacco use in general will be fairly low, due to weaker tobacco control policies and education on the harms of tobacco along with more positive societal norms toward smoking in India and Bangladesh compared to most high-income countries.
- 2) Risk perceptions for specific tobacco products will be related to which product one currently uses; for example, a cigarette smoker would perceive smokeless tobacco to be

more harmful than cigarettes, whereas a smokeless user would perceive cigarettes to be more harmful than smokeless tobacco. This is expected based on previous research findings that tobacco users rate other products as more harmful than their own, perhaps as a means of justifying their tobacco use (see section 2.7).

- 3) Type of tobacco user should be a strong predictor of tobacco product risk perceptions, with tobacco users being more likely to say that their own product is less harmful than other products. Strength of addiction to tobacco use (including heaviness of use and perceived addiction) is expected to influence product risk perceptions in that those who are more heavily addicted may be more likely to say that other products are more harmful than their own. This should be true if product risk perceptions are a type of rationalization for tobacco use, as those who are more heavily addicted may have a greater need to justify their behaviour. This prediction is supported by previous findings that higher heaviness of smoking scores (based on number of cigarettes per day and time until first cigarette of the day) are associated with lower perceptions of risks from smoking (Costello et al., 2012), and findings that cigarette smokers who smoke more cigarettes per day are more likely than lighter smokers to perceive other products to be more harmful than cigarettes (Tomar & Hatsukami, 2007). On the other hand, those who perceive greater health risks from tobacco use in general should be less likely to say that their product is less harmful than others. Because greater perceptions of health risks are associated with stronger intentions to quit (Costello et al., 2012), those with greater perceived risks should not have as strong a need to endorse the belief that their product is less harmful than others to continue smoking.

4) Regarding the final objective to determine the role that perceived risk plays on future behaviour, it would be easy to make predictions in either direction. If risk perceptions are based on beliefs held as a result of acquired knowledge on the harms of tobacco products, and are thus held with the belief that they are truly accurate, then we would expect risk perceptions to remain consistent even if a tobacco user switches from using one product to another between waves. However, if risk perceptions are maintained and adjusted more as a means of justifying one's current behaviour, then we would expect them to change following a behaviour change (i.e., switching from one product to another). Indeed, I expect to find the latter outcome – that a tobacco user's risk perceptions of products will change if he/she switches products, in order to justify their behaviour – as predicted by cognitive dissonance theory and previously discussed findings concerning risk-minimizing beliefs (especially Fotuhi et al., 2013). However, in these cases I would not expect beliefs to be completely reversed following a product switch – that is, if a smoker strongly believes that smokeless tobacco is more harmful than cigarettes before switching to smokeless tobacco, that individual may not go so far now as to strongly believe that cigarettes are now more harmful, as predicted by the Theory of Motivated Reasoning and reality constraints (Kunda, 1990). Instead, I would expect to see a shift in risk perceptions so that those who switch products still adjust their beliefs to be more in line with what they want to believe (i.e., that the product they are now using is not that harmful).

4.0 Methods

4.1 The International Tobacco Control (ITC) Project

The International Tobacco Control (ITC) Project is a research collaboration across 22 countries - Canada, United States, United Kingdom, Australia, Thailand, Malaysia, Republic of Korea, China, Mexico, Uruguay, New Zealand, France, Germany, the Netherlands, Bhutan, Ireland, Brazil, India, Bangladesh, Mauritius, Kenya, and Zambia – inhabited by over 70% of the world’s tobacco users. The main goal of the project is to evaluate the psychosocial and behavioural effects of tobacco control policies such as health warning labels or smoke-free legislation. In each country, large-scale prospective cohort surveys are conducted using the same key measures and rigorous methodology to allow for comparisons across countries. The survey measures - which include items on individual smoking behaviour, attitudes towards tobacco control policies, and psychosocial beliefs about smoking - and research design allow for evaluations of tobacco control policies and changes in beliefs, knowledge, or behaviour within a population over time. More details on the conceptual framework and methodology of the ITC Project can be found in Fong et al. (2006) and Thompson et al. (2006).

4.2 Sample and Methods of the TCP India Project

In India, the ITC Project is called the TCP (Tobacco Control Policy) India Survey in order to avoid confusion with ITC Limited (the India Tobacco Company), the leading tobacco company in India. The TCP India Project was created in 2006 to evaluate the psychosocial and behavioural effects of tobacco control legislation in India and to understand more about patterns of tobacco use in low- and middle-income countries (LMICs). The project is a collaboration between researchers at the University of Waterloo, the Roswell Park Cancer Institute, the University of South Carolina, and the Healis-Sekhsaria Institute for Public Health in India.

Healis was responsible for working with collaborating institutes in each state in India to carry out the survey fieldwork. The project is expected to have three survey waves; two have been completed thus far, but at the time of this dissertation, data from only Wave 1 was available.

The TCP India Project is a prospective cohort study of adult (aged 15 or older) tobacco users and non-users in four states in India: Maharashtra, West Bengal, Bihar, and Madhya Pradesh. In each state, the capital city (Mumbai in Maharashtra, Patna in Bihar, Indore in Madhya Pradesh, and Kolkata in West Bengal) and its surrounding rural villages were surveyed. Within each of the four urban cities, ten wards were selected with probability proportional to size, each with an intended sample size of 150 households. Within each ward, ten enumeration blocks were randomly selected, and attempts were made to interview the maximum number of households from the first enumeration block before continuing with the next block until the sample size was reached. The dwellings within each enumeration block were approached in random order. Within the surrounding rural areas in each state, a single district was chosen and four villages were selected from those with at least 1000 households in each district, with probability of selection proportional to size. Dwellings were randomly approached until 125 households in each village were successfully interviewed. Households that were successfully contacted completed a Household Enumeration Form administered by an interviewer, which was a 15-20 minute interview to determine the tobacco use status, gender, age, and language of all household members, as well as the socio-economic status of the household. In total, 9699 households across all four states were enumerated, and from those households, 8051 tobacco users and 2534 non-users then completed the ITC Survey. The Wave 1 Survey was carried out between August 2010 and October 2011.

Within each selected household, eligible respondents could be smoked tobacco users,

smokeless tobacco users, mixed users (who used both smoked and smokeless tobacco), or non-users of tobacco. A current tobacco user was defined as someone who was currently using their product at least once a month. Up to four adults who were tobacco users were selected to be interviewed from each household, and up to one adult non-user from every third household that was enumerated was randomly selected for an interview. Once a respondent was selected and agreed to participate, he or she was provided with an information letter and gave their informed consent. The individual then completed a screener survey to determine which type of survey they should complete based on their tobacco use status, and then completed the survey face-to-face with an interviewer in their selected language (Hindi, Bengali, Marathi, or English), which took approximately 90 minutes for a tobacco user and 45 minutes for a non-user. At the end of the interview, each respondent was debriefed and remunerated with a small gift which differed by state. Further information on the sampling design and methods of the TCP India Project can be found in the TCP India Survey Wave 1 Technical Report, available at www.itcproject.org (see also Appendix A).

The TCP India Project received ethical approval from the Office of Research Ethics at the University of Waterloo (Waterloo, Canada) and from the Healis-Institutional Review Board at the Healis-Sekhsaria Institute for Public Health (Navi Mumbai, India).

4.3 Sample and Methods of the ITC Bangladesh Project

The ITC Bangladesh Project was established in 2008 as a collaboration between the University of Dhaka in Bangladesh and the University of Waterloo in Canada, with the goal of estimating tobacco use prevalence and patterns in Bangladesh, evaluating tobacco control policies, and understanding the behaviour and beliefs of tobacco users and non-users. The ITC Bangladesh Project is a longitudinal cohort study, meaning that respondents who participated in

the first survey wave were recontacted to participate in subsequent waves. Three survey waves have been completed thus far, with a fourth wave expected to begin in Fall 2014. Wave 1 was conducted between February and May of 2009, Wave 2 from March to June 2010, and Wave 3 from November 2011 to May 2012.

The ITC Bangladesh Survey is a nationally representative probability sample of tobacco users and non-users selected through a multi-stage clustered sampling design. In Wave 1, the total sample included two groups: a national sample representing the broad national population of Bangladesh, and a floating population sample representing the floating (not included in official census) and urban poor population. For the national sample, 23 of the 64 districts covering Bangladesh were selected: 20 randomly with probability proportional to size, and 3 purposively to include tribal and border populations. Within each district, 40 upazilas or sub districts were selected, then 2 villages from each upazila were selected, all with probability proportional to size, resulting in 80 villages and 450 households that were enumerated. For the floating or slum population sample, six urban slums within Dhaka and surrounding areas were selected, with a total sample of 552 households.

As with India, selected households first completed an enumeration form before the survey was conducted. The enumeration form was used to determine the socio-economic status of the household and the tobacco use status, gender, age, ethnicity of the individuals in each household. To be defined as a current tobacco user, an individual had to be currently using a specific tobacco product at least once a week. Among the floating population, enumeration and surveys were conducted on the same visit, but among the national population, surveys were conducted two months after enumeration. Within selected households without tobacco users, one non-user was randomly selected to complete the survey, and within households with tobacco

users, all available users plus one randomly selected non-user were surveyed. As such, the sample of households was chosen to be nationally representative, and within households, the sampling rate was higher for tobacco users than for non-users. Survey weights were later computed to adjust for varying inclusion probabilities so that tobacco users would be nationally representative of tobacco users in Bangladesh and the non-user sample would be nationally representative of non-users. All respondents were aged 15 or older. Once a respondent was selected, they received an information letter and provided written consent to participate. The main survey was then conducted face-to-face in one of three languages – Bengali, Garo, or Chakma – based on location of the survey. Tobacco user surveys took about an hour and a half to complete and non-smoker surveys were conducted in 30-45 minutes. At the end of the interview, respondents were debriefed and remunerated with 200 Taka (approximately 3.00 USD) per household. The total sample size of the Wave 1 Survey comprised 3107 tobacco users and 2656 non-users of tobacco.

At the two subsequent survey waves, as many respondents as possible from the previous wave were recontacted for participation to allow for longitudinal cohort data over time. Even if respondents had quit using tobacco since the prior wave, they were still asked to participate and administered a quitter survey. New respondents were selected and interviewed to replace any respondents who were lost at follow-up; interviewers selected respondents from households who were enumerated at Wave 1 but not yet interviewed before requesting a new randomly selected sample. Due to the nature of the floating population, only some of these respondents were able to be recontacted at Wave 2, and none could be recontacted at Wave 3, thus the majority of these respondents were newly recruited at each wave. A total of 2398 tobacco users, and 2742 non-users (which includes quitters) completed the Wave 2 Survey, and the Wave 3 sample consisted

of 3275 tobacco users and 2247 non-users. More details on sampling and survey methods at each of the three waves, as well as retention rates between each wave, can be found in the ITC Bangladesh technical reports at www.itcproject.org (see also Appendix A).

The ITC Bangladesh Project received ethical approval from the Office of Research Ethics at the University of Waterloo (Waterloo, Canada) and the Ethical Review Committee of the Bangladesh Medical Research Council (Dhaka, Bangladesh).

4.4 Survey Types

All ITC surveys are designed to be functionally equivalent across countries to allow for cross-country comparisons on key measures of tobacco use behaviour and attitudes. While some ITC countries include only cigarette smoker or non-smoker surveys, the India and Bangladesh surveys were slightly more complicated due to the wide variety of tobacco user types. Before respondents completed the main survey, they completed a brief screener survey to determine their tobacco use status (i.e., cigarette smoker, bidi smoker, smokeless user, mixed user, non-user), then they were administered a survey based on their user type. All surveys included questions relevant to tobacco policies (e.g., warning labels, prices), as well as measures of smoking behaviour, attitudes, beliefs, psychosocial moderators, and demographic variables. Most measures were asked identically across survey types, but some measures of tobacco use behaviour were specific to the respondent's type of tobacco used.

4.4.1 Surveys in India

Wave 1 of the India Survey included four types of surveys: a smoked user survey for those who used only smoked tobacco products (including bidis or cigarettes), a smokeless user survey for those who only used smokeless tobacco products, a mixed user survey for those who used both smoked and smokeless tobacco, and a non-user survey for those who had never used

tobacco or were ex-tobacco users.

4.4.2 Surveys in Bangladesh

At Wave 1 of the Bangladesh Survey, respondents were administered one of three types of surveys depending on their tobacco use: a cigarette/dual user survey for those who smoked cigarettes or both cigarettes and bidis, a bidi survey for those who smoked only bidis, and a non-smoker survey. At Wave 2, a fourth dual smoker survey was added so that those who smoked both cigarettes and bidis responded to a separate survey. Any respondents who used smokeless tobacco in addition to another product responded to the survey regarding the other product, but if they exclusively used smokeless tobacco they responded to the non-smoker survey. Waves 2 and 3 also included a quitter survey for those who were smoking at a previous wave but had since stopped. At Wave 3, a separate smokeless user survey was added for those who used exclusively smokeless tobacco, and a mixed user survey was also added for those who used both smoked and smokeless tobacco.

A summary of all survey types and respondents in both India and Bangladesh is displayed in Table 2.

Table 2. Survey and Respondent Types for India W1 and Bangladesh W1-3

Survey Wave	India Wave 1	Bangladesh Wave 1	Bangladesh Wave 2	Bangladesh Wave 3
Survey Dates	August 2010 - October 2011	February - May 2009	March - June 2010	November 2011 - May 2012
Survey Type	Face-to-face interview			
Sampling	Four states: Maharashtra, West Bengal, Bihar, and Madhya Pradesh	Nationally representative probability sample		
Respondent Types	Smoked user (bidis and/or cigarettes), smokeless user, mixed user (smoked and smokeless products), non-user	Cigarette/dual user, bidi user, non-smoker	Cigarette user, bidi user, dual user (cig and bidi), non-smoker	Cigarette user, bidi user, dual user, mixed user, smokeless user, non-user
Number of Respondents	1255 smoked users, 805 mixed users, 5989 smokeless users, 2534 non-users	3107 smokers (2390 cigarette, 415 bidi, 302 dual), 2656 non-smokers	2938 smokers (2306 cigarettes, 359 bidi, 273 dual), 169 quitters, 2573 non-smokers	3275 tobacco users (1723 cigarette, 267 bidi, 207 dual, 297 mixed, 781 smokeless), 242 quitters, 2005 non-users

4.5 Measures of Interest

The ITC Surveys include a wide variety of measures, but only certain sets of measures were included in analyses for the purposes of this dissertation. All measures that were used in analyses are described in detail within each results chapter, but a summary of all measures is included below.

4.5.1 Demographic Measures

Demographic measures for each respondent were included in several analyses as control variables. These variables include gender, age group (15-17 years, 18-14, 25-39, 40-54, and 55 or older), urban or rural residence, monthly household income (low, moderate, or high), respondent's highest level of education achieved (low, moderate, or high), state in India (West Bengal, Madhya Pradesh, Maharashtra, Bihar), and division in Bangladesh (Barisal, Chittagong, Khulna, Rajshahi, Sylhet, Dhaka). The specific income and education levels that made up the categories in India and Bangladesh are described in more detail in Chapter 8 where they are first included in analyses. Type of tobacco user (i.e., cigarette smoker, bidi smoker, dual smoker, mixed user, smokeless user, non-user) is also an important variable used in all analyses.

4.5.2 Health Risk Perceptions

All tobacco users were asked questions that measured their own personal perceived health risks from using their product. This included perceptions of how much smoking or smokeless use has damaged their health, how worried they are that it will damage their health in the future, and how they would compare their own chance of getting lung cancer or mouth cancer (the latter was asked of smokeless tobacco users) to a non-user if they continue using their product at the same rate. These measures of perceived risk were specific to the type of tobacco the respondent used, but all respondents were also asked whether smoked tobacco and smokeless

tobacco are good for health or not (in India, respondents were asked about smoked and smokeless tobacco, and in Bangladesh, respondents were asked about cigarettes, bidis, and smokeless tobacco).

4.5.3 Product Risk Perceptions

In addition to measures of the health risks of using their own products, all respondents were asked about their perceptions of the risk of other products. All respondents in both India and Bangladesh were asked if a particular tobacco product is less harmful, more harmful, or no different for health compared to another product, with the three comparisons being cigarettes compared to bidis, smokeless tobacco compared to cigarettes, and smokeless compared to bidis. Respondents could also reply with ‘don’t know’ to each question.

All users in India and Bangladesh were also asked about why they started using their product; respondents answer ‘yes’ or ‘no’ to a series of possible reasons for starting to use their product, such as to reduce stress or because their friends were using it. One of the options is because the product ‘is less harmful than other forms of tobacco’. While this measure is subject to possible memory bias, it was included as a measure of product risk perception when analyzing data from those who switch products between waves.

4.5.4 Other Variables

Other measures that are included in some analyses include three measures of tobacco use and addiction: how many times, on average, a tobacco user’s product is used each day, how soon after waking the user first uses their product, and how addicted to their product the user perceives themselves to be. These measures are described in more detail in section 8.2.1.

4.6 Data Analysis

After survey fieldwork was completed in each country, the researchers within each country checked the completed questionnaires and entered the data into a template before sending it to the ITC Data Management Centre (DMC) at the University of Waterloo. Data analysts within the DMC then checked the data for outliers, out-of-range values, mismatches between forms or waves, and any other errors, before releasing the data for analysis. There are also several quality control measures in place throughout the data collection process to ensure accuracy of the interviews and data, which are described in the technical reports. The data analysts also constructed cross-sectional and longitudinal survey weights for the data to account for the varying inclusion probabilities of individuals who were interviewed, as well as adjustments for non-response and attrition. The methods for all weights construction are also included in the technical reports for each country.

After receiving the data, I ensured data were complete and accurate for all measures of interest, combined multiple waves of data in Bangladesh (matching variables on the unique IDs of the respondents), and combined the core information for respondents collected at enumeration to the survey data in both India and Bangladesh. Several variables were recoded into different categories (e.g., creating three income categories or a dichotomous variable for logistic regression), and any responses of ‘refused’ to answer for any measure were coded as missing. Responses of ‘don’t know’ were coded as missing only for variables where ‘don’t know’ was not a meaningful response (e.g., ‘Don’t know’ was a valid response for measures of perceived harm of tobacco products and so those responses were maintained). All analyses included in this dissertation were conducted in IBM SPSS Statistics version 22.0, using the Complex Samples Module so that all frequencies and analyses (unless otherwise noted) take into account the survey

weights, stratification, and multistage structure of the sampling design of the surveys, unless otherwise stated. Specific analyses that were conducted for this dissertation are described in detail within each relevant results section.

5.0 Sample Characteristics

5.1 Characteristics of the India Wave 1 Sample

The sample characteristics of the Wave 1 India sample are presented in Table 3. The non-tobacco user sample consisted of around two-thirds females and one-third males, whereas the tobacco user sample was the reverse, with about two-thirds males and one-third females; the majority of female tobacco users exclusively used smokeless tobacco. The majority of respondents were middle-aged, with bidi smokers having the lowest proportion of young respondents (aged 15-24) and the highest proportion of older respondents above the age of 55. Cigarette smokers had the highest proportion of urban residents, while bidi smokers had the highest proportion of rural residents. Cigarette smokers also had the highest proportion of respondents in the highest education and income categories, while bidi smokers had the highest proportion of low education and income respondents. Most tobacco users were daily users of their product(s).

Table 3. Characteristics of the India Wave 1 Sample (Unweighted)

Characteristic	All Tobacco Users (n=8051)	Smoked Users (n=1255)	Cigarette Smokers (n=436)	Bidi Smokers (n=444)	Smokeless Users (n=5991)	Mixed Users (n=805)	Non-Users (n=2534)
	%(n)	%(n)	%(n)	%(n)	%(n)	%(n)	%(n)
Sex							
Female	32.2 (2602)	2.9 (37)	0.4 (2)	4.1 (18)	42.6 (2552)	1.6 (13)	65.3 (1655)
Male	67.7 (5449)	97.1 (1218)	99.6 (502)	95.9 (426)	57.4 (3439)	98.4 (792)	34.7 (879)
Age Group							
15-17	2.2 (176)	0.7 (9)	1.4 (7)	0 (0)	2.6 (158)	1.1 (9)	7.9 (201)
18-24	11.4 (914)	7.6 (95)	14.1 (71)	1.8 (8)	12.1 (725)	11.7 (94)	21.3 (539)
25-39	33.3 (2677)	30.2 (379)	37.9 (191)	17.3 (77)	33.3 (1996)	37.5 (302)	37.4 (947)
40-54	30.1 (2421)	35.2 (442)	26.8 (135)	42.3 (188)	28.4 (1703)	34.3 (276)	20.6 (523)
55+	23.1 (1863)	26.3 (330)	19.8 (100)	38.5 (171)	23.5 (1409)	15.4 (124)	12.8 (324)
Urban/Rural							
Urban	72.9 (5866)	67.9 (852)	86.5 (436)	48.0 (213)	73.4 (4398)	76.5 (616)	74.6 (1890)
Rural	27.1 (2185)	32.1 (403)	13.5 (68)	52.0 (231)	26.6 (1593)	23.5 (189)	25.4 (644)
Education							
Low	60.2 (4839)	54.3 (678)	31.4 (158)	79.8 (352)	61.2 (3660)	62.4 (501)	38.1 (965)
Moderate	29.4 (2366)	28.4 (355)	37.2 (187)	17.7 (78)	30.0 (1797)	26.7 (214)	39.0 (986)
High	10.3 (831)	17.3 (216)	31.4 (158)	2.5 (11)	8.8 (527)	11.0 (88)	22.9 (580)
Income							
Low	27.8 (2239)	31.7 (398)	14.5 (73)	43.2 (192)	26.2 (1570)	33.7 (271)	23.3 (591)
Moderate	56.2 (4524)	49.5 (621)	55.0 (277)	46.2 (205)	58.1 (3482)	52.3 (421)	54.3 (1376)
High	13.3 (1069)	16.3 (205)	27.8 (140)	7.0 (31)	12.9 (773)	11.3 (91)	18.7 (474)
Cigarette Smoking Status							
Daily	77.0 (1068)	81.2 (643)	87.1 (438)	n/a	n/a	71.4 (425)	n/a
Less than daily	13.3 (184)	11.1 (88)	9.5 (48)	n/a	n/a	16.1 (96)	n/a
Less than weekly	9.7 (135)	7.7 (61)	3.4 (17)	n/a	n/a	12.4 (74)	n/a

Table 3 (continued). Characteristics of the India Wave 1 Sample (Unweighted)

Characteristic	All Tobacco Users (n=8051)	Smoked Users (n=1255)	Cigarette Smokers (n=436)	Bidi Smokers (n=444)	Smokeless Users (n=5991)	Mixed Users (n=805)	Non-Users (n=2534)
	%(n)	%(n)	%(n)	%(n)	%(n)	%(n)	%(n)
Bidi smoking status							
Daily	91.7 (1053)	94.0 (686)	n/a	99.5 (441)	n/a	87.8 (367)	n/a
Less than daily	4.9 (56)	3.6 (26)	n/a	0.5 (2)	n/a	7.2 (30)	n/a
Less than weekly	3.4 (39)	2.5 (18)	n/a	0 (0)	n/a	5.0 (21)	n/a
Smokeless status							
Daily	97.7 (6632)	n/a	n/a	n/a	97.9 (5859)	96.3 (773)	n/a
Less than daily	1.8 (122)	n/a	n/a	n/a	1.8 (105)	2.1 (17)	n/a
Less than weekly	0.5 (36)	n/a	n/a	n/a	0.4 (23)	1.6 (13)	n/a

Note: Some categories may not total 100% due to missing responses or rounding. Responses under ‘all tobacco users’ represent combined responses from all tobacco users who responded to that question; not all tobacco users responded to every question.

5.2 Characteristics of the Bangladesh Wave 3 Sample

Table 4 presents the characteristics of the Wave 3 Bangladesh sample, which is used for cross-sectional analyses in this dissertation as it is the most recent wave of survey data. The majority of the non-user sample consisted of females, while tobacco users were mostly males, except for the smokeless users, who were mainly female. The majority of respondents were middle-aged, and similar to the India sample, bidi smokers had the lowest proportion of young respondents (aged 15-24), the highest proportion of older respondents above the age of 55, and the highest proportion of rural residents. Bidi and smokeless users had the lowest levels of education, and bidi smokers also had the lowest income of all groups. Most tobacco users were daily users of their product(s).

Table 4. Characteristics of the Bangladesh Wave 3 Sample (Unweighted)

Characteristic	All Tobacco Users (n=3528)	Dual Smokers (n=207)	Cigarette Smokers (n=1724)	Bidi Smokers (n=268)	Smokeless Users (n=782)	Mixed Users (n=297)	Non-Users (n=2005)
	%(n)	%(n)	%(n)	%(n)	%(n)	%(n)	%(n)
Sex							
Female	19.0 (670)	2.9 (6)	1.3 (23)	12.3 (33)	73.3 (573)	7.4 (22)	77.8 (1559)
Male	81.0 (2850)	97.1 (201)	98.7 (1701)	87.7 (235)	26.7 (209)	92.6 (275)	22.2 (446)
Age Group							
15-17	2.2 (76)	1.9 (4)	2.9 (50)	0.4 (1)	1.2 (9)	1.2 (9)	7.8 (156)
18-24	12.6 (442)	7.7 (16)	17.3 (298)	4.9 (13)	7.3 (57)	7.3 (57)	25.8 (517)
25-39	34.9 (1230)	26.6 (55)	42.1 (725)	18.7 (50)	31.6 (247)	31.6 (247)	40.0 (803)
40-54	28.7 (1010)	33.8 (70)	23.9 (412)	35.8 (96)	33.4 (261)	33.4 (261)	18.6 (372)
55+	21.6 (762)	30.0 (62)	13.9 (239)	40.3 (108)	26.6 (208)	26.6 (208)	7.8 (157)
Urban/Rural							
Urban	44.0 (1553)	23.7 (49)	52.3 (902)	18.2 (49)	49.6 (390)	34.7 (103)	49.2 (986)
Rural	56.0 (1975)	76.3 (158)	47.7 (824)	81.8 (220)	50.4 (397)	65.3 (194)	50.8 (1019)
SES							
Low	31.9 (1126)	36.2 (75)	30.0 (517)	43.9 (118)	31.7 (249)	34.3 (102)	30.1 (603)
Moderate	34.3 (1208)	29.5 (61)	34.2 (591)	34.6 (93)	35.0 (275)	30.6 (91)	33.7 (676)
High	33.8 (1193)	34.3 (71)	35.8 (618)	21.6 (58)	33.3 (262)	35.0 (104)	36.2 (726)
Education							
Low	26.0 (912)	24.3 (50)	17.7 (303)	34.6 (93)	43.8 (344)	29.8 (88)	21.7 (434)
Moderate	54.5 (1911)	65.5 (135)	54.6 (936)	56.9 (153)	48.0 (377)	58.6 (173)	49.9 (998)
High	19.6 (689)	10.2 (21)	27.8 (476)	8.6 (23)	8.3 (65)	11.5 (34)	28.5 (570)
Income							
Low	9.0 (316)	12.6 (26)	6.2 (107)	23.0 (62)	8.4 (66)	9.8 (29)	9.0 (181)
Moderate	36.3 (1281)	53.1 (110)	32.3 (556)	48.0 (129)	37.9 (298)	34.3 (102)	35.5 (714)
High	42.4 (1496)	30.9 (64)	48.0 (828)	20.8 (56)	38.6 (304)	46.1 (137)	40.7 (818)

Table 4 (continued). Characteristics of the Bangladesh Wave 3 Sample (Unweighted)

Characteristic	All Tobacco Users (n=3528)	Dual Smokers (n=207)	Cigarette Smokers (n=1724)	Bidi Smokers (n=268)	Smokeless Users (n=782)	Mixed Users (n=297)	Non-Users (n=2005)
	%(n)	%(n)	%(n)	%(n)	%(n)	%(n)	%(n)
Cigarette Smoking Status							
Daily	96.6 (2070)	83.5 (172)	99.1 (1681)	n/a	n/a	90.4 (217)	n/a
Less than daily	2.6 (56)	14.6 (30)	0.6 (10)	n/a	n/a	6.7 (16)	n/a
Less than weekly	0.7 (16)	1.9 (4)	0.3 (5)	n/a	n/a	2.9 (7)	n/a
Bidi smoking status							
Daily	94.6 (566)	93.2 (193)	n/a	99.3 (267)	n/a	86.9 (106)	n/a
Less than daily	3.2 (19)	5.8 (12)	n/a	0.4 (1)	n/a	4.9 (6)	n/a
Less than weekly	2.2 (13)	1.0 (2)	n/a	0.4 (1)	n/a	8.2 (10)	n/a
Smokeless status							
Daily	76.5 (800)	n/a	n/a	n/a	79.2 (598)	69.4 (202)	n/a
Less than daily	22.3 (233)	n/a	n/a	n/a	19.3 (146)	29.9 (87)	n/a
Less than weekly	1.2 (13)	n/a	n/a	n/a	1.5 (11)	0.7 (2)	n/a

Note: Some categories may not total 100% due to missing responses or rounding. Responses under ‘all tobacco users’ represent combined responses from all tobacco users who responded to that question; not all tobacco users responded to every question.

6.0 Health Risk Perceptions from Tobacco Use

6.1 Objective and Hypothesis

This chapter describes general perceived health risks from tobacco use in India and Bangladesh and differences in perceived risk according to tobacco user type. Specifically, it addresses the following research objective:

Evaluate health risk perceptions of tobacco use and compare differences in risk perceptions associated with specific tobacco products that are commonly used in India and Bangladesh. This includes the following research questions:

- a) What are tobacco users' and non-users' perceptions of the riskiness of tobacco use?
- b) Do general health risk perceptions from tobacco use differ across different types of tobacco users?

The hypothesis for this section was as follows:

Perceptions of the health risks for tobacco use in general will be fairly low, due to weaker tobacco control policies and education on the harms of tobacco along with more positive societal norms toward smoking in India and Bangladesh compared to most high-income countries. These risk perceptions of harm to one's own health should demonstrate an underestimation of the risks.

6.2 Methods

6.2.1 Measures

In order to describe health risk perceptions from tobacco use in India and Bangladesh, four general measures were evaluated in each country: if tobacco is good for health or not, how much tobacco has damaged your health, how worried you are it will damage your health, and

how you would compare your own chance of getting a disease from tobacco use to a non-user. Each measure was tailored to the respondent's tobacco use status, so that smokers responded to questions about smoked tobacco, smokeless respondents responded to smokeless tobacco questions, and mixed users responded to both. The only measures that were asked across all tobacco user types were whether smoked tobacco is good for health or not and whether smokeless tobacco is good for health or not. Specific measures that will be presented in this section, including response options and which types of users responded to each question are presented in Tables 5 (India) and 6 (Bangladesh). Though not displayed in the tables below, respondents also had the options of 'refused' or 'don't know' for each measure.

Table 5. Health Risk Perception Measures in India, Wave 1

Measure and Response Options as Presented in Surveys	Measure was presented to...			
	Smokers	Mixed Users	Smoke-less	Non-Users
Smoked Tobacco Measures				
Do you think smoking is . . .?				
1 Good for your health	✓	✓	✓	✓
2 Neither good nor bad for your health				
3 Not good for your health				
Let's say that you continue to smoke as much as you do now. How would you compare your own chance of getting lung cancer in the future to the chance of a non-user? Would you say that you are . . .				
1 Much more likely to get lung cancer than a non-user	✓	✓	-	-
2 Somewhat more likely				
3 A little more likely				
4 Just as likely				
5 Less likely				
To what extent, if at all, has smoking damaged your health?				
1 Not at all	✓	✓	-	-
2 A little				
3 A lot				
How worried are you, if at all, that smoking WILL damage your health in the future?				
1 Not at all worried	✓	✓	-	-
2 A little worried				
3 Moderately worried				
4 Very worried				
Smokeless Tobacco Measures				
Let's say that you continue to use smokeless tobacco as much as you do now. How would you compare your own chance of getting mouth cancer in the future to the chance of a non-user? Would you say that you are . . .				
1 Much more likely to get mouth cancer than a non-user	-	✓	✓	-
2 Somewhat more likely				
3 A little more likely				
4 Just as likely				
5 Less likely				

Table 5 (continued). Health Risk Perception Measures in India, Wave 1

Measure and Response Options as Presented in Surveys	Measure was presented to:			
	Smokers	Mixed Users	Smoke-less	Non-Users
To what extent, if at all, has using smokeless tobacco damaged your health?				
1 Not at all	-	✓	✓	-
2 A little				
3 A lot				
How worried are you, if at all, that using smokeless tobacco WILL damage your health in the future?				
1 Not at all worried	-	✓	✓	-
2 A little worried				
3 Moderately worried				
4 Very worried				

Table 6. Health Risk Perception Measures in Bangladesh, Wave 3

Measure and Response Options as Presented in Surveys	Measure was presented to...					
	Cig	Bidi	Dual	Mixed	Smoke-less	Non-user
Cigarette Measures						
Do you think smoking cigarettes is ...?						
1 Good for your health	✓	✓	✓	✓	✓	✓
2 Neither good nor bad for your health						
3 Not good for your health						

Table 6 (continued). Health Risk Perception Measures in Bangladesh, Wave 3

Measure and Response Options as Presented in Surveys	Measure was presented to...					
	Cig	Bidi	Dual	Mixed	Smoke-less	Non-user
Let's say that you continue to smoke cigarettes as much as you do now. How would you compare your own chance of getting lung cancer in the future to the chance of a non-smoker? Would you say that you are . . .						
1 Much more likely to get lung cancer than a non-smoker	✓	-	✓	✓	-	-
2 Somewhat more likely						
3 A little more likely						
4 Just as likely						
5 Less likely						
To what extent, if at all, has smoking cigarettes damaged your health?						
1 Not at all	✓	-	✓	✓	-	-
2 A little						
3 A lot						
How worried are you, if at all, that smoking cigarettes WILL damage your health in the future?						
1 Not at all worried	✓	-	✓	✓	-	-
2 A little worried						
3 Moderately worried						
4 Very worried						
Bidi Measures						

Let's say that you continue to smoke bidis as much as you do now. How would you compare your own chance of getting lung cancer in the future to the chance of a non-smoker? Would you say that you are . . .

1 Much more likely to get lung cancer than a non-smoker	-	✓	✓	✓	-	-
2 Somewhat more likely						
3 A little more likely						
4 Just as likely						
5 Less likely						

Table 6 (continued). Health Risk Perception Measures in Bangladesh, Wave 3

Measure and Response Options as Presented in Surveys	Measure was presented to...					
	Cig	Bidi	Dual	Mixed	Smokeless	Non-user
To what extent, if at all, has smoking bidis damaged your health?						
1 Not at all	-	✓	✓	✓	-	-
2 A little						
3 A lot						
How worried are you, if at all, that smoking bidis WILL damage your health in the future?						
1 Not at all worried	-	✓	✓	✓	-	-
2 A little worried						
3 Moderately worried						
4 Very worried						
Smokeless Tobacco Measures						
Let's say that you continue to use smokeless tobacco as much as you do now. How would you compare your own chance of getting mouth cancer in the future to the chance of a non-user? Would you say that you are . . .						
1 Much more likely to get mouth cancer than a non-user	-	-	-	✓	✓	-
2 Somewhat more likely						
3 A little more likely						
4 Just as likely						
5 Less likely						
To what extent, if at all, has using smokeless tobacco damaged your health?						
1 Not at all	-	-	-	✓	✓	-
2 A little						
3 A lot						
How worried are you, if at all, that using smokeless tobacco WILL damage your health in the future?						
1 Not at all worried	-	-	-	✓	✓	-
2 A little worried						
3 Moderately worried						
4 Very worried						

6.2.2 Data Analysis

Weighted frequencies, including percentage and number of respondents along with standard error, were produced for all health risk perception measures. Frequencies are presented for non-users and tobacco users, then separated by tobacco user types. Pearson's chi-square tests of independence were conducted to determine if there were significant differences in responses to each measure according to tobacco user type. Unweighted Z-tests of column proportions within each chi-square were used to determine which responses significantly differed across users at the $p=.05$ level. Additional analyses were conducted on the measures of whether smoked tobacco/smokeless tobacco/cigarettes/bidis are good for health or not, as these measures were asked across all user types. A dichotomous version of each measure was created so that those who responded 'not good for health' could be compared to those who responded 'neither' or 'good for health', and a logistic regression was conducted to determine if different types of tobacco users significantly differed in their likelihood of responding that each product is 'not good for health'.

6.3 Results

6.3.1 Health Risk Perceptions in India

Weighted frequencies for all response options to each measure of health risk perceptions are presented in Table 7. For simplification, frequencies for the most negative/strong perception of risk for each measure are also displayed in Figure 1 to allow for visual comparison of responses across tobacco user types.

Table 7. Health Risk Perceptions in India, Wave 1

Measure	All Tobacco Users* (n=8048)	All Smoked Tobacco Users (n=1255)	Smokeless Users (n=5991)	Mixed Users (n=805)	Non-Users (n=2534)
	% (n)	% (n)	% (n)	% (n)	% (n)
	SE(%)	SE(%)	SE(%)	SE(%)	SE(%)
Smoked tobacco (ST) good for health					
ST good for health	1.4 (115) SE = 0.2	3.0 (37) SE = 0.6	1.0 (58) SE = 0.2	2.4 (20) SE = 0.7	1.0 (25) SE = 0.3
Neither	3.6 (287) SE = 0.7	6.6 (82) SE = 1.4	2.5 (150) SE = 0.7	6.9 (55) SE = 1.1	1.0 (24) SE = 0.3
ST not good for health	94.1 (7568) SE = 0.8	90.0 (1121) SE = 1.8	95.4 (5724) SE = 0.8	90.3 (723) SE = 1.4	97.7 (2473) SE = 0.4
Don't know	0.9 (75) SE = 0.3	0.3 (4) SE = 0.2	1.1 (67) SE = 0.4	0.4 (3) SE = 0.3	0.4 (10) SE = 0.1
ST damaged health					
Not at all	49.8 (1019) SE = 3.4	49.7 (619) SE = 4.1	n/a	49.9 (400) SE = 3.6	n/a
A little	34.0 (697) SE = 3.4	33.3 (415) SE = 3.5	n/a	35.2 (283) SE = 2.9	n/a
A lot	12.5 (256) SE = 2.8	12.6 (157) SE = 1.8	n/a	12.4 (99) SE = 2.3	n/a
Don't know	3.7 (75) SE = 1.8	4.4 (55) SE = 1.1	n/a	2.5 (20) SE = 0.9	n/a
Worried ST will damage health					
Not at all	27.8 (568) SE = 2.6	26.8 (333) SE = 2.7	n/a	29.3 (235) SE = 3.3	n/a
A little	27.3 (559) SE = 2.5	27.4(341) SE = 2.6	n/a	27.2 (218) SE = 2.9	n/a
Moderately	28.4 (580) SE = 2.5	28.5 (355) SE = 2.7	n/a	28.1 (225) SE = 3.3	n/a
Very	15.4 (316) SE = 2.1	16.0 (199) SE = 2.2	n/a	14.6 (117) SE = 2.5	n/a
Don't know	1.1 (22) SE = 0.4	1.3 (16) SE = 0.6	n/a	0.7 (6) SE = 0.4	n/a
Probability of lung cancer: ST user vs. non-user					
Much more likely to get lung cancer than a non-user	41.5 (848) SE = 3.5	38.5 (479) SE = 3.4	n/a	46.0 (369) SE = 4.2	n/a
Somewhat more likely	19.0 (389) SE = 2.1	21.6 (269) SE = 2.6	n/a	14.9 (120) SE = 1.8	n/a
A little more likely	18.0 (368) SE = 2.4	15.7 (196) SE = 2.3	n/a	21.5 (172) SE = 2.8	n/a
Just as likely	15.0 (306) SE = 1.5	17.1 (213) SE = 2.0	n/a	11.6 (93) SE = 1.7	n/a

Table 7 (continued). Health Risk Perceptions in India, Wave 1

Measure	All Tobacco Users* (n=8048)	All Smoked Tobacco Users (n=1255)	Smokeless Users (n=5991)	Mixed Users (n=805)	Non-Users (n=2534)
	% (n)	% (n)	% (n)	% (n)	% (n)
	SE(%)	SE(%)	SE(%)	SE(%)	SE(%)
Less likely	1.8 (36) SE = 0.3	1.8 (23) SE = 0.4	n/a	1.7 (13) SE = 0.5	n/a
Don't know	4.8 (99) SE = 0.7	5.2 (64) SE = 0.9	n/a	4.3 (35) SE = 1.0	n/a
Smokeless (SL) Tobacco Good for Health					
SL good for health	4.8 (386) SE = 0.7	4.6 (58) SE = 0.7	5.2 (311) SE = 0.9	2.2 (18) SE = 0.6	0.5 (14) SE = 0.2
Neither	7.5 (606) SE = 1.3	3.1 (38) SE = 0.7	8.3 (499) SE = 1.5	8.7 (70) SE = 1.4	0.7 (17) SE = 0.2
SL not good for health	87.0 (7002) SE = 1.4	90.8 (1131) SE = 1.0	86.0 (5158) SE = 1.6	88.8 (712) SE = 1.5	98.5 (2496) SE = 0.3
Don't know	0.7 (54) SE = 0.1	1.5 (19) SE = 0.4	0.5 (33) SE = 0.1	0.3 (3) SE = 0.2	0.3 (7) SE = 0.2
SL damaged health					
Not at all	62.9 (4275) SE = 3.3	n/a	64.4 (3864) SE = 3.4	51.2 (411) SE = 3.6	n/a
A little	26.5 (1800) SE = 2.2	n/a	25.2 (1509) SE = 2.3	36.3 (291) SE = 2.8	n/a
A lot	7.7 (525) SE = 1.0	n/a	7.3 (440) SE = 1.0	10.5 (85) SE = 1.9	n/a
Don't know	2.9 (199) SE = 1.3	n/a	3.1 (184) SE = 1.4	2.0 (16) SE = 0.7	n/a
Worried SL will damage health					
Not at all	35.4 (2403) SE = 3.2	n/a	35.6 (2136) SE = 3.3	33.3 (267) SE = 3.1	n/a
A little	24.3 (1650) SE = 2.4	n/a	24.1 (1446) SE = 2.4	25.4 (204) SE = 2.7	n/a
Moderately	21.2 (1439) SE = 3.0	n/a	20.2 (1214) SE = 3.2	28.2 (226) SE = 2.8	n/a
Very	18.5 (1258) SE = 3.4	n/a	19.3 (1155) SE = 3.6	12.8 (103) SE = 2.2	n/a
Don't know	0.7 (47) SE = 0.2	n/a	0.8 (45) SE = 0.2	0.3 (2) SE = 0.2	n/a

Table 7 (continued). Health Risk Perceptions in India, Wave 1

Measure	All Tobacco Users* (n=8048)	All Smoked Tobacco Users (n=1255)	Smokeless Users (n=5991)	Mixed Users (n=805)	Non-Users (n=2534)
	% (n), SE(%)	% (n), SE(%)	% (n), SE(%)	% (n), SE(%)	% (n), SE(%)
Probability of mouth cancer: SL user vs. non-user					
Much more likely to get mouth cancer than a non-user	46.1 (3134) SE = 3.8	n/a	46.0 (2756) SE = 3.9	47.1 (378) SE = 4.1	n/a
Somewhat more likely	15.5 (1053) SE = 1.7	n/a	15.8 (945) SE = 1.8	13.5 (108) SE = 1.6	n/a
A little more likely	14.8 (1006) SE = 2.4	n/a	14.1 (846) SE = 2.6	20.0 (160) SE = 2.3	n/a
Just as likely	13.1 (889) SE = 1.3	n/a	12.8 (769) SE = 1.3	15.0 (120) SE = 2.3	n/a
Less likely	3.1 (209) SE = 1.0	n/a	3.3 (195) SE = 1.1	1.7 (14) SE = 0.7	n/a
Don't know	7.4 (503) SE = 1.1	n/a	8.0 (481) SE = 1.2	2.7 (22) SE = 0.6	n/a

*Note: Responses under 'all tobacco users' represent combined responses from all tobacco users who responded to that question. Not all tobacco users responded to every question.

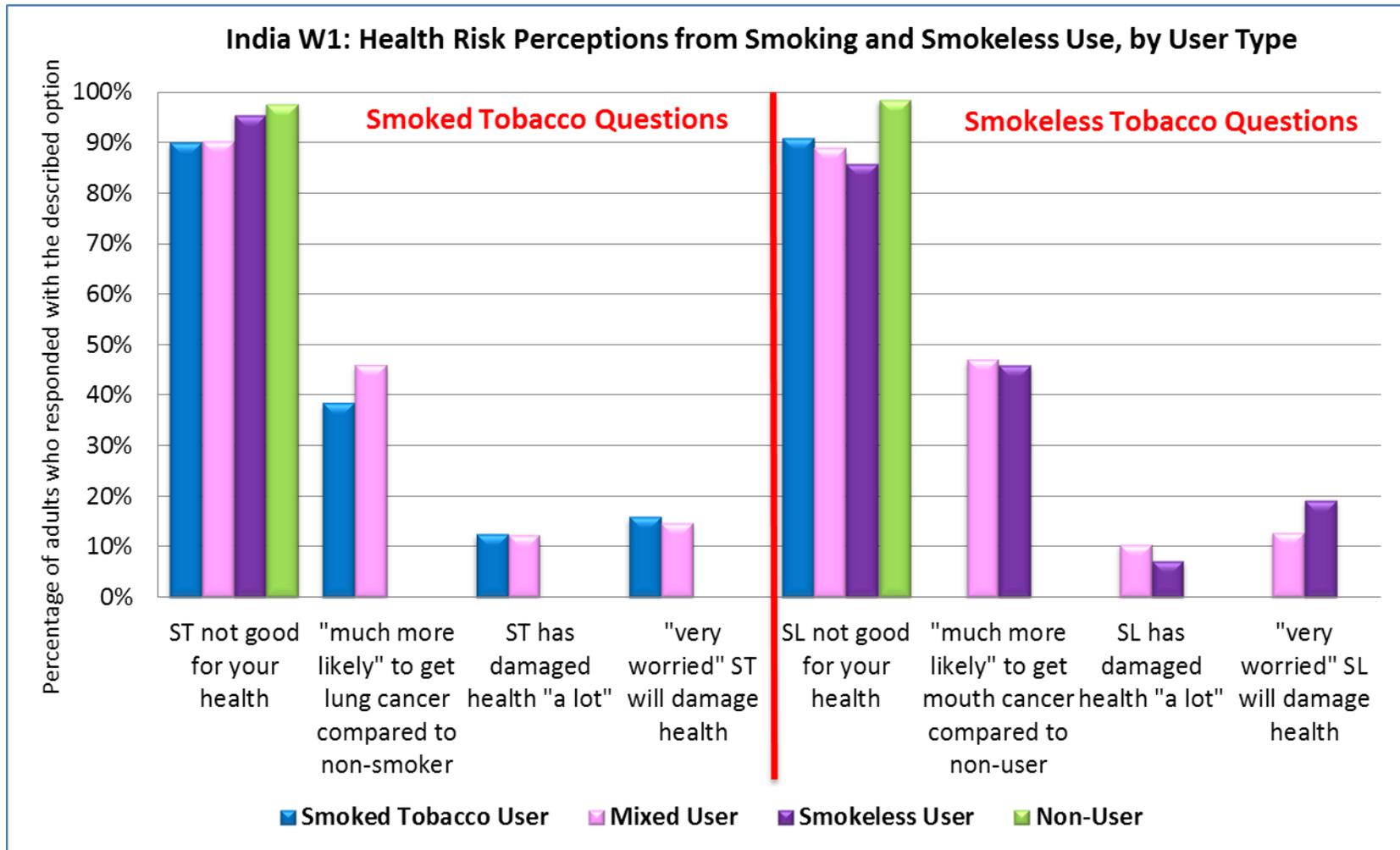


Figure 1. Health Risk Perceptions in India, Wave 1

Overall, while the majority (over 85%) of all respondents believed that both smoked and smokeless tobacco are not good for your health in general, perceptions of specific damage to one's own health were much lower. Less than half of respondents perceived themselves to be 'much more likely' to get lung cancer or mouth disease compared to a non-user, and less than 20% of all respondents said that their own tobacco use had damaged their health 'a lot' or that they were 'very worried' it would damage their health in the future.

Comparing responses across tobacco user types, the data demonstrate that different tobacco users displayed differences in risk perceptions. Tobacco use status was significantly related to health perceptions (i.e., whether smoked/smokeless tobacco is good for your health or not) of smoked tobacco ($X^2(4, N = 7967) = 117.15, p < .001$), and smokeless tobacco ($X^2(4, N = 7999) = 55.56, p < .001$). Chi-square analyses revealed that significantly more (at the $p = .05$ level) smokeless users said that smoked tobacco is not good for your health compared to smokers and mixed users, and significantly less smokeless users than smokers said that smokeless tobacco is not good for your health. Logistic regression analyses using tobacco user type to predict the odds of saying that smoked/smokeless is good for your health versus not revealed that smoked tobacco users had 0.34 times lower odds ($p < .001, 95\% \text{ CI } [0.21, 0.56]$) and mixed users had 0.35 times lower odds ($p < .001, 95\% \text{ CI } [0.22, 0.56]$) than smokeless users of saying that smoked tobacco is 'not good' for your health compared to 'neither' or 'good' for health. Smokeless tobacco users had 0.54 times lower odds ($p < .001, 95\% \text{ CI } [0.42, 0.70]$) and mixed users had 0.69 times lower odds ($p = .03, 95\% \text{ CI } [0.52, 0.92]$) compared to smoked tobacco users of saying that smokeless tobacco is 'not good' for your health.

Of the three remaining measures of risk perceptions of *smoked* tobacco, only the probability of developing lung cancer was significantly related to smoking status

($X^2(4, N = 2058) = 38.27, p = .001$). Significantly more (at the $p = .05$ level) mixed users compared to smoked users believed that they were ‘much more likely’ than a non-smoker to get lung cancer. Perceptions that smoked tobacco has damaged health and worries that it would damage future health did not significantly differ between smokers and mixed users.

Two of the three remaining measures of risk perceptions of *smokeless* tobacco use significantly differed between smokeless users and mixed tobacco users. Significantly more (at the $p = .05$ level) smokeless users than mixed users said that they are ‘less likely’ than a non-user to develop mouth cancer, but there was no difference between the groups in saying they were ‘more likely’ to get mouth cancer and no significant difference in the measure overall ($X^2(4, N = 6303) = 23.73, p = .077$). A significantly lower proportion of smokeless users compared to mixed users said that smokeless tobacco use has damaged their health ‘a lot’, and a greater proportion of smokeless users than mixed users said it has ‘not at all’ damaged their health ($X^2(2, N = 6592) = 61.56, p < .001$). There were also significant differences in worries that smokeless use will damage future health, and interestingly, a greater proportion of smokeless users compared to mixed users were ‘very worried’ smokeless use would damage their future health ($X^2(3, N = 6742) = 38.18, p = .005$).

6.3.2 Risk Perceptions in Bangladesh

Weighted frequencies for all response options to each measure of health risk perceptions for cigarettes, bidis, and smokeless tobacco are presented in Table 8. Responses are presented for all tobacco users and non-users, and broken down by tobacco user type. Figure 2 displays frequencies for the most negative/strong perception of risk for each measure to allow for visual comparison of responses across tobacco user types.

Table 8. Health Risk Perceptions in Bangladesh, Wave 3

Measure	All Tobacco Users (n=3528)	Dual Smokers (n=207)	Cigarette Smokers (n=1724)	Bidi Smokers (n=268)	Smokeless Users (n=782)	Mixed Users (n=297)	Quitters (n=242)	Non-Users (n=2005)
	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)
	SE(%)	SE(%)	SE(%)	SE(%)	SE(%)	SE(%)	SE(%)	SE(%)
Cigarette Measures								
Cigs good for health or not								
Good for health	0.9 (28) SE = 0.3	1.1 (3) SE = 0.9	1.0 (18) SE = 0.3	1.4 (4) SE = 0.7	0.8 (6) SE = 0.9	0 (0) SE = 0	0.7 (1) SE = 0.7	0.7 (14) SE = 0.3
Neither	2.3 (73) SE = 0.4	0 (0) SE = 0	3.4 (57) SE = 0.6	0 (0) SE = 0	1.5 (11) SE = 0.6	1.0 (2) SE = 0.7	1.3 (3) SE = 0.9	0.1 (2) SE = 0.1
Not good for health	96.1 (3066) SE = 0.4	98.9 (218) SE = 0.9	94.3 (1597) SE = 0.7	98.6 (270) SE = 0.7	97.6 (746) SE = 1.1	98.9 (236) SE = 0.7	96.6 (211) SE = 1.6	99.2 (1986) SE = 0.3
Don't know	0.7 (23) SE = 0.4	0 (0) SE = 0	1.3 (22) SE = 0.7	0 (0) SE = 0	0.1 (1) SE = 0.1	0 (0) SE = 0	1.4 (3) SE = 1.3	0 (0) SE = 0
Cigs damaged health								
Not at all	10.2 (212) SE = 1.8	17.1 (35) SE = 5.8	9.2 (152) SE = 1.6	n/a	n/a	10.9 (26) SE = 2.3	7.8 (11) SE = 4.2	n/a
A little	52.1 (1086) SE = 3.9	61.3 (126) SE = 5.3	49.5 (813) SE = 4.0	n/a	n/a	62.7 (148) SE = 6.7	32.2 (46) SE = 4.9	n/a
A lot	25.7 (535) SE = 2.9	13.3 (27) SE = 3.1	28.4 (467) SE = 3.0	n/a	n/a	17.3 (41) SE = 5.5	50.9 (72) SE = 4.9	n/a
Don't know	12.0 (250) SE = 2.2	8.3 (17) SE = 2.3	12.9 (211) SE = 2.8	n/a	n/a	9.1 (21) SE = 1.9	9.2 (13) SE = 2.9	n/a

Table 8 (continued). Health Risk Perceptions in Bangladesh, Wave 3

Measure	All Tobacco Users (n=3528)	Dual Smokers (n=207)	Cigarette Smokers (n=1724)	Bidi Smokers (n=268)	Smokeless Users (n=782)	Mixed Users (n=297)	Quitters (n=242)	Non-Users (n=2005)
Worried cigs will damage health								
Not at all	12.2 (248) SE = 1.4	19.3 (42) SE = 4.3	10.8 (171) SE = 1.6	n/a	n/a	14.7 (35) SE = 3.1	n/a	n/a
A little	52.7 (1072) SE = 4.4	61.0 (132) SE = 4.7	51.3 (814) SE = 4.8	n/a	n/a	54.0 (127) SE = 5.8	n/a	n/a
Moderately	26.8 (545) SE = 5.5	11.0 (24) SE = 2.2	29.8 (472) SE = 6.0	n/a	n/a	21.1 (50) SE = 5.0	n/a	n/a
Very	6.1 (124) SE = 1.0	5.9 (13) SE = 2.7	5.8 (92) SE = 1.1	n/a	n/a	8.4 (20) SE = 1.5	n/a	n/a
Don't know	2.3 (47) SE = 0.6	2.8 (6) SE = 1.0	2.3 (37) SE = 0.7	n/a	n/a	1.7 (4) SE = 0.8	n/a	n/a
Probability of lung cancer: cigarette smoker vs. non-smoker								
Much more likely to get lung cancer than a non-smoker	40.7 (877) SE = 5.6	27.9 (61) SE = 3.8	43.2 (734) SE = 6.3	n/a	n/a	35.0 (82) SE = 5.6	n/a	n/a
Somewhat more likely	18.3 (393) SE = 1.7	18.9 (41) SE = 4.3	18.6 (316) SE = 2.2	n/a	n/a	15.7 (37) SE = 3.0	n/a	n/a
A little more likely	31.6 (680) SE = 4.0	40.3 (88) SE = 3.5	29.4 (500) SE = 3.9	n/a	n/a	39.3 (92) SE = 9.3	n/a	n/a
Just as likely	4.1 (88) SE = 0.7	3.2 (7) SE = 1.6	4.3 (73) SE = 0.9	n/a	n/a	3.4 (8) SE = 1.5	n/a	n/a
Less likely	0.7 (14) SE = 0.3	0.5 (1) SE = 0.5	0.6 (10) SE = 0.2	n/a	n/a	1.2 (3) SE = 0.9	n/a	n/a
Don't know	4.7 (100) SE = 3.1	9.2 (20) SE = 2.5	4.0 (67) SE = 0.8	n/a	n/a	5.5 (13) SE = 2.4	n/a	n/a

Table 8 (continued). Health Risk Perceptions in Bangladesh, Wave 3

Measure	All Tobacco Users (n=3528)	Dual Smokers (n=207)	Cigarette Smokers (n=1724)	Bidi Smokers (n=268)	Smokeless Users (n=782)	Mixed Users (n=297)	Quitters (n=242)	Non-Users (n=2005)
Bidi Measures								
Bidis good for health or not								
Good for health	0.6 (14) <i>SE</i> = 0.2	0.9 (2) <i>SE</i> = 0.6	0.6 (10) <i>SE</i> = 0.2	0 (0) <i>SE</i> = 0	n/a	n/a	0 (0) <i>SE</i> = 0	0.2 (4) <i>SE</i> = 0.1
Neither	0.6 (15) <i>SE</i> = 0.2	1.1 (2) <i>SE</i> = 0.8	0.4 (7) <i>SE</i> = 0.2	1.2 (3) <i>SE</i> = 0.7	n/a	n/a	0 (0) <i>SE</i> = 0	0.5 (11) <i>SE</i> = 0.3
Not good for health	98.4 (2362) <i>SE</i> = 0.3	98.0 (216) <i>SE</i> = 1.0	98.7 (1681) <i>SE</i> = 0.3	98.8 (269) <i>SE</i> = 0.7	n/a	n/a	100.0 (236) <i>SE</i> = 0.0	99.0 (1966) <i>SE</i> = 0.3
Don't know	0.4 (9) <i>SE</i> = 0.2	0 (0) <i>SE</i> = 0	0.3 (5) <i>SE</i> = 0.2	0 (0) <i>SE</i> = 0	n/a	n/a	0 (0) <i>SE</i> = 0	0.2 (4) <i>SE</i> = 0.2
Bidis damaged health								
Not at all	14.6 (91) <i>SE</i> = 2.6	16.5 (36) <i>SE</i> = 5.2	n/a	11.3 (16) <i>SE</i> = 3.2	n/a	11.3 (16) <i>SE</i> = 3.2	4.6 (2) <i>SE</i> = 2.8	n/a
A little	53.5 (333) <i>SE</i> = 2.4	62.8 (137) <i>SE</i> = 5.1	n/a	47.5 (67) <i>SE</i> = 5.4	n/a	46.5 (67) <i>SE</i> = 5.4	20.5 (11) <i>SE</i> = 5.2	n/a
A lot	24.8 (154) <i>SE</i> = 3.2	15.6 (34) <i>SE</i> = 4.5	n/a	26.9 (38) <i>SE</i> = 5.5	n/a	26.9(38) <i>SE</i> = 5.5	53.4 (28) <i>SE</i> = 9.3	n/a
Don't know	7.1 (44) <i>SE</i> = 1.5	5.1 (11) <i>SE</i> = 1.7	n/a	14.3 (20) <i>SE</i> = 3.7	n/a	14.3 (20) <i>SE</i> = 3.7	21.5 (11) <i>SE</i> = 7.8	n/a

Table 8 (continued). Health Risk Perceptions in Bangladesh, Wave 3

Measure	All Tobacco Users (n=3528)	Dual Smokers (n=207)	Cigarette Smokers (n=1724)	Bidi Smokers (n=268)	Smokeless Users (n=782)	Mixed Users (n=297)	Quitters (n=242)	Non-Users (n=2005)
Worried bidis will damage health								
Not at all	18.1 (112) SE = 2.0	17.9 (39) SE = 3.7	n/a	18.2 (48) SE = 3.1	n/a	18.2 (26) SE = 4.0	n/a	n/a
A little	54.8 (340) SE = 3.1	59.6 (131) SE = 5.2	n/a	52.8 (138) SE = 4.8	n/a	50.9 (72) SE = 5.6	n/a	n/a
Moderately	16.7 (104) SE = 3.8	12.6 (28) SE = 2.1	n/a	22.0 (58) SE = 5.7	n/a	13.0 (18) SE = 5.5	n/a	n/a
Very	6.2 (39) SE = 1.8	6.4 (14) SE = 2.7	n/a	4.5 (12) SE = 1.3	n/a	9.1 (13) SE = 3.7	n/a	n/a
Don't know	4.3 (27) SE = 1.2	3.4 (7) SE = 1.5	n/a	2.5 (7) SE = 0.8	n/a	8.9 (13) SE = 2.1	n/a	n/a
Probability of lung cancer: bidi smoker vs. non-smoker								
Much more likely to get lung cancer than a non-smoker	32.3 (203) SE = 3.1	33.0 (72) SE = 5.9	n/a	30.9 (83) SE = 3.3	n/a	33.8 (48) SE = 6.4	n/a	n/a
Somewhat more likely	18.5 (116) SE = 2.2	17.7 (39) SE = 3.1	n/a	20.5 (55) SE = 3.2	n/a	16.2 (23) SE = 6.4	n/a	n/a
A little more likely	33.3 (209) SE = 2.4	41.9 (92) SE = 3.6	n/a	28.0 (75) SE = 3.5	n/a	30.0 (42) SE = 5.1	n/a	n/a
Just as likely	2.7 (17) SE = 0.9	1.1 (2) SE = 0.7	n/a	3.0 (8) SE = 1.4	n/a	4.6 (6) SE = 2.6	n/a	n/a
Less likely	0.9 (6) SE = 0.5	0.5 (1) SE = 0.5	n/a	0.7 (2) SE = 0.3	n/a	2.0 (3) SE = 1.5	n/a	n/a
Don't know	12.3 (77) SE = 2.2	5.7 (12) SE = 1.7	n/a	17.0 (45) SE = 2.7	n/a	13.4 (19) SE = 4.3	n/a	n/a

Table 8 (continued). Health Risk Perceptions in Bangladesh, Wave 3

Measure	All Tobacco Users (n=3528)	Dual Smokers (n=207)	Cigarette Smokers (n=1724)	Bidi Smokers (n=268)	Smokeless Users (n=782)	Mixed Users (n=297)	Quitters (n=242)	Non-Users (n=2005)
Smokeless Measures								
Smokeless good for health or not								
Good for health	0.7 (22) <i>SE</i> = 0.3	0.3 (1) <i>SE</i> = 0.3	0.7 (13) <i>SE</i> = 0.2	0.1 (.5) <i>SE</i> = 0.1	0.9 (7) <i>SE</i> = 0.9	0.6 (2) <i>SE</i> = 0.2	0.2 (.5) <i>SE</i> = 0.2	0.1 (2) <i>SE</i> = 0.1
Neither	1.8 (60) <i>SE</i> = 0.7	2.2 (7) <i>SE</i> = 2.9	0.8 (13) <i>SE</i> = 0.3	0.2 (1) <i>SE</i> = 0.2	3.1 (24) <i>SE</i> = 1.4	5.1 (15) <i>SE</i> = 2.5	0 (0) <i>SE</i> = 0	0.9 (18) <i>SE</i> = 0.5
Not good for health	96.6 (3157) <i>SE</i> = 0.7	95.0 (209) <i>SE</i> = 2.8	97.5 (1670) <i>SE</i> = 0.7	99.3 (274) <i>SE</i> = 0.6	94.7 (725) <i>SE</i> = 1.7	94.3 (279) <i>SE</i> = 2.5	99.8 (237) <i>SE</i> = 0.2	98.9 (1959) <i>SE</i> = 0.5
Don't know	0.9 (30) <i>SE</i> = 0.3	1.3 (3) <i>SE</i> = 0.5	1.0 (16) <i>SE</i> = 0.6	0.4 (1) <i>SE</i> = 0.4	1.3 (10) <i>SE</i> = 0.4	0 (0) <i>SE</i> = 0	0 (0) <i>SE</i> = 0	0 (0) <i>SE</i> = 0
Smokeless damaged health								
Not at all	14.9 (153) <i>SE</i> = 3.4	n/a	n/a	n/a	14.4 (105) <i>SE</i> = 4.1	16.2 (48) <i>SE</i> = 3.4	6.7 (1) <i>SE</i> = 5.6	n/a
A little	48.5 (496) <i>SE</i> = 4.7	n/a	n/a	n/a	45.3 (329) <i>SE</i> = 4.9	56.6 (267) <i>SE</i> = 4.7	48.6 (10) <i>SE</i> = 12.3	n/a
A lot	14.6 (150) <i>SE</i> = 3.1	n/a	n/a	n/a	16.3 (118) <i>SE</i> = 3.0	10.6 (31) <i>SE</i> = 3.4	30.2 (6) <i>SE</i> = 10.5	n/a
Don't know	21.9 (224) <i>SE</i> = 3.5	n/a	n/a	n/a	24.0 (175) <i>SE</i> = 5.0	16.6 (49) <i>SE</i> = 2.7	14.6 (3) <i>SE</i> = 10.8	n/a

Table 8 (continued). Health Risk Perceptions in Bangladesh, Wave 3

Measure	All Tobacco Users (n=3528)	Dual Smokers (n=207)	Cigarette Smokers (n=1724)	Bidi Smokers (n=268)	Smokeless Users (n=782)	Mixed Users (n=297)	Quitters (n=242)	Non-Users (n=2005)
Worried smokeless will damage health								
Not at all	18.5 (195) <i>SE</i> = 3.4	n/a	n/a	n/a	17.3 (131) <i>SE</i> = 3.9	21.6 (64) <i>SE</i> = 3.9	n/a	n/a
A little	37.4 (394) <i>SE</i> = 4.9	n/a	n/a	n/a	36.3 (275) <i>SE</i> = 5.6	40.3 (119) <i>SE</i> = 4.5	n/a	n/a
Moderately	29.8 (314) <i>SE</i> = 5.3	n/a	n/a	n/a	30.9 (234) <i>SE</i> = 5.4	26.8 (79) <i>SE</i> = 5.7	n/a	n/a
Very	3.5 (37) <i>SE</i> = 1.5	n/a	n/a	n/a	2.6 (20) <i>SE</i> = 1.4	5.9 (18) <i>SE</i> = 1.7	n/a	n/a
Don't know	10.8 (114) <i>SE</i> = 3.2	n/a	n/a	n/a	12.9 (98) <i>SE</i> = 4.3	5.4 (16) <i>SE</i> = 1.4	n/a	n/a
Probability of mouth cancer: smokeless user vs. non-user								
Much more likely to get mouth cancer than a non-user	14.1 (142) <i>SE</i> = 3.1	n/a	n/a	n/a	13.5 (97) <i>SE</i> = 3.0	15.4 (45) <i>SE</i> = 4.5	n/a	n/a
Somewhat more likely	20.1 (203) <i>SE</i> = 2.5	n/a	n/a	n/a	18.5 (133) <i>SE</i> = 2.3	24.0 (70) <i>SE</i> = 5.2	n/a	n/a
A little more likely	48.8 (492) <i>SE</i> = 2.2	n/a	n/a	n/a	48.6 (349) <i>SE</i> = 2.6	49.1 (143) <i>SE</i> = 3.1	n/a	n/a
Just as likely	6.0 (60) <i>SE</i> = 1.4	n/a	n/a	n/a	6.1 (44) <i>SE</i> = 2.0	5.5 (16) <i>SE</i> = 1.8	n/a	n/a
Less likely	1.1 (11) <i>SE</i> = 0.4	n/a	n/a	n/a	1.2 (9) <i>SE</i> = 0.5	0.7 (2) <i>SE</i> = 0.7	n/a	n/a
Don't know	10.0 (101) <i>SE</i> = 1.3	n/a	n/a	n/a	11.9 (86) <i>SE</i> = 1.7	5.2 (15) <i>SE</i> = 1.5	n/a	n/a

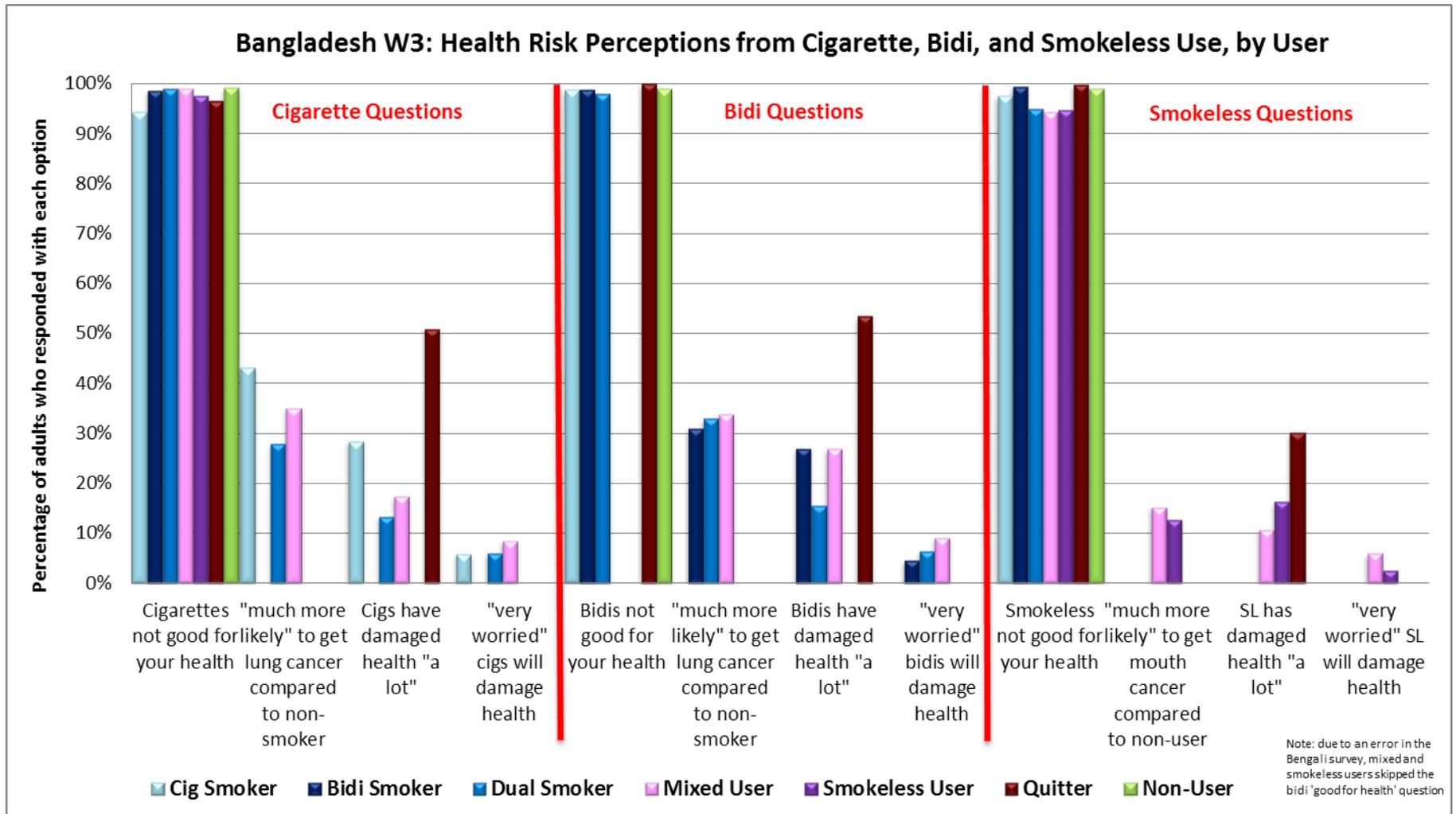


Figure 2. Health Risk Perceptions in Bangladesh, Wave 3

Looking at measures of health risk perceptions for cigarettes, bidis, and smokeless tobacco in Bangladesh, similar patterns to those in India were found. The majority (over 90%) of all respondents believed that none of the three products is good for your health, but perceptions of specific damage to one's *own* health were much lower for current tobacco users. Less than 40% of all tobacco users believed they were 'much more likely' to get lung cancer or mouth disease compared to a non-user, and less than 10% were 'very worried' that their product would damage their health in the future. When asked if their product had already damaged their health, around 50% of bidi and cigarette quitters acknowledged that smoking had damaged their health 'a lot', compared to less than 30% of current cigarette and bidi smokers, and around 30% of smokeless quitters and 15% of smokeless users said that smokeless tobacco had damaged their health 'a lot'.

Separate measures of whether smokeless tobacco, bidis, and cigarettes are 'good for health' or not were asked of all respondents. None of the weighted chi-square analyses to test for differences in responses to the three variables across tobacco user types were significant, but there were significant unweighted cell differences for specific responses. In particular, the proportion of cigarette smokers who said that cigarettes are 'not good for health' was significantly (at the $p=.05$ level) lower than bidi, dual, mixed, and smokeless users; the proportion of mixed users who said that smokeless tobacco is 'not good for health' was significantly higher than bidi, dual, and cigarette smokers, and smokeless users also significantly differed from cigarette smokers. Logistic regression analyses using tobacco user type to predict the odds of saying that cigarettes, bidis, or smokeless tobacco are good for your health versus not good for health revealed that bidi users had 3.29 times greater odds ($p <.05$, 95% CI [1.17, 9.21]) and mixed users had 4.24 times greater odds ($p <.05$, 95% CI [1.13, 15.87]) than cigarette

smokers of saying that cigarettes are ‘not good’ for your health compared to ‘neither’ or ‘good’ for health. For the measure of smokeless tobacco, cigarette smokers (OR = 2.75, 95% CI [1.29, 5.89]), bidi smokers (OR = 13.94, 95% CI [2.18, 87.97]), and quitters (OR = 23.51, 95% CI [2.30, 240.62]) all had significantly greater odds than smokeless users of saying that smokeless tobacco is ‘not good’ for health. There were no significant differences by user type for the perception of bidis being good for health.

Of the three remaining measures of risk perceptions of cigarettes, the perception of lung cancer probability did not significantly differ by tobacco use status, but the perceptions of damage to health did. Interestingly, a significantly greater proportion of cigarette smokers than dual smokers or mixed users said that cigarette smoking had damaged their health ‘a lot’, and quitters were significantly more likely to say this than all other types of users ($X^2(6, N = 2020) = 85.12, p < .001$). However, when looking towards the future, significantly fewer cigarette smokers than mixed users were ‘very worried’ that cigarettes would damage their health ($X^2(6, N = 2044) = 48.35, p = .001$). Of the three perceptions of bidis, only the measure of bidis having damaged health significantly differed by tobacco use status ($X^2(6, N = 597) = 46.88, p = .002$), with significantly fewer bidi smokers than dual smokers or quitters saying that bidis had damaged their health ‘a lot’. None of the three measures of perceptions of risk for smokeless tobacco significantly differed by user type.

6.4 Discussion

The findings from this section revealed that generally, tobacco users in India and Bangladesh are aware of the harms of tobacco use, but the majority underestimate their own personal risk of harm from tobacco use, and tend to perceive greater harm from using other products compared to their own.

Overall, the majority (over 85%) of tobacco users and non-users in both India and Bangladesh perceive both smoked and smokeless tobacco to be bad for their health. As previous research has found that most smokers are generally aware that smoking is harmful, it is not surprising that the majority of tobacco users acknowledge in a survey that tobacco use is generally not good for health.

However, when asked how likely they are to get cancer from their tobacco use compared to a non-user, less than half of respondents (between 35%-45%) in India believed they were 'much more likely' to get lung cancer (smoked tobacco users) or mouth cancer (smokeless users) than a non-user. This may represent an optimistic bias, as when I looked at responses to the knowledge measures within the India surveys (not reported), 85% of smoked tobacco users said that smoking causes lung cancer and 82% of smokeless users said that smokeless use causes mouth cancer. This supports previous research findings that while tobacco users may be aware that tobacco use causes cancer or disease, they may not perceive *themselves* to be at high risk of developing these diseases. However, it could also be the case that respondents do not understand or appreciate the probability of cancer associated with tobacco use, because the measure of how likely they are to get cancer represents a general probability of getting cancer rather than a specific measure of whether they personally expect to get cancer.

In Bangladesh, smokers' perceptions of the probability of acquiring lung cancer were about the same as India, with between 30%-45% of smokers saying they were 'much more likely' to get lung cancer compared to a non-smoker. However, much fewer (around 15%) smokeless users perceived themselves to be at high risk of mouth cancer. As with India, the majority of tobacco users stated that tobacco use causes cancer earlier in the survey (96% of cigarette smokers and 89% of bidi smoker said that smoking their product causes lung cancer,

respectively, and 87% of smokeless users said that smokeless use causes mouth cancer), suggesting that tobacco users have biased perceptions of their own chance of disease compared to the average smoker.

Compared to earlier (2003) data from four high-income ITC countries (Canada, U.S., U.K., Australia), perceptions of the risk of cancer in India and Bangladesh were not much lower, which went against the hypothesis. Across those four high-income countries, 35.5% of smokers perceived themselves to be much more likely to get lung cancer compared to a non-smoker, which is around the same proportion as found in India and Bangladesh (Costello, Logel, Fong, Zanna, & McDonald, 2012). Because education efforts and tobacco control policies including warning labels are generally weaker in India and Bangladesh compared to the four high-income countries of the Costello et al. study, the very similar levels of responses to the chance of getting cancer may indicate that respondents' underestimation of the risks represent a biased perception of the risks they personally face rather than a lack of information.

It is also important to note that the ITC Surveys ask tobacco users to compare their risk of cancer to a non-smoker (as opposed to an average smoker, which would be a stronger measure of optimistic bias), so the majority of respondents, if they were basing their responses on accurate risk information, should say that they are much more likely than a non-user to get cancer.

Additional evidence that tobacco users have biased perceptions of health risks comes from the even lower (less than 15%) proportion of tobacco users who believed that their tobacco use had damaged their health a lot, or were worried that it would damage their health in the future. As these measures specifically evaluated personal risk perceptions by asking about health damage to the respondents themselves, these findings support the prediction that tobacco users have inaccurate or biased perceptions of their personal risk of harm from smoking. It makes

sense that tobacco users' perceptions of the damage that has already occurred to their health were low as they likely have not experienced evidence of damage to their health yet, but the finding that so few were worried about future damage seems to suggest a general lack of appreciation for the likelihood and/or severity of diseases associated with tobacco use.

When perceptions of harm from smoked and smokeless tobacco were compared across different tobacco user types, significant differences were found. In both India and Bangladesh, smoked tobacco users were less likely than smokeless users to say that smoked tobacco is 'not good' for health, and smokeless users were less likely than other users to say that smokeless tobacco is not good for health. These differences provide further evidence that tobacco users have biased risk perceptions of the harm of tobacco use by suggesting that tobacco users perceive less harm from their own product compared to others, perhaps as a means of justifying their tobacco use.

However, specific comparisons of the risks of various tobacco products were not evaluated in this section. In order to understand more about product risk perceptions and whether tobacco users have optimistic biases regarding their own tobacco product compared to others, it is necessary to examine measures that directly ask tobacco users to compare the harm of one product versus another, which will be assessed in the following chapter.

7.0 Tobacco Product Risk Perceptions

7.1 Objective and Hypothesis

The purpose of this chapter was to examine specific risk perceptions of different tobacco products in India and Bangladesh, and explore any differences in product risk perceptions that may exist across different types of tobacco users. Specifically, this chapter addresses the following research objective:

Evaluate health risk perceptions of tobacco use and compare differences in risk perceptions associated with specific tobacco products that are commonly used in India and Bangladesh. This includes the following research questions:

- a) What are tobacco users' and non-users' perceptions of the riskiness of specific tobacco products in comparison to other tobacco products?
- b) Do these product risk perceptions differ across different types of tobacco users?

The hypothesis for this section (see Chapter 3) was as follows:

Risk perceptions for specific tobacco products will be related to which product one currently uses; for example, a cigarette smoker would perceive smokeless tobacco to be more harmful than cigarettes, whereas a smokeless user would perceive cigarettes to be more harmful than smokeless tobacco. This is expected based on previous research findings that tobacco users rate other products as more harmful than their own, perhaps as a means of justifying their tobacco use (see section 2.7).

7.2 Methods

7.2.1 Measures

In addition to measures of the health risks of using their own products (Chapter 6), respondents were asked about their perceptions of the risk of other tobacco products. All

respondents in both India and Bangladesh were asked if a particular tobacco product is less harmful, more harmful, or no different for health (or ‘don’t know’) compared to another product, with the three comparisons being cigarettes versus bidis, smokeless tobacco compared to cigarettes, and smokeless compared to bidis. Because these measures were asked of all respondents, regardless of tobacco user type, comparisons can be made across users. Specific measures that are included in this section, including full response options, are presented in Tables 9 (India) and 10 (Bangladesh). Though not displayed in the tables below, respondents also had the option of choosing ‘refused’ or ‘don’t know’ for each measure.

Table 9. Product Risk Perception Measures in India, Wave 1

Measure and Response Options as Presented in Surveys	Measure was presented to...			
	Smok- ers	Mixed Users	Smoke -less	Non- Users
Compared to smoking cigarettes, do you think bidis are less harmful, more harmful, or no different for health?				
1 Bidis less harmful than cigarettes	✓	✓	✓	✓
2 Bidis more harmful than cigarettes				
3 No difference				
Compared to smoking cigarettes, do you think using smokeless tobacco is less harmful, more harmful, or no different for health?				
1 Smokeless tobacco less harmful than cigarettes	✓	✓	✓	✓
2 Smokeless tobacco more harmful than cigarettes				
3 No difference				
Compared to smoking bidis, do you think smokeless tobacco is less harmful, more harmful or no different for health?				
1 Smokeless tobacco less harmful than bidis	✓	✓	✓	✓
2 Smokeless tobacco more harmful than bidis				
3 No difference				

Table 10. Product Risk Perception Measures in Bangladesh, Waves 1 to 3

Measure and Response Options as Presented in Surveys	Measure was presented to...												
	Wave 1			Wave 2				Wave 3					
	Cig/ Dual	Bidi	Non- user	Cig	Bidi	Dual	Non- user	Cig	Bidi	Dual	Mixed	Smoke -less	Non- user
Compared to smoking cigarettes, do you think bidis are less harmful, more harmful, or no different for health? 1 Bidis less harmful 2 Bidis more harmful 3 No difference	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Compared to smoking cigarettes, do you think smokeless tobacco products are less harmful, more harmful or no different for health? 1 Smokeless tobacco products less harmful than cigarettes 2 Smokeless tobacco products more harmful than cigarettes 3 No difference	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Compared to smoking bidis, do you think smokeless tobacco products are less harmful, more harmful or no different for health? 1 Smokeless are less harmful 2 Smokeless are more harmful 3 No difference	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

7.2.2 Data Analysis

Weighted frequencies, including percentage and number of respondents along with standard error, were produced for all product risk perception measures. Frequencies are presented for all current tobacco users as a group, and also broken down by tobacco use status: dual smokers (who smoke both cigarettes and bidis), cigarette only smokers, bidi smokers, mixed tobacco users (who use both smoked and smokeless tobacco), and smokeless tobacco users. While all smoked tobacco users responded to the same survey, I identified those who said they smoke cigarettes and not bidis, and those who smoked bidis but not cigarettes to create separate categories of cigarette-only and bidi-only smokers in order to allow for comparisons across those groups. Non-smoker perceptions are also presented, and because Wave 3 included respondents who had quit using tobacco from a previous wave, quitters are included as well. Pearson's chi-square tests of independence were conducted to determine if there was a significant difference in responses to each measure according to tobacco user type. Unweighted Z-tests of column proportions within each chi-square were then used to determine which responses significantly differed across users at the $p=.05$ level. Finally, a logistic regression analysis was conducted for each of the three product risk perception measures with tobacco user status (including quitters) predicting the likelihood of saying one product is less harmful or more harmful than the other. In order to use a dichotomous outcome variable for this simple binomial logistic regression, those who responded with 'no difference' or 'don't know' were excluded from those analyses.

7.3 Results

7.3.1 Product Risk Perceptions in India

Weighted frequencies for all response options to each measure of product risk perception are presented in Table 11 and Figure 3.

While the majority of non-users and mixed tobacco users said that there is ‘no difference’ in harm between any of the products, there were many differences across other types of tobacco users, with the results demonstrating that tobacco users tend to perceive their own tobacco product to be less harmful than other products. The majority of cigarette users said that smokeless tobacco and bidis are more harmful than cigarettes, but that there is no difference in harm between smokeless and bidis (products they do not use). Similarly, the majority of bidi users said that cigarettes and smokeless tobacco are more harmful than bidis, but that there is no difference in harm between smokeless tobacco and cigarettes. Smokeless users showed a slightly different pattern, with most saying either that smokeless is less harmful than bidis and cigarettes or that there is no difference in harm, but very few saying that smokeless is more harmful than other products.

Table 11. Product Risk Perceptions for India, Wave 1

Measure	All Tobacco Users (n=8047)	All Smoked Tobacco Users (n=1255)	Cigarettes Only* (n=504)	Bidis Only* (n=444)	Smokeless Users (n=5988)	Mixed Users (n=805)	Non-Users (n=2534)
	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)
	SE(%)	SE(%)	SE(%)	SE(%)	SE(%)	SE(%)	SE(%)
Bidis vs. Cigarettes							
Bidis less harmful than cigs	20.3 (1634) SE = 1.9	32.8 (408) SE = 3.6	18.9 (97) SE = 3.0	46.3 (197) SE = 7.2	16.6 (993) SE = 1.8	29.0 (232) SE = 2.5	14.0 (355) SE = 1.6
Bidis more harmful than cigs	19.2 (1541) SE = 1.6	27.1 (338) SE = 2.4	41.7 (214) SE = 3.7	11.1 (47) SE = 2.7	16.7 (1004) SE = 1.8	24.8 (199) SE = 2.4	15.3 (387) SE = 1.5
No difference	51.7 (4161) SE = 2.7	36.3 (453) SE = 3.0	34.7 (178) SE = 3.1	38.3 (163) SE = 6.6	56.0 (3362) SE = 2.9	43.2 (346) SE = 3.1	62.4 (1582) SE = 2.4
Don't know	8.8 (710) SE = 1.3	3.7 (47) SE = 0.6	4.6 (24) SE = 1.1	4.3 (18) SE = 1.4	10.7 (640) SE = 1.7	2.9 (23) SE = 1.0	8.3 (210) SE = 1.3
Smokeless (SL) vs. Cigs							
SL less harmful than cigs	33.9 (2728) SE = 2.6	17.4 (216) SE = 2.2	17.3 (88) SE = 2.7	20.6 (87) SE = 4.2	37.6 (2254) SE = 3.1	32.0 (257) SE = 2.5	14.5 (367) SE = 1.7
SL more harmful than cigs	18.7 (1507) SE = 1.8	42.0 (523) SE = 2.9	48.1 (246) SE = 3.3	29.0 (123) SE = 3.8	13.0 (780) SE = 1.8	25.4 (204) SE = 2.8	17.5 (443) SE = 1.7
No difference	38.9 (3128) SE = 2.7	33.0 (411) SE = 2.9	29.1 (149) SE = 3.0	39.5 (168) SE = 5.9	40.2 (2409) SE = 3.1	38.4 (308) SE = 3.1	59.1 (1499) SE = 2.8
Don't know	8.5 (682) SE = 1.2	7.6 (95) SE = 1.1	5.5 (28) SE = 1.4	11.0 (47) SE = 2.2	9.2 (554) SE = 1.5	4.1 (33) SE = 1.0	8.9 (225) SE = 1.3

Table 11 (continued). Product Risk Perceptions for India, Wave 1

Measure	All Tobacco Users (n=8047)	All Smoked Tobacco Users (n=1255)	Cigarettes Only* (n=504)	Bidis Only* (n=444)	Smokeless Users (n=5988)	Mixed Users (n=805)	Non-Users (n=2534)
	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)
	SE(%)	SE(%)	SE(%)	SE(%)	SE(%)	SE(%)	SE(%)
SL vs. Bidis							
SL less harmful than bidis	35.0 (2810) SE = 2.7	15.5 (193) SE = 1.7	17.3 (88) SE = 2.7	17.0 (72) SE = 2.7	39.3 (2353) SE = 3.2	33.0 (264) SE = 2.9	14.1 (356) SE = 1.7
SL more harmful than bidis	18.2 (1461) SE = 1.8	42.1 (524) SE = 2.8	38.4 (196) SE = 3.4	40.5 (172) SE = 4.9	12.3 (736) SE = 1.7	25.0 (200) SE = 2.6	16.3 (413) SE = 1.5
No difference	38.8 (3120) SE = 2.8	35.9 (447) SE = 2.9	38.8 (198) SE = 3.6	35.2 (150) SE = 5.3	39.6 (2370) SE = 3.2	37.9 (303) SE = 3.0	61.3 (1553) SE = 2.6
Don't know	8.0 (645) SE = 1.2	6.4 (80) SE = 0.9	5.6 (28) SE = 1.3	7.3 (31) SE = 1.3	8.9 (533) SE = 1.6	4.1 (33) SE = 1.0	8.3 (211) SE = 1.3

*Note: The 'cig only' and 'bidi only' categories represent those smoked tobacco users who exclusively used cigarettes or bidis; these categories were created from the existing group of smoked tobacco users. Responses under 'all tobacco users' represent combined responses from all tobacco users who responded to that question; not all tobacco users responded to every question.

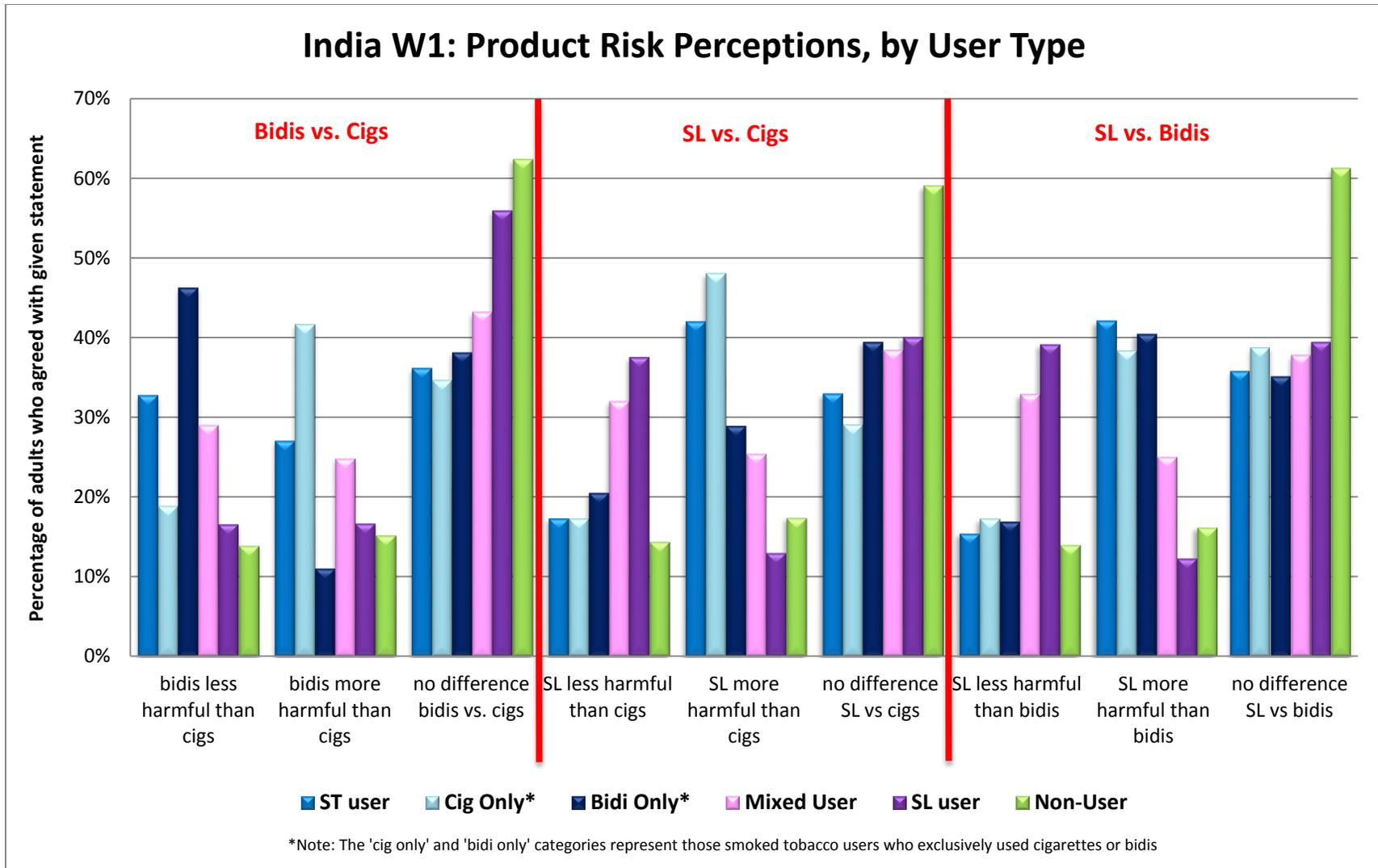


Figure 3. Product Risk Perceptions by User Type, India Wave 1

Comparing responses across tobacco users, there were significant differences in product risk perceptions by tobacco user type. Each of the three product risk comparison measures was significantly related to tobacco use status, both when tobacco use was defined as smoked user, smokeless user, or mixed user, and when it was defined as cigarette only smoker, bidi only smoker, other smoker, smokeless user, and mixed user. The latter grouping was used for most analyses to allow for comparisons between responses of cigarette and bidi smokers.

There was a significant relationship between tobacco use status and risk perceptions of bidis versus cigarettes ($X^2(8, N = 7337) = 504.32, p < .001$), with a significantly (at the $p = .05$ level) greater proportion of bidi smokers than all other user types saying that bidis are less harmful than cigarettes, and a significantly greater proportion of cigarette smokers than all other users saying that bidis are more harmful than cigarettes. Significantly more smokeless users than any other users said that there is no difference in harm between cigarettes and bidis. A simple logistic regression with tobacco user type predicting the odds of saying bidis are less harmful compared to more harmful than cigarettes revealed the same pattern, with tobacco use status significantly predicting risk perceptions of bidis versus cigarettes (Wald $F = 11.53, p < .001$). In particular, bidi users were 9.21 times more likely (95% CI [4.44, 19.10]) than cigarette smokers to say that bidis are less harmful than cigarettes.

Tobacco use status and risk perceptions of cigarettes versus smokeless tobacco were also significantly related ($X^2(8, N = 7348) = 676.93, p < .001$), with significant differences across all users for perceptions that smokeless is less harmful than cigarettes and more harmful than cigarettes. In particular, significantly more smokeless users than cigarette smokers said that smokeless is less harmful than cigarettes, and more cigarette smokers than smokeless users said that smokeless is more harmful than cigarettes. Simple logistic regression analyses revealed that

tobacco use status significantly predicted risk perceptions of smokeless tobacco versus cigarettes (Wald $F = 45.00$, $p < .001$). In particular, smokeless tobacco users were 8.03 times more likely than cigarette smokers (95% CI [4.54, 14.20]) to say that smokeless tobacco is less harmful than cigarettes.

Finally, there was a significant relationship between tobacco use status and risk perceptions of bidis versus smokeless tobacco ($X^2(8, N = 7373) = 708.04$, $p < .001$), with smokeless users significantly differing from bidi smokers on all response options (i.e., significantly more smokeless users than bidi smokers said that smokeless is less harmful than bidis and vice versa), but bidi and cigarette smokers did not significantly differ from each other on any responses. Again, a logistic regression found that tobacco use status significantly predicted product risk perceptions of smokeless tobacco compared to bidis (Wald $F = 44.00$, $p < .001$), with smokeless users having 7.59 times greater odds (95% CI [4.38, 13.17]) than bidi smokers of saying that smokeless is less harmful than bidis.

7.3.2 Product Risk Perceptions in Bangladesh

Weighted frequencies for all response options to each measure of product risk perception are presented in Table 12 and Figure 4, with responses of ‘don’t know’ omitted from the graph.

Similar to in India, the majority of all non-users, quitters, and mixed tobacco users (who use both smoked and smokeless products) tended to say that there is ‘no difference’ in harm between any of the products. However, unlike in India, the majority of all other respondents also tended to say that there is ‘no difference’ in harm between any of the products, with many bidi users in particular choosing this response. Nevertheless, there were still differences across tobacco user types in perceptions that one product is more or less harmful than another; for example, cigarette smokers had the highest proportion of respondents saying that both bidis and

smokeless tobacco are 'more harmful' than cigarettes, and smokeless tobacco users had the highest proportion of respondents who perceived smokeless to be 'less harmful' than both bidis and cigarettes.

Table 12. Product Risk Perceptions in Bangladesh, Wave 3

Measure	All Tobacco Users (n=3233)	Dual Smokers (n=207)	Cigarettes Only (n=1693)	Bidis Only (n=265)	Smokeless Users (n=775)	Mixed Users (n=293)	Quitters (n=240)	Non-Users (n=1988)
	% (n) SE(%)	% (n) SE(%)	% (n) SE(%)	% (n) SE(%)	% (n) SE(%)	% (n) SE(%)	% (n) SE(%)	% (n), SE(%)
Bidis vs. Cigarettes								
Bidis less harmful than cigs	2.1 (67) SE = 0.5	3.8 (8) SE = 1.8	1.6 (27) SE = 0.4	5.0 (14) SE = 1.5	1.2 (9) SE = 0.8	3.0 (9) SE = 1.2	2.3 (6) SE = 0.9	1.4 (27) SE = 0.4
Bidis more harmful than cigs	27.4 (889) SE = 1.7	27.8 (61) SE = 5.7	32.2 (542) SE = 2.3	17.7 (49) SE = 2.3	19.3 (148) SE = 2.1	30.5 (89) SE = 2.9	21.5 (51) SE = 3.2	16.6 (327) SE = 1.6
No difference	60.6 (1962) SE = 3.4	65.0 (143) SE = 6.5	58.5 (987) SE = 4.3	66.5 (183) SE = 2.9	62.5 (478) SE = 4.3	58.6 (171) SE = 3.0	71.7 (169) SE = 3.2	72.3 (1427) SE = 3.2
Don't know	9.9 (320) SE = 2.9	3.4 (7) SE = 1.4	7.7 (129) SE = 3.1	10.8 (30) SE = 2.7	17.0 (130) SE = 3.8	8.0 (23) SE = 1.9	4.4 (10) SE = 1.1	9.7 (192) SE = 2.5
Smokeless (SL) vs. Cigs								
SL less harmful than cigs	13.1 (422) SE = 1.0	12.4 (27) SE = 4.7	6.5 (109) SE = 1.2	10.7 (29) SE = 2.7	27.4 (210) SE = 2.2	15.9 (46) SE = 2.4	9.1 (22) SE = 1.9	9.9 (195) SE = 1.6
SL more harmful than cigs	22.1 (713) SE = 1.8	23.3 (51) SE = 5.5	29.2 (488) SE = 2.5	10.0 (27) SE = 2.0	8.5 (65) SE = 1.6	27.7 (81) SE = 4.9	16.5 (39) SE = 3.5	11.3 (223) SE = 1.6
No difference	54.8 (1768) SE = 3.3	60.5 (133) SE = 5.9	56.7 (948) SE = 3.6	67.0 (183) SE = 3.7	47.0 (360) SE = 4.2	49.2(144) SE = 4.5	69.6 (165) SE = 3.9	68.9 (1357) SE = 3.1
Don't know	10.0 (322) SE = 2.6	3.9 (9) SE = 1.5	7.7 (129) SE = 2.7	12.3 (33) SE = 2.8	17.0 (130) SE = 3.8	7.2 (21) SE = 1.6	4.8 (11) SE = 1.2	9.9 (196) SE = 2.5

Table 12 (continued). Product Risk Perceptions in Bangladesh, Wave 3

Measure	All Tobacco Users (n=3233)	Dual Smokers (n=207)	Cigarettes Only (n=1693)	Bidis Only (n=265)	Smokeless Users (n=775)	Mixed Users (n=293)	Quitters (n=240)	Non-Users (n=1988)
	% (n), SE(%)	% (n), SE(%)	% (n), SE(%)	% (n), SE(%)	% (n), SE(%)	% (n), SE(%)	% (n), SE(%)	% (n), SE(%)
Smokeless (SL) vs. Bidis								
SL less harmful than bidis	15.2 (491) SE = 1.0	13.2 (29) SE = 4.7	7.5 (127) SE = 1.2	11.2 (31) SE = 2.7	34.1 (256) SE = 2.3	16.3 (48) SE = 2.6	11.2 (26) SE = 2.2	12.6 (249) SE = 1.6
SL more harmful than bidis	18.4 (595) SE = 2.0	23.3 (51) SE = 5.8	23.7 (399) SE = 2.7	10.9 (30) SE = 2.0	5.3 (40) SE = 2.0	25.5 (75) SE = 5.3	16.6 (39) SE = 3.6	9.1 (178) SE = 1.7
No difference	55.9 (1801) SE = 3.3	59.2 (131) SE = 5.9	59.3 (1000) SE = 3.9	66.3 (182) SE = 3.9	45.1 (339) SE = 3.6	51.2 (150) SE = 4.9	67.4 (159) SE = 4.0	68.3 (1343) SE = 3.6
Don't know	10.5 (338) SE = 2.5	4.3 (9) SE = 1.6	9.5 (159) SE = 2.8	11.7 (32) SE = 2.6	15.4 (116) SE = 3.3	7.0 (21) SE = 1.6	4.8 (11) SE = 1.2	10.0 (197) SE = 2.7

Note: Responses under ‘all tobacco users’ represent combined responses from all tobacco users who responded to that question; not all tobacco users responded to every question.

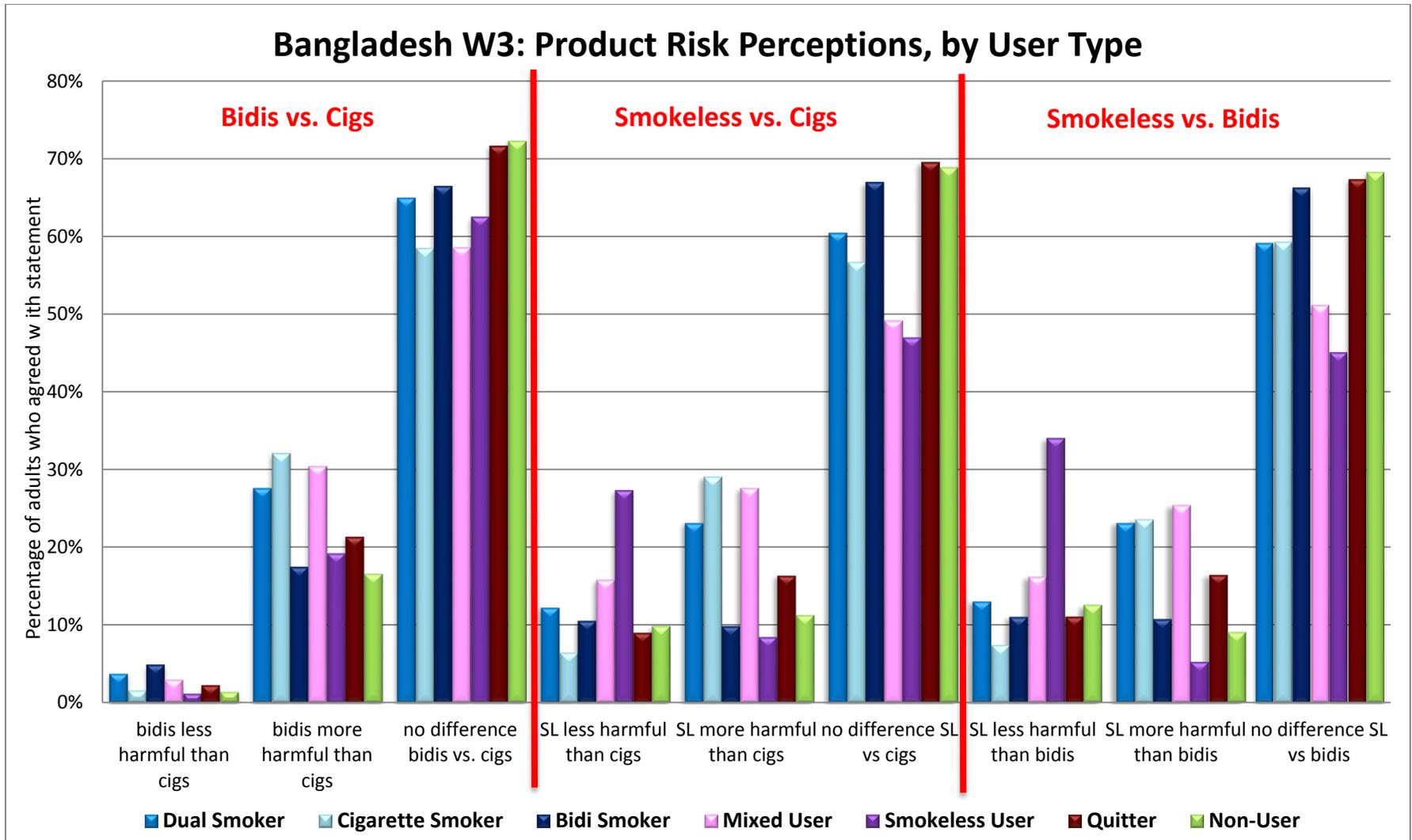


Figure 4. Product Risk Perceptions by User Type, Bangladesh Wave 3

Similar to India, there were significant differences in product risk perceptions by tobacco user type, with all three product risk comparison measures being significantly related to tobacco use status.

There was a significant relationship between tobacco use status and risk perceptions of bidis versus cigarettes ($X^2 (15, N = 3473) = 141.84, p <.001$), with significantly more (at the $p=.05$ level) cigarette smokers than bidi smokers, smokeless users, and quitters saying that bidis are more harmful than cigarettes, and significantly more bidi smokers than all other users except quitters saying that bidis are less harmful than cigarettes. A simple logistic regression with tobacco user type predicting the odds of saying bidis are less harmful compared to more harmful than cigarettes was significant (Wald $F = 3.27, p =.018$), with cigarette smokers being 5.62 times more likely than bidi smokers (95% CI [2.34, 13.52]) to say that bidis are more harmful than cigarettes.

Risk perceptions of cigarettes compared to smokeless tobacco also significantly differed by tobacco user type ($X^2 (15, N = 3465) = 409.99, p <.001$). A significantly greater proportion of cigarette smokers than bidi smokers, dual smokers, mixed users, smokeless users, and quitters said that smokeless tobacco is more harmful than cigarettes, and a significantly greater proportion of smokeless users than all other users said that smokeless tobacco is less harmful than cigarettes. A logistic regression found that tobacco use significantly predicted risk perceptions of smokeless tobacco versus cigarettes (Wald $F = 28.60, p <.001$). In particular, cigarette smokers were 14.40 times more likely (95% CI [8.96, 23.13]) than smokeless users to say that smokeless is more harmful than cigarettes.

Risk perceptions of bidis versus smokeless tobacco were also significantly related to tobacco use status ($X^2 (15, N = 3451) = 436.69, p <.001$), with a significantly greater proportion

of smokeless users than any other group saying that smokeless tobacco is less harmful than bidis. However, while significantly more bidi users than smokeless users responded that smokeless is more harmful than bidis, significantly more cigarette smokers, dual smokers, and mixed users responded with this option compared to bidi smokers. Tobacco use status significantly predicted risk perceptions of bidis versus smokeless in a logistic regression (Wald $F = 9.72$, $p < .001$), with bidi smokers having 6.22 times greater odds than smokeless tobacco users (95% CI [1.99, 19.44]) of saying that smokeless tobacco is more harmful than bidis. However, as found in the chi-square analysis, all other categories of tobacco users had even higher odds of saying that smokeless tobacco is more harmful than bidis; for example, cigarette smokers were 20.16 times more likely (95% CI [7.97, 51.03]) than smokeless users to say that smokeless is more harmful than bidis and 3.24 times more likely (95% CI [1.36, 7.73]) than bidi smokers to say so.

7.4 Discussion

Overall, the findings from this section support my hypothesis that tobacco users would perceive their own product to be less harmful than other tobacco products, which is consistent with the notion that tobacco product risk perceptions may be influenced by an optimistic bias that tobacco users maintain about their own tobacco use, perhaps to alleviate concerns about the harm their product may be causing them.

In both India and Bangladesh, the majority of non-tobacco users, including quitters, as well as mixed users (those who use both smoked and smokeless tobacco products) perceived all tobacco products to be equally harmful. In addition, current tobacco users tended to say that there is no difference in harm between tobacco products that they do not use, for example, cigarette smokers said that bidis and smokeless tobacco are equally harmful. This suggests that when asked to compare the risks of two different tobacco products, those who do not use either

of them and those who use both of them will generally say that they are equally harmful; according to cognitive dissonance theory this is because they would have no cognitive incentive to believe that one is less harmful than the other.

On the other hand, when asked to compare a tobacco product that they currently use to another product, users in both India and Bangladesh were significantly more likely to say that their own product is less harmful than the other product (versus more harmful or no different). For example, cigarette smokers believed that cigarettes are less harmful than bidis, while bidi smokers perceived bidis to be less harmful than cigarettes. Assuming all tobacco users have equal access to information about the harms and that tobacco users have the greatest access to information about the harms of their own product through regular exposure to warning labels, and considering that non-users perceived all products to be equally harmful, the consistent findings that tobacco users perceived their own product to be less harmful than others suggests that there exists a bias in their risk perceptions of tobacco products.

There were some differences in patterns of product risk perceptions between India and Bangladesh. In India, smokeless tobacco users were about equally likely to believe that smokeless tobacco is less harmful than bidis or cigarettes as they were to perceive smokeless tobacco to be equally harmful to other products. Given that smokeless tobacco is generally considered by experts to be less harmful than other tobacco products (O'Connor, 2012), it seems especially odd that the strong majority of smokeless users do not say that their product is the least harmful. However, there was a large, national mass media campaign in India to educate smokeless tobacco users about the health harms of smokeless tobacco which took place in 2009, a year before the ITC India Survey (Murukutla et al., 2012). In addition, pictorial warnings had just been introduced on all tobacco packages for the first time in 2009 (previously there were no

warnings on smokeless packages and text warnings on cigarette packages) (ITC Project, 2013). It is therefore possible that the recent focus on the harms of smokeless tobacco increased smokeless users' awareness of the harms of smokeless use, and also may have made it more difficult to maintain a motivated belief that their product is less harmful than others, which would support the Theory of Motivated Reasoning (Kunda, 1990). There is also the possibility that the horrific images of mouth cancer that is strongly associated with smokeless use rather than cigarette or bidi use (although use of smoked tobacco products is also highly associated with mouth cancer) may have had an influence on elevating perceptions of the likelihood of harm. Even though conceptual models of perceptions of risk distinguish between likelihood and severity, they are not independent of each other, as shown in a number of studies where severity has an influence on perceptions of likelihood (Slovic, 2000a; Weinstein, 2000).

In Bangladesh, despite differences in risk perceptions across users, the majority of all users generally said that there is no difference in harm between products, and bidi smokers seemed especially likely to perceive all products to be equal in harm. It is possible that there was a media campaign in Bangladesh to educate tobacco consumers that there is no such thing as a "safe" tobacco product, as this message is commonly emphasized by both the tobacco industry and tobacco control organizations (Kozlowski & Edwards, 2005) and may contribute to beliefs that all products are equally harmful. However, it is unclear from available data if such a campaign existed in Bangladesh, so it is difficult to interpret why respondents in Bangladesh generally perceived no difference in harm across products.

While the findings from this section suggest that type of tobacco user is a significant predictor of tobacco product risk perceptions, demographic variables and individual differences were not controlled for in these analyses. The next chapter will seek to determine whether

tobacco user type is a significant predictor of product risk perceptions when controlling for other factors, as well as which additional factors may also predict risk perceptions of tobacco products.

8.0 Predictors of Product Risk Perceptions

8.1 Objective and Hypothesis

The purpose of this section was to explore factors that lead to beliefs that one tobacco product is more or less harmful than another, with the specific research objective as follows:

Determine if certain factors can predict a tobacco user's risk perceptions of various tobacco products, that is, whether they perceive one product to be more or less harmful than another. Factors to evaluate as possible predictors of product risk perceptions in both India and Bangladesh include:

- a) Type of tobacco user (controlling for demographic variables);
- b) Demographics variables, including state or division, urban or rural residence, gender, age group, income, and education;
- c) Heaviness of tobacco use and perceived addiction to one's tobacco product;
- d) General health risk perceptions of using tobacco.

My predictions for this section, with justifications based on previous research, were described earlier in section 3.2, and are summarized below:

1. Type of tobacco user should be a strong predictor of tobacco product risk perceptions, with tobacco users being more likely to say that their own product is less harmful than other products.
2. Strength of addiction to tobacco should influence product risk perceptions in that those who are more heavily addicted should be more likely to say that other products are more harmful than their own.
3. Those who perceive greater health risks from tobacco use in general should be less likely to say that their product is less harmful than others.

8.2 Methods

8.2.1 Measures

The measures that were used in the analyses in this section include demographic variables, addiction and tobacco use measures, perceived health risks, and perceived product risks. The specific measures and response options that appeared in the surveys are presented in Tables 13 (India) and 14 (Bangladesh), with response options of ‘refused’ and ‘don’t know’ omitted from the tables.

Demographic variables included monthly household income and highest level of education achieved. In India, monthly income was categorized into low (<5,000 rupees), moderate (5,000-15,000 rupees), and high income (15,000-20,000 rupees), and education was categorized into low (illiterate to middle school), moderate (secondary school), and high (graduate to above post-graduate degree). In Bangladesh, income categories correspond to low (<5,000 taka), moderate (5,000-10,000 taka), and high (greater than 10,000 taka), and education was categorized as low (illiterate), moderate (1 to 8 years of school), and high (9 years or more). Other demographic measures were recorded at the time of enumeration and included gender (male or female); urban or rural residence status; age, which was categorized into 15-17 years, 18-24, 25-39, 40-54, and 55 or older; state in India (West Bengal, Madhya Pradesh, Maharashtra, Bihar); and division in Bangladesh (Barisal, Chittagong, Khulna, Rajshahi, Sylhet, Dhaka).

Measures of tobacco use and addiction included how many times, on average, the product (cigarettes, bidis, or smokeless tobacco) is used each day, which was coded as 0 (less than 10 a day), 1 (10-20 a day), 2 (21-30), and 3 (more than 30); how soon after waking the product is first used (more than 60 minutes after waking, 31-60 minutes, 6-30 minutes, less than 5 minutes); and how addicted the user perceives themselves to be (not at all, somewhat, very). A heaviness of

tobacco use index (HTI) for each product (cigarettes, bidis, smokeless tobacco) was created following previous ITC research methods (Costello, Logel, Fong, Zanna, & McDonald, 2012), wherein the number of uses per day and time after waking were summed to create a scale from 0-6, where 0 represents low heaviness of tobacco use/dependence and 6 represents high dependence. The HTI score and perceived addiction were used as measures of addiction in the analyses in this section.

Additional measures included perceived health risks, as reported in Chapter 6, including likelihood of getting cancer from tobacco use, perceived damage from using one's product, and worry about future health damage. Perceived product risks were used as the dependent variables in the analyses, including comparisons of harm between bidis versus cigarettes, smokeless tobacco versus cigarettes, and smokeless versus bidis; these measures were described in Chapter 7.

Table 13. Demographic, Addiction, and Perceived Risk Measures in India, Wave 1

Measure and Response Options as Presented in Surveys	Measure was presented to...		
	Cig & Bidi Smokers	Mixed Users	Smokeless
Income and Education			
In the last year, on average, how much was the total monthly income of your family?			
1 Less than 5,000 rupees			
2 5,000-10,000 rupees	✓	✓	✓
3 10,000-15,000 rupees			
4 15,000-20,000 rupees			
5 More than 20,000 rupees			
What is your highest level of education?			
01 Illiterate			
02 Literate, no formal education			
03 Up to primary School (up to class IV)			
04 Middle School class V to VII	✓	✓	✓
05 Secondary School (ITI course, class XII/X or intermediate)			
06 Graduate (BA/ BSc/ Diploma etc.)			
07 Post Graduate/ Professional Degree			
08 Above Post Graduate degree (i.e., PhD)			
Heaviness of Tobacco Use and Addiction Measures			
On average, how many cigarettes do you smoke each day?			
_____	✓	✓	-
On average, how many bidis do you smoke each day?			
_____	✓	-	-
On average, how many times do you use it [asked about the smokeless product they use most frequently] each day?			
_____	-	✓	✓
How soon after waking do you usually have your first smoke?			
1 5 min or less			
2 6-30 min			
3 31-60 min	✓	✓	-
4 More than 60 min			

Table 13 (cont'd). Demographic, Addiction, and Perceived Risk Measures in India, Wave 1

Measure and Response Options as Presented in Surveys	Measure was presented to...		
	Cig & Bidi Smokers	Mixed Users	Smokeless
On a usual day, how soon after waking do you first use smokeless tobacco?			
1 5 min or less			
2 6-30 min	-	✓	✓
3 31-60 min			
4 More than 60 min			
Do you consider yourself addicted to smoking (any smoked tobacco products)? That is, “addicted” means “a very strong habit”. Would you say . .			
1 Not at all addicted	✓	✓	-
2 Yes, somewhat addicted			
3 Yes, very addicted			
Do you consider yourself addicted to any smokeless tobacco products? That is, “addicted” means “a very strong habit”. Would you say . . .			
1 Not at all addicted	-	✓	✓
2 Yes, somewhat addicted			
3 Yes, very addicted			
Perceived Health Risks			
Let's say that you continue to smoke as much as you do now. How would you compare your own chance of getting lung cancer in the future to the chance of a non-user? Would you say that you are . . .			
1 Much more likely to get lung cancer than a non-user	✓	✓	-
2 Somewhat more likely			
3 A little more likely			
4 Just as likely			
5 Less likely			
Let's say that you continue to use smokeless tobacco as much as you do now. How would you compare your own chance of getting mouth cancer in the future to the chance of a non-user? Would you say that you are . . .			
1 Much more likely to get mouth cancer than a non-user	-	✓	✓
2 Somewhat more likely			
3 A little more likely			
4 Just as likely			
5 Less likely			

Table 13 (cont'd). Demographic, Addiction, and Perceived Risk Measures in India, Wave 1

Measure and Response Options as Presented in Surveys	Measure was presented to...		
	Cig & Bidi Smokers	Mixed Users	Smokeless
To what extent, if at all, has smoking damaged your health?			
1 Not at all			
2 A little	✓	✓	-
3 A lot			
To what extent, if at all, has using smokeless tobacco damaged your health?			
1 Not at all	-	✓	✓
2 A little			
3 A lot			
How worried are you, if at all, that smoking WILL damage your health in the future?			
1 Not at all worried			
2 A little worried	✓	✓	-
3 Moderately worried			
4 Very worried			
How worried are you, if at all, that using smokeless tobacco WILL damage your health in the future?			
1 Not at all worried	-	✓	✓
2 A little worried			
3 Moderately worried			
4 Very worried			
Perceived Product Risks			
Compared to smoking cigarettes, do you think bidis are less harmful, more harmful, or no different for health?			
1 Bidis less harmful than cigarettes	✓	✓	✓
2 Bidis more harmful than cigarettes			
3 No difference			
Compared to smoking cigarettes, do you think using smokeless tobacco is less harmful, more harmful, or no different for health?			
1 Smokeless tobacco less harmful than cigarettes	✓	✓	✓
2 Smokeless tobacco more harmful than cigarettes			
3 No difference			
Compared to smoking bidis, do you think smokeless tobacco is less harmful, more harmful or no different for health?			
1 Smokeless tobacco less harmful than bidis	✓	✓	✓
2 Smokeless tobacco more harmful than bidis			
3 No difference			

Table 14. Demographic, Addiction, and Perceived Risk Measures in Bangladesh, Wave 3

Measure and Response Options as Presented in Surveys	Measure was presented to...				
	Dual Smokers	Cigarette Smokers	Bidi Smokers	Mixed Users	Smokeless Users
Income and Education					
In the last year, on average, how much was the total monthly income of your household?					
1 Less than 5,000 Taka					
2 5,000-10,000 Taka	✓	✓	✓	✓	✓
3 10,000-15,000 Taka					
4 15,000-20,000 Taka					
5 20,000+ Taka					
What is your highest level of education?					
1 Illiterate					
2 Primary (1-5 years)					
3 Secondary (6-8 years)					
4 SSC (9-10 years)	✓	✓	✓	✓	✓
5 HSC (11-12 years)					
6 Bachelor's degree (14-16 years)					
7 Master's degree (15-17 years)					
8 Above Master's degree (i.e., PhD)					
Heaviness of Tobacco Use and Addiction					
On average, how many whole cigarettes do you smoke per day? _____					
	✓	✓	-	✓	-
On average, how many whole bidis do you smoke per day? _____					
	✓	-	✓	✓	-
On average, how many times do you use smokeless tobacco per day? _____					
	-	-	-	✓	✓
How soon after waking do you smoke your first cigarette?					
1 5 min or less					
2 6-30 min	✓	✓	-	✓	-
3 31-60 min					
4 More than 60 min					

Table 14 (cont'd). Demographic, Addiction, & Perceived Risk Measures in Bangladesh, W3

Measure and Response Options as Presented in Surveys	Measure was presented to...				
	Dual Smokers	Cig Smokers	Bidi Smokers	Mixed Users	Smokeless Users
How soon after waking do you smoke your first bidi?					
1 5 min or less					
2 6-30 min	✓	-	✓	✓	-
3 31-60 min					
4 More than 60 min					
On a usual day, how soon after waking do you first use smokeless tobacco?					
1 5 min or less					
2 6-30 min	-	-	-	✓	✓
3 31-60 min					
4 More than 60 min					
Do you consider yourself addicted to cigarettes? That is, "addicted" means "a very strong habit". Would you say . . .					
1 Not at all addicted	✓	✓	-	✓	-
2 Yes, somewhat addicted					
3 Yes, very addicted					
Do you consider yourself addicted to bidis? That is, "addicted" means "a very strong habit". Would you say . . .					
1 Not at all addicted	✓	-	✓	✓	--
2 Yes, somewhat addicted					
3 Yes, very addicted					
Do you consider yourself addicted to any smokeless tobacco products? That is, "addicted" means "a very strong habit". Would you say . . .					
1 Not at all addicted	-	-	-	✓	✓
2 Yes, somewhat addicted					
3 Yes, very addicted					
Perceived Health Risks					
Let's say that you continue to smoke cigarettes as much as you do now. How would you compare your own chance of getting lung cancer in the future to the chance of a non-smoker? Would you say that you are . . .					
1 Much more likely to get lung cancer than a non-smoker	✓	✓	-	✓	-
2 Somewhat more likely					
3 A little more likely					
4 Just as likely 5 Less likely					

Table 14 (cont'd). Demographic, Addiction, & Perceived Risk Measures in Bangladesh, W3

Measure and Response Options as Presented in Surveys	Measure was presented to...				
	Dual Smokers	Cig Smokers	Bidi Smokers	Mixed Users	Smokeless Users
Let's say that you continue to smoke bidis as much as you do now. How would you compare your own chance of getting lung cancer in the future to the chance of a non-smoker? Would you say that you are . . .					
1 Much more likely to get lung cancer than a non-smoker	✓	-	✓	✓	-
2 Somewhat more likely					
3 A little more likely					
4 Just as likely					
5 Less likely					
Let's say that you continue to use smokeless tobacco as much as you do now. How would you compare your own chance of getting mouth cancer in the future to the chance of a non-user? Would you say that you are . . .					
1 Much more likely to get mouth cancer than a non-user	-	-	-	✓	✓
2 Somewhat more likely					
3 A little more likely					
4 Just as likely					
5 Less likely					
To what extent, if at all, has smoking cigarettes damaged your health?					
1 Not at all	✓	✓	-	✓	-
2 A little					
3 A lot					
To what extent, if at all, has smoking bidis damaged your health?					
1 Not at all	✓	-	✓	✓	-
2 A little					
3 A lot					
To what extent, if at all, has using smokeless tobacco damaged your health?					
1 Not at all	-	-	-	✓	✓
2 A little					
3 A lot					

Table 14 (cont'd). Demographic, Addiction, & Perceived Risk Measures in Bangladesh, W3

Measure and Response Options as Presented in Surveys	Measure was presented to...				
	Dual Smokers	Cig Smokers	Bidi Smokers	Mixed Users	Smokeless Users
How worried are you, if at all, that smoking cigarettes WILL damage your health in the future?					
1 Not at all worried	✓	✓	-	✓	-
2 A little worried					
3 Moderately worried					
4 Very worried					
How worried are you, if at all, that smoking bidis WILL damage your health in the future?					
1 Not at all worried					
2 A little worried	✓	-	✓	✓	-
3 Moderately worried					
4 Very worried					
How worried are you, if at all, that using smokeless tobacco WILL damage your health in the future?					
1 Not at all worried	-	-	-	✓	✓
2 A little worried					
3 Moderately worried					
4 Very worried					
Perceived Product Risks					
Compared to smoking cigarettes, do you think bidis are less harmful, more harmful, or no different for health?					
1 Bidis less harmful than cigarettes	✓	✓	✓	✓	✓
2 Bidis more harmful than cigarettes					
3 No difference					
Compared to smoking cigarettes, do you think using smokeless tobacco is less harmful, more harmful, or no different for health?					
1 Smokeless tobacco less harmful than cigarettes	✓	✓	✓	✓	✓
2 Smokeless tobacco more harmful than cigarettes					
3 No difference					
Compared to smoking bidis, do you think smokeless tobacco is less harmful, more harmful or no different for health?					
1 Smokeless tobacco less harmful than bidis	✓	✓	✓	✓	✓
2 Smokeless tobacco more harmful than bidis					
3 No difference					

8.2.3 Data Analysis

In order to determine which factors significantly predicted product risk perceptions, multinomial logistic regression models were conducted. Because product risk perceptions included three discrete categorical outcomes – less harmful, more harmful, or no difference – multinomial logistic regression allowed these outcomes to be predicted by a set of independent variables, with the odds of one outcome compared to another. For each model, only the results for the odds that a respondent said that a certain product is ‘less harmful’ than another product compared to ‘more harmful’ are presented in this dissertation; that is, ‘more harmful’ was used as the reference category. Although ‘no difference’ was also included in the models, odds ratio results associated with this outcome are, for the most part, not discussed as I was more interested in determining which factors lead to a belief that a product is less or more harmful than another product.

Logistic regression models were run separately with each of the three product comparison measures as dependent variables: bidis versus cigarettes, smokeless tobacco versus cigarettes, and smokeless tobacco versus bidis. For each of these three measures, five regression models were conducted. First, all demographic variables (state/division, urban or rural status, gender, age group, income, and education) along with tobacco user type were included as predictor variables. Second, interaction terms of tobacco user type with each of the demographic measures were added to the model in order to determine if demographics predicted product risk perceptions differently for different tobacco users. Next, three models were conducted with addiction and perceived risk measures as predictor variables: one for cigarette users only, one for bidi users, and one for smokeless users. These had to be conducted separately because these

measures were specific to user types. Each of these models also included the demographic variables in order to control for them. Results of the analyses include Wald F test p-values to determine if a variable significantly predicted product risk perceptions, along with specific odds ratios for the belief that a product is less harmful versus more harmful. In some cases, a predictor may be significant but the presented odds ratio is not, which indicates the significance may lie with the ‘no difference’ belief, which is not presented in these results.

8.3 Results

8.3.1 Overview of Predictors of Risk Perceptions in India

Tables 15 through 18 present the results of the multiple logistic regression models to determine which factors significantly predicted product risk perceptions for each of the three product comparisons (bidis versus cigarettes, cigarettes versus smokeless tobacco, and smokeless versus bidis) in India. Table 15 includes results for the demographic measures, type of tobacco user, and interactions of demographic variables with type of tobacco user. Table 16 displays the results for the models with addiction and perceived risk measures predicting product risk perceptions among cigarette smokers only, Table 17 presents results for bidi smokers, and Table 18 presents results for smokeless tobacco users.

In general, demographic variables were not significant predictors of product risk perceptions, with the exception of state, gender, and age. In particular, tobacco users in Bihar tended to be more likely than the other three states to say that bidis are more harmful than both cigarettes and smokeless tobacco, and females and older tobacco users were generally more likely than males and younger age groups to say that there was ‘no difference’ in harm between products. Controlling for demographic variables, tobacco user type was a significant predictor of all three product risk comparisons, with tobacco users being significantly more likely to say that

their own product is less harmful than the other products. The only significant interaction across all three risk comparison measures was between gender and tobacco user type, with the majority of the female sample in the smokeless user category, and this group was more likely to perceive 'no difference' in harm between products compared to males. Also controlling for demographic variables, the majority of the measures of addiction and perceived health risk did not significantly predict product risk perceptions, but the directions of odds ratios and those findings that were significant all tended to support the prediction that tobacco users who are more addicted to their product are more likely to say that their product is less harmful than another, and those who perceive greater personal health risks from using their product are more likely to say that their product is more harmful than another.

Table 15. Predictors of Product Risk Perceptions in India – Main Effects and Interactions

Predictor	Bidis less harmful than cigs			Smokeless less harmful than cigs			Smokeless less harmful than bidis		
	n=7116	Adjusted odds ratio (95% CI)	<i>p</i> -value	n=7147	Adjusted odds ratio (95% CI)	<i>p</i> -value	n=7177	Adjusted odds ratio (95% CI)	<i>p</i> -value
Main Effects:									
State			.002			<.001			<.001
West Bengal	1816	1.82 (0.75-4.47)		1803	0.22 (0.08-0.65)*		1797	0.15 (0.05-0.47)*	
Madhya Pradesh	1659	3.46 (1.28-9.32)*		1620	0.40 (0.15-1.10)		1629	0.25 (0.09-0.71)*	
Maharashtra	1816	1.18 (0.46-3.12)		1775	0.39 (0.15-1.09)		1794	0.28 (0.09-0.85)*	
Bihar	1939	1.00 (reference)		1948	1.00 (reference)		1956	1.00 (reference)	
Urban/rural status			.387			.203			.165
Rural	1920	0.64 (0.32-1.27)		1905	1.63 (0.81-3.27)		1927	1.85 (0.88-3.86)	
Urban	5196	1.00 (reference)		5242	1.00 (reference)		5249	1.00 (reference)	
Gender			<.001			<.001			<.001
Male	4995	0.94 (0.73-1.22)		5009	1.47 (1.08-2.01)*		5030	1.35 (0.97-1.88)	
Female	2121	1.00 (reference)		2138	1.00 (reference)		2147	1.00 (reference)	
Age (years)			<.001			<.001			<.001
15-17	168	1.06 (0.98-1.15)		166	1.17 (1.07-1.27)*		165	1.06 (0.98-1.15)	
18-24	855	(continuous)		855	(continuous)		859	(continuous)	
25-39	2420			2457			2457		
40-54	2105			1563			2117		
55+	1569			1935			1578		
Income			.439			.003			.002
Low	1964	0.72 (0.47-1.10)		1935	0.76 (0.43-1.34)		1951	1.02 (0.59-1.79)	
Moderate	4075	0.87 (0.61-1.22)		4107	1.25 (0.86-1.82)		4116	1.34 (0.91-1.98)	
High	1077	1.00 (reference)	.289	1104	1.00 (reference)		1110	1.00 (reference)	
Education						.559			.220
Low	4171	1.25 (0.85-1.83)		4171	0.93 (0.62-1.39)		4194	0.81 (0.51-1.27)	
Moderate	2159	1.32 (0.99-1.75)		2175	0.93 (0.61-1.44)		2188	0.89 (0.57-1.40)	
High	786	1.00 (reference)		801	1.00 (reference)		795	1.00 (reference)	

Table 15 (continued). Predictors of Product Risk Perceptions in India – Main Effects and Interactions

Predictor	Bidis less harmful than cigs			Smokeless less harmful than cigs			Smokeless less harmful than bidis		
	n=7116	Adjusted odds ratio (95% CI)	p-value	n=7147	Adjusted odds ratio (95% CI)	p-value	n=7177	Adjusted odds ratio (95% CI)	p-value
Type of Tobacco User			<.001			<.001			<.001
Other smoked	300	3.60 (2.14-6.15)*		285	0.87 (0.49-1.55)		285	0.69 (0.34-1.39)	
Cig smoker	474	1.00 (reference)		470	1.00 (reference)		469	1.36 (0.72-2.57)	
Bidi smoker	387	8.86 (4.37-17.94)*		360	1.68 (0.98-2.91)		376	1.00 (reference)	
Mixed tobacco	755	2.61 (1.76-3.88)*		747	3.20 (2.12-4.83)*		745	3.39 (2.00-5.72)*	
Smokeless user	5200	2.34 (1.50-3.66)*		5285	7.29 (4.26-12.46)*		5302	7.88 (4.10-15.16)*	
Interactions:									
State* tobacco user	-	-	.662	-	-	<.001	-	-	<.001
Urban/rural*tobacco user type	-	-	.918	-	-	.426	-	-	.756
Gender*tobacco user type	-	-	<.001	-	-	<.001	-	-	<.001
Age group*tobacco user type	-	-	.001	-	-	.220	-	-	.001
Income*tobacco user type	-	-	.148	-	-	1.000	-	-	.944
Education*tobacco user type	-	-	.522	-	-	.283	-	-	.387

Note: Odds ratios represent the odds of the response that a product is ‘less harmful’ compared to ‘more harmful’, with significance indicated by a *.

Table 16. Addiction and Perceived Risk Predictors of Product Risk Perceptions in India – Cigarette Smokers Only

Predictor	Bidis less harmful than cigs			Smokeless less harmful than cigs			Smokeless less harmful than bidis		
	n=392	Adjusted OR (95% CI)	p-value	n=388	Adjusted OR (95% CI)	p-value	n=388	Adjusted OR (95% CI)	p-value
Heaviness of Smoking			.141			.192			.543
Low	280	1.16 (0.69-1.93)		275	0.83 (0.34-2.54)		272	0.70 (0.24-2.07)	
Moderate	105	(continuous)		105	(continuous)		108	(continuous)	
High	7			8			7		
Perceived Addiction to Smoking			.014			.170			.940
Not at all addicted	71	0.59 (0.39-0.89)*		68	0.62 (0.37-1.04)		67	0.97 (0.57-1.65)	
Somewhat addicted	196	(continuous)		191	(continuous)		189	(continuous)	
Very addicted	125			129			132		
Probability of Lung Cancer			.052			.748			.461
Less likely than a non-smoker	7	1.18 (0.84-1.64)		7	1.13 (0.83-1.54)		8	0.85 (0.61-1.20)	
Just as likely	64	(continuous)		64	(continuous)		66	(continuous)	
A little more likely	69			65			63		
Somewhat more likely	85			82			83		
Much more likely	166			168			167		
Cigarette smoking has damaged health			.444			.498			.674
Not at all	196	0.78 (0.51-1.18)		193	1.36 (0.76-2.45)		195	1.32 (0.70-2.49)	
A little	152	(continuous)		151	(continuous)		149	(continuous)	
A lot	44			44			44		
Worried smoking will damage health			.670			.626			.448
Not at all worried	90	0.91 (0.66-1.28)		91	1.15 (0.84-1.56)		94	0.81 (0.58-1.13)	
A little worried	117	(continuous)		114	(continuous)		111	(continuous)	
Moderately worried	124			123			122		
Very worried	61			61			61		

Note: Odds ratios represent the odds of the response that a product is ‘less harmful’ compared to ‘more harmful’, with significance indicated by a *. All measures in these models controlled for the demographic measures in Table 15.

Table 17. Addiction and Perceived Risk Predictors of Product Risk Perceptions in India – Bidi Smokers Only

Predictor	Bidis less harmful than cigs			Smokeless less harmful than cigs			Smokeless less harmful than bidis		
	n=323	Adjusted OR (95% CI)	p-value	n=305	Adjusted OR (95% CI)	p-value	n=315	Adjusted OR (95% CI)	p-value
Heaviness of Smoking			.132			.114			.110
Low	152	2.15 (0.99-4.71)		143	1.60 (0.99-2.91)		146	1.94 (1.04-3.61)*	
Moderate	33	(continuous)		134	(continuous)		136	(continuous)	
High	22			28			33		
Perceived Addiction to Smoking			.180			.808			
Not at all addicted	10	0.57 (0.29-1.09)		21	0.96 (0.58-1.59)		20	0.44 (0.22-0.86)*	.051
Somewhat addicted	150	(continuous)		143	(continuous)		145	(continuous)	
Very addicted	151			141			150		
Probability of Lung Cancer			.120			.035			
Less likely than a non-smoker	5	1.29 (0.88-1.91)		6	1.51 (1.04-2.19)*		6	1.16 (0.83-1.65)	.336
Just as likely		(continuous)		44	(continuous)		48	(continuous)	
A little more likely	56			52			53		
Somewhat more likely	72			69			69		
Much more likely	143			134			139		
Bidi smoking has damaged health			.011			.256			.556
Not at all	178	0.46 (0.24-0.86)*		167	0.70 (0.39-1.27)		175	1.16 (0.70-1.94)	
A little	103	(continuous)		96	(continuous)		97	(continuous)	
A lot	43			42			43		
Worried smoking will damage health			.236			.595			.152
Not at all worried	79	1.17 (0.84-1.63)		72	1.16 (0.86-1.55)		78	0.89 (0.59-1.33)	
A little worried	112	(continuous)		103	(continuous)		106	(continuous)	
Moderately worried	91			87			90		
Very worried	41			41			41		

Note: Odds ratios represent the odds of the response that a product is ‘less harmful’ compared to ‘more harmful’, with significance indicated by a *. All measures in these models controlled for the demographic measures in Table 15.

Table 18. Addiction and Perceived Risk Predictors of Product Risk Perceptions in India – Smokeless Users Only

Predictor	Bidis less harmful than cigs			Smokeless less harmful than cigs			Smokeless less harmful than bidis		
	n=4612	Adjusted OR (95% CI)	p-value	n=4700	Adjusted OR (95% CI)	p-value	n=4709	Adjusted OR (95% CI)	p-value
Heaviness of Tobacco Use			.081			.026			.062
Low	3415	0.87 (0.62-1.22)		3472	1.20 (0.97-1.49)		3475	1.22 (0.87-1.69)	
Moderate	1144	(continuous)		1176	(continuous)		1180	(continuous)	
High	53			53			53		
Perceived Addiction to Smokeless Tobacco			.123			.164			.206
Not at all addicted	571	1.15 (0.98-1.35)		578	1.08 (0.88-1.31)		577	1.13 (0.92-1.39)	
Somewhat addicted	2192	(continuous)		2217	(continuous)		2211	(continuous)	
Very addicted	1849			1906			1920		
Probability of Mouth Cancer			.050			.002			<.001
Less likely than a non user	183	1.14 (0.99-1.33)		184	0.79 (0.68-0.92)*		183	0.76 (0.66-0.87)*	
Just as likely	614	(continuous)		633	(continuous)		629	(continuous)	
A little more likely	691			703			705		
Somewhat more likely	811			826			831		
Much more likely	2314			2353			2360		
Smokeless use has damaged health			.023			.396			.063
Not at all	2991	0.71 (0.53-0.95)*		3058	0.85 (0.68-1.07)		3056	0.79 (0.65-0.96)	
A little	1257	(continuous)		1273	(continuous)		1280	(continuous)	
A lot	363			369			372		
Worried smokeless will damage health			.086			.045			.138
Not at all worried	1568	0.84 (0.71-0.99)*		1591	0.78 (0.65-0.95)*		1593	0.83 (0.68-1.00)	
A little worried	1183	(continuous)		1203	(continuous)		1193	(continuous)	
Moderately worried	954			991			997		
Very worried	907			915			926		

Note: Odds ratios represent the odds of the response that a product is ‘less harmful’ compared to ‘more harmful’, with significance indicated by a *. All measures in these models controlled for the demographic measures in Table 15.

8.3.2 Predictors of Belief that Bidis are Less Harmful than Cigarettes in India

Of the demographic variables that were included in the analysis, income, education, and urban or rural residence were not significant predictors of risk perceptions of bidis versus cigarettes, but state, gender, and age were all significantly related to risk perceptions. The odds of saying that bidis are less harmful compared to more harmful than cigarettes did not significantly differ by age or gender, but there were significant interactions between tobacco user type and age and gender. Controlling for demographic variables, tobacco user type significantly predicted product risk perceptions, with all other current tobacco users being more likely to say that bidis are less harmful than cigarettes compared to cigarette smokers. In particular, bidi smokers were 8.86 times more likely (95% CI [4.37-17.94]) than cigarette smokers to say that bidis are less harmful than cigarettes (versus more harmful).

Looking at the relationships between measures of addiction and risk perceptions of bidis versus cigarettes, neither heaviness of tobacco use nor perceived addiction to tobacco were significant predictors of product risk perceptions of bidis versus cigarettes for bidi smokers or smokeless tobacco users, but there was a significant relationship for cigarette smokers. In line with my predictions, cigarette smokers who perceived themselves to be more addicted to smoking were less likely to say that bidis are less harmful than cigarettes. In other words, more addicted cigarette smokers were more likely to say that bidis are more harmful than cigarettes.

Among the perceived risk predictors, none significantly predicted risk perceptions of bidis versus cigarettes among cigarette smokers, but among bidi smokers, those who perceived greater damage from their smoking had 0.46 times lower odds (95% CI [0.24-0.86]) of saying that bidis are less harmful than cigarettes. In other words, bidi smokers who perceived that smoking had damaged their health more were more likely to say that bidis are more harmful

(versus less harmful) than cigarettes, in line with predictions once again. There were significant relationships between perceived risk and perceptions of bidis versus cigarettes for smokeless users as well, with smokeless users who perceived more damage and who were more worried about future damage being less likely to say that bidis are less harmful than cigarettes.

8.3.3 Predictors of Belief that Smokeless is Less Harmful than Cigarettes in India

Significant demographic predictors of risk perceptions of smokeless tobacco versus cigarettes included state, gender, age, and income, with significantly greater odds of saying that smokeless tobacco is less harmful than cigarettes among older age groups and among males (compared to females). There were significant interactions for both state and gender with tobacco user type. Controlling for demographic variables, tobacco user type significantly predicted product risk perceptions, with mixed tobacco users (OR=3.20) and smokeless tobacco users (OR=7.29) being significantly more likely than cigarette smokers to say that smokeless tobacco is less harmful than cigarettes (versus more harmful).

Controlling for demographic variables, measures of addiction did not significantly predict product risk perceptions for cigarette or bidi smokers, but there was a significant relationship for smokeless tobacco users. Heaviness of smokeless tobacco use was a significant predictor of risk perceptions of cigarettes versus smokeless tobacco, with heavier users being more likely to say that smokeless tobacco is less harmful than cigarettes, though the odds ratio was not significant. Cigarette smokers who perceived themselves to be more addicted to smoking were more likely to say that smokeless is more harmful than cigarettes, though this relationship was not significant. These findings were in line with the prediction that those who are more addicted to their product would be more likely to say that it is less harmful than other products.

Of the perceived risk measures, there were only significant results among bidi smokers, with those who perceived themselves to have a higher risk of lung cancer from smoking being more likely to say that smokeless is less harmful than cigarettes, though this did not fit in with my predictions. Though perceived risk predictors did not significantly predict product risk perceptions among cigarette smokers or smokeless users, the odds ratios were in the direction of my predictions, with cigarette smokers who perceived greater risk from smoking having greater odds of saying that cigarettes are more harmful than smokeless, and smokeless users who perceived greater health risks being more likely to say that smokeless is more harmful than cigarettes, though again, these findings did not reach significance.

8.3.4 Predictors of Belief that Smokeless is Less Harmful than Bidis in India

Demographic variables that significantly predicted product risk perceptions of smokeless tobacco versus bidis included state, gender, age, and income, with significant odds ratios for the belief that smokeless is less harmful than bidis versus more harmful found only for the state variable. Significant interactions with tobacco user type were found for state, gender, and age group. Controlling for these demographics, tobacco user type significantly predicted product risk perceptions of smokeless tobacco compared to bidis, with mixed tobacco users (OR=3.39) and smokeless tobacco users (OR=7.88) being significantly more likely than bidi smokers to say that smokeless is less harmful than bidis.

Tobacco addiction was significantly related to risk perceptions of smokeless tobacco for bidi smokers only, with opposing findings for the two measures of addiction. Bidi smokers who were heavier smokers had 1.94 times greater odds of saying that smokeless tobacco is less harmful than bidis, but bidi smokers who perceived themselves to be more addicted to smoking had significantly lower odds (OR=0.44) of saying that smokeless is less harmful than bidis. The

latter finding that more heavily addicted bidi smokers perceived their product to be less harmful than another was in line with my predictions. Smokeless tobacco users who were heavier users and perceived themselves to be more addicted also had greater odds of saying that smokeless is less harmful than bidis, but these findings were not significant.

Among the measures of perceived risk, most findings trended in line with predictions but were not significant. The only significant factor was the perception of greater risk of mouth cancer among smokeless users, with those who perceived greater risk having lower odds of saying that smokeless tobacco is less harmful than bidis (or higher odds of saying that smokeless tobacco is more harmful).

8.3.5 Overview of Predictors of Risk Perceptions in Bangladesh

The results from the multiple logistic regression models to determine which factors significantly predicted product risk perceptions for each of the three tobacco product comparisons in Bangladesh are presented in Tables 19 through 22. Table 19 presents results for the demographic measures, type of tobacco user, and interactions of demographic variables with type of tobacco user. Table 20 displays the results for the models with addiction and perceived risk measures predicting product risk perceptions among cigarette smokers only, Table 21 presents results for bidi smokers, and Table 22 presents results for smokeless tobacco users.

Similar findings to those in India resulted from the models with demographics and tobacco user status as predictor variables. Most demographic variables did not significantly determine product risk perceptions, with the exception of division and gender. There were no consistent patterns in responses by division, but similarly to India, females tended to be more likely than males to perceive ‘no difference’ in harm between products compared to males. Controlling for demographic variables, however, tobacco user type was significantly related to

product risk perceptions, with tobacco users perceiving their own product to be the less harmful product in all comparisons. The only significant interaction between tobacco user type and demographics for all three measures was between division and tobacco use status, but there did not appear to be a consistent or meaningful finding from those interactions.

Unlike in India, however, the addiction and perceived risk measures were generally not significantly related to product risk perceptions in Bangladesh, with the exception of addiction measures for smokeless tobacco users, which predicted risk perceptions in the opposite direction than was expected: smokeless tobacco users with greater levels of tobacco use were more likely to say that smokeless is more harmful than cigarettes, and those with greater perceived addiction were more likely to say that smokeless is more harmful than bidis. However, still only 2 of 6 addiction measures for smokeless users across the three models were significant.

Table 19. Predictors of Product Risk Perceptions in Bangladesh – Main Effects and Interactions

Predictor	Bidis less harmful than cigs			Smokeless less harmful than cigs			Smokeless less harmful than bidis		
	n=2844	Adjusted odds ratio (95% CI)	p-value	n=3031	Adjusted odds ratio (95% CI)	p-value	n=2807	Adjusted odds ratio (95% CI)	p-value
Main Effects:									
Division			<.001			<.001			<.001
Barisal	169	0.18 (0.01-4.94)		169	1.97 (1.14-3.38)*		167	1.26 (0.42-3.78)	
Chittagong	400	0.76 (0.24-2.39)		396	0.63 (0.26-1.49)		397	0.58 (0.15-2.28)	
Khulna	237	1.98 (0.61-6.45)		234	1.80 (0.70-4.62)		234	1.11 (0.38-3.25)	
Rajshahi	499	9.35 (3.09-28.28)*		492	4.04 (1.74-9.41)*		487	2.96 (1.22-7.15)*	
Sylhet	180	1.63 (0.61-4.35)		186	0.34 (0.23-0.50)		185	0.16 (0.08-0.35)*	
Dhaka	1359	1.00 (reference)		1356	1.00 (reference)		1338	1.00 (reference)	
Urban/rural status			.047			.082			.077
Rural	1680	2.54 (1.03-6.28)*		1674	1.53 (0.93-2.50)		1662	1.57 (0.72-3.41)	
Urban	1164	1.00 (reference)		1158	1.00 (reference)		1145	1.00 (reference)	
Gender			.007			.012			.004
Male	2435	1.35 (0.24-7.59)		2420	1.88 (0.75-4.71)		2393	1.21 (0.60-2.43)	
Female	409	1.00 (reference)		412	1.00 (reference)		414	1.00 (reference)	
Age (years)			.766			.976			.875
15-17	61	1.16 (0.78-1.73)		61	1.01 (0.86-1.20)		61	1.00 (0.84-1.20)	
18-24	332	(continuous)		329	(continuous)		326	(continuous)	
25-39	1034			1032			1015		
40-54	785			780			779		
55+	631			629			627		
Income			.373			.131			.021
Low	288	1.49 (0.44-5.07)		279	0.74 (0.32-1.76)		280	0.66 (0.25-1.70)	
Moderate	1246	1.61 (0.89-2.91)		1251	0.91 (0.56-1.48)		1241	1.01 (0.63-1.63)	
High	1310	1.00 (reference)		1303	1.00 (reference)		1286	1.00 (reference)	
Education			.367			.678			.723
Low	688	0.49 (0.14-1.72)		687	1.22 (0.68-2.18)		686	0.83 (0.45-1.54)	
Moderate	1628	0.57 (0.21-1.54)		1622	1.12 (0.69-1.81)		1612	0.84 (0.52-1.36)	
High	528	1.00 (reference)		523	1.00 (reference)		510	1.00 (reference)	

Table 19 (continued). Predictors of Product Risk Perceptions in Bangladesh – Main Effects and Interactions

Predictor	Bidis less harmful than cigs			Smokeless less harmful than cigs			Smokeless less harmful than bidis		
	n=2844	Adjusted odds ratio (95% CI)	p-value	n=3031	Adjusted odds ratio (95% CI)	p-value	n=2807	Adjusted odds ratio (95% CI)	p-value
Type of Tobacco User			.185			<.001			<.001
Cigarette smoker	1384	1.00 (reference)		1374	1.00 (reference)		1350	0.38 (0.13-1.13)	
Bidi smoker	227	3.06 (1.31-7.15)*		221	3.79 (1.32-10.85)*		224	1.00 (reference)	
Dual smoker	206	1.36 (0.39-4.80)		205	1.65 (0.56-4.85)		204	0.52 (0.14-1.94)	
Mixed tobacco	244	2.45 (0.87-6.91)		247	3.23 (1.70-6.14)*		248	1.00 (0.37-2.67)	
Smokeless tobacco	582	1.69 (0.38-7.51)		583	21.55 (7.61-60.99)*		580	9.62 (2.70-34.24)*	
Quitter	202	1.87 (0.62-5.61)		202	2.36 (1.28-4.35)*		201	0.77 (0.24-2.41)	
Interactions:									
Division*tobacco user type	-	-	<.001	-	-	<.001	-	-	<.001
Urban/rural*tobacco user type	-	-	.215	-	-	.002	-	-	.225
Gender*tobacco user type	-	-	.115	-	-	.050	-	-	.172
Age group* tobacco user type	-	-	.878	-	-	1.00	-	-	1.00
Income*tobacco user type	-	-	.126	-	-	1.00	-	-	.570
Education*tobacco user type	-	-	.181	-	-	1.00	-	-	1.00

Note: Odds ratios represent the odds of the response that a product is ‘less harmful’ compared to ‘more harmful’, with significance indicated by a *.

Table 20. Addiction and Perceived Risk Predictors of Product Risk Perceptions in Bangladesh – Cigarette Smokers Only

Predictor	Bidis less harmful than cigs			Smokeless less harmful than cigs			Smokeless less harmful than bidis		
	n=1096	Adjusted OR (95% CI)	p-value	n=1089	Adjusted OR (95% CI)	p-value	n=1077	Adjusted OR (95% CI)	p-value
Heaviness of Smoking			.104			.041			.859
Low	940	0.90 (0.14-5.71)		934	1.17 (0.52-2.63)		924	0.83(0.34-2.12)	
Moderate	143	(continuous)		142	(continuous)		140	(continuous)	
High	13			13			13		
Perceived Addiction to Smoking			.027			.461			.120
Not at all addicted	53	0.74 (0.35-1.60)		54	1.30 (0.67-2.52)		54	1.82 (1.00-3.30)	
Somewhat addicted	525	(continuous)		522	(continuous)		516	(continuous)	
Very addicted	518			513			508		
Probability of Lung Cancer			.910			.247			.821
Less likely than a non-smoker	4	0.99 (0.44-2.23)		5	1.24 (0.82-1.87)		5	1.00 (0.73-1.38)	
Just as likely	33	(continuous)		36	(continuous)		33	(continuous)	
A little more likely	338			333			330		
Somewhat more likely	228			226			224		
Much more likely	493			489			485		
Cigarette smoking has damaged health			.012			.012			.037
Not at all	106	4.12 (0.65-26.24)		104	3.32 (0.95-11.59)		101	3.88 (0.93-16.26)	
A little	619	(continuous)		620	(continuous)		612	(continuous)	
A lot	371			365			364		
Worried smoking will damage health			.096			.021			.031
Not at all worried	104	0.43 (0.15-1.19)		101	0.37 (0.18-0.74)*		99	0.32 (0.14-0.73)*	
A little worried	564	(continuous)		565	(continuous)		555	(continuous)	
Moderately worried	363			358			357		
Very worried	66			66			65		

Note: Odds ratios represent the odds of the response that a product is ‘less harmful’ compared to ‘more harmful’, with significance indicated by a *. All measures in these models controlled for the demographic measures in Table 19.

Table 21. Addiction and Perceived Risk Predictors of Product Risk Perceptions in Bangladesh – Bidi Smokers Only

Predictor	Bidis less harmful than cigs			Smokeless less harmful than cigs			Smokeless less harmful than bidis		
	n=171	Adjusted OR (95% CI)	p-value	n=166	Adjusted OR (95% CI)	p-value	n=168	Adjusted OR (95% CI)	p-value
Heaviness of Smoking			.002			.445			
Low	103	0.02 (0.01-0.17)*		99	0.56 (0.10-3.08)		101	0.61 (0.11-3.34)	.259
Moderate	60	(continuous)		60	(continuous)		60	(continuous)	
High	7			7			7		
Perceived Addiction to Smoking			.206			.299			.254
Not at all addicted	6	1.76 (0.23-13.49)		6	7.24 (0.44-118.31)		6	8.77 (0.61-126.88)	
Somewhat addicted	68	(continuous)		67	(continuous)		68	(continuous)	
Very addicted	97			93			94		
Probability of Lung Cancer			.422			.112			.028
Less likely than a non-smoker	1	3.48 (0.49-24.68)		1	3.13 (0.79-12.41)		1	3.34 (1.04-10.77)*	
Just as likely	3	(continuous)		3	(continuous)		3	(continuous)	
A little more likely	54			52			53		
Somewhat more likely	42			43			43		
Much more likely	69			68			68		
Bidi smoking has damaged health			.065			.216			.415
Not at all	21	16.87 (0.65-441.16)		18	0.16 (0.02-1.30)		19	0.24 (0.03-2.12)	
A little	80	(continuous)		79	(continuous)		80	(continuous)	
A lot	69			69			69		
Worried smoking will damage health			.113			.356			.952
Not at all worried	27	0.64 (0.06-7.01)		25	2.35 (0.72-7.71)		26	1.15 (0.41-3.24)	
A little worried	93	(continuous)		92	(continuous)		92	(continuous)	
Moderately worried	41			39			41		
Very worried	10			10			10		

Note: Odds ratios represent the odds of the response that a product is ‘less harmful’ compared to ‘more harmful’, with significance indicated by a *. All measures in these models controlled for the demographic measures in Table 19.

Table 22. Addiction and Perceived Risk Predictors of Product Risk Perceptions in Bangladesh – Smokeless Users Only

Predictor	Bidis less harmful than cigs			Smokeless less harmful than cigs			Smokeless less harmful than bidis		
	n=360	Adjusted OR (95% CI)	p-value	n=270	Adjusted OR (95% CI)	p-value	n=269	Adjusted OR (95% CI)	p-value
Heaviness of Tobacco Use			.633			.027			.010
Low	188	0.91 (0.22-3.75)		130	0.38 (0.19-0.75)*		130	0.30 (0.14-0.63)*	
Moderate	147	(continuous)		119	(continuous)		118	(continuous)	
High	25			21			21		
Perceived Addiction to Smokeless Tobacco			.035			.153			.070
Not at all addicted	32	0.15 (0.02-0.93)*		18	0.29 (0.08-1.00)		18	0.17 (0.03-0.82)*	
Somewhat addicted	135	(continuous)		91	(continuous)		91	(continuous)	
Very addicted	192			161			159		
Probability of Mouth Cancer			.016			.099			.031
Less likely than a non user	2	5.77 (1.80-18.51)*		2	1.32 (0.30-5.76)		2	1.04 (0.30-3.67)	
Just as likely	30	(continuous)		10	(continuous)		10	(continuous)	
A little more likely	211			119			118		
Somewhat more likely	97			83			83		
Much more likely	87			56			55		
Smokeless use has damaged health			.034			.247			.389
Not at all	60	0.21 (0.03-1.46)		19	2.33 (0.39-14.00)		18	1.21 (0.27-5.40)	
A little	267	(continuous)		175	(continuous)		175	(continuous)	
A lot	100			76			75		
Worried smokeless will damage health			.019			.298			.202
Not at all worried	79	5.89 (1.25-27.83)*		22	0.34 (0.07-1.66)		22	0.92 (0.30-2.85)	
A little worried	175	(continuous)		120	(continuous)		119	(continuous)	
Moderately worried	158			123			121		
Very worried	15			5			6		

Note: Odds ratios represent the odds of the response that a product is ‘less harmful’ compared to ‘more harmful’, with significance indicated by a *. All measures in these models controlled for the demographic measures in Table 19.

8.3.6 Predictors of Belief that Bidis are Less Harmful than Cigarettes in Bangladesh

Among the demographic variables that were included in the model to predict the belief that bidis are less harmful than cigarettes in Bangladesh, division, urban or rural status, and gender were all significant predictors, with significantly greater odds of saying that bidis are less harmful than cigarettes for those in Rajshahi versus Dhaka and those in rural areas compared to urban areas. Controlling for all demographic variables, tobacco user type was not a significant predictor of product risk perceptions overall, but bidi smokers had significantly greater odds (OR=3.06) than cigarette smokers of saying that bidis are less harmful than cigarettes. Tobacco user type only significantly interacted with division.

The measures of addiction that were included as predictors in the model for bidis versus cigarettes resulted in some conflicting results. Perceived addiction was a significant predictor among cigarette smokers, with those who perceived themselves to be more addicted being more likely to say that bidis are more harmful than cigarettes, which was in line with predictions though the odds ratio was not significant. However, bidi users who were heavier users were significantly more likely to say that bidis are more harmful than cigarettes (against predictions), while bidi smokers who perceived themselves to be more addicted had greater odds of saying that bidis are less harmful, though this was not significant.

Measures of perceived health risk only significantly predicted product risk perceptions of bidis versus cigarettes among smokeless users, with those who perceived greater health risks from smokeless use having significantly greater odds of saying that bidis are less harmful than cigarettes, which did not support my predictions.

8.3.7 Predictors of Belief that Smokeless is Less Harmful than Cigarettes in Bangladesh

Among the demographic variables that were included as predictors in the model predicting product risk perceptions of smokeless tobacco compared to cigarettes, only gender and division were significant predictors, with significant interactions with tobacco user type for division and urban or rural status. Controlling for demographic variables, tobacco user type was a significant predictor of product risk perceptions, with smokeless tobacco users having over 21 times greater odds (OR=21.55, 95% CI [7.61-60.99]) of saying that smokeless tobacco is less harmful than cigarettes, compared to cigarette smokers.

Few measures of addiction or perceived risk significantly predicted risk perceptions of smokeless tobacco compared to cigarettes. The only measure of addiction that was significant was the heaviness of tobacco use index for smokeless tobacco users, with greater scores predicting lower odds of saying that smokeless is less harmful than cigarettes. In other words, heavier smokeless tobacco users were more likely to say that smokeless is more harmful than cigarettes, which went against predictions. Among the perceived risk measures, the only significant finding was that cigarette smokers who worried more that smoking would damage their health were less likely to say that smokeless is less harmful than cigarettes, which was also contrary to predictions.

8.3.8 Predictors of Belief that Smokeless is Less Harmful than Bidis in Bangladesh

Of the demographic measures that were included in the model with product risk perceptions of smokeless tobacco compared to bidis as the outcome variable, only division and income were significant predictors, with a significant interaction with tobacco user type for the division variable. Controlling for demographics, tobacco user type was a significant predictor of product risk perceptions, with smokeless tobacco users having significantly greater odds

(OR=9.62, 95% CI [2.70-34.24]) than bidi smokers of saying that smokeless is less harmful than bidis.

Measures of addiction were not significant predictors of product risk perceptions of smokeless versus bidis for cigarette or bidi smokers, but among smokeless users, those who were more addicted were less likely to say that smokeless is less harmful than bidis, or more likely to say that smokeless is more harmful, which ran counter to predictions. Perceived risk measures did not significantly predict product risk perceptions among smokeless users, but there was a significant relationship between perceived probability of lung cancer and product risk perceptions for bidi smokers. Bidi smokers who perceived themselves to be more at risk of lung cancer were significantly more likely (OR=3.34) to say that smokeless tobacco is less harmful than bidis, which was in line with predictions.

8.4 Discussion

The purpose of this chapter was to determine if tobacco user type is a significant predictor of tobacco product risk perceptions when controlling for demographic variables, and if when controlling for type of tobacco user, other factors significantly predicted product risk perceptions. Results were inconsistent or non-significant for many of the variables that were included in the models except for tobacco user type; tobacco use status was a consistently strong predictor of tobacco product risk perceptions in both India and Bangladesh, with tobacco users perceiving their own product to be less harmful than other products, and less harmful than users of other products perceive it to be. This confirms what was found in Chapter 7, but through a more sophisticated regression model controlling for demographic variables to establish the independence of tobacco user type as a significant predictor.

Most of the demographic measures that were included in the models (sex, age group, income, education, state/district) were not consistent predictors of the belief that a product is less harmful than another across models and countries. However, in India there was a general tendency for females and older age groups to be more likely than males and younger age groups to say that there is 'no difference' in harm between products. The gender difference for the 'no difference' belief also appeared somewhat inconsistently in Bangladesh, but it is unclear exactly why these differences emerged. It is likely that the gender differences and interactions emerged because the majority of the female sample used smokeless tobacco and smokeless users also tended to perceive no difference in harm more than other users. However, it could also be the case that females are less likely to perceive low harm of a product (and thus respond no difference) because they generally have less power and control in Indian and Bangladeshi society compared to males; this latter explanation is supported by previous research showing that groups

with more control in society tend to perceive lower risk of harm in general (Finucane, Slovic, Mertz, Flynn, & Satterfield, 2000; Satterfield, Mertz, & Slovic, 2004). The tendency for older age groups to perceive no difference in harm could also be related to amount of control in society, or also to the length of time they have been using their product. There were also significant differences in product risk perceptions by state (in India) and division (in Bangladesh). In particular, tobacco users in Bihar tended to be more likely than the other three states in India to say that bidis are more harmful than both cigarettes and smokeless tobacco. This may be in part explained by the fact that Bihar had the lowest proportion of smoked tobacco users of the four states, and that people in Bihar are generally lower income compared to other areas, so because bidi usage is associated with low socioeconomic status (Rahman & Fukui, 2000), it is therefore possible that bidis may have a more negative connotation in Bihar.

Across all models, the majority of addiction and perceived risk measures were not significant predictors of tobacco product risk perceptions. I had predicted that stronger addiction to a product would lead to lower perceived risk for it in comparison to another product in order to justify the difficult-to-change behaviour (i.e., because quitting would be more difficult for more highly addicted tobacco users), and greater perceived health risks from tobacco use would predict lower likelihood of believing your product is less harmful than others. The greatest support for these predictions was found in India, where results generally suggested that those who were more addicted to their product were more likely to endorse biased risk perceptions of their product, perceiving it to be less harmful than others. This was expected as those who are more addicted should have a greater psychological need to justify their behaviour because it may be more difficult for them to quit. On the other hand, those who perceived greater general health risks from using tobacco were less likely to say that their product is less harmful, also in line

with expectations. However, the findings from Bangladesh were inconsistent, with few significant predictors, so it is difficult to draw conclusions from these predictors overall. It is possible that other unmeasured individual difference variables were at play; for example, some users who are more strongly addicted may believe they will never be able to quit and thus need to justify their behaviour more, whereas others with strong addictions may be more motivated to quit and therefore less likely to justify their behaviour. Regarding general health risk perceptions, it may be the case that they are simply unrelated to product risk perceptions as they reflect different motivations; that is, true health concerns versus behaviour justifications.

In order to understand the role of product risk perceptions more clearly, it is necessary to not only explore the predictors of these risk perceptions but to also look at the relationships between risk perceptions and future behaviour, which is addressed in the next section.

9.0 Product Risk Perceptions and Future Behaviour

9.1 Objective and Hypothesis

This final section of results explores longitudinal data from the ITC Bangladesh Surveys in order to examine the relationship between tobacco product risk perceptions and behaviour, including quitting or switching to a different product. As noted earlier, these analyses could only be done with Bangladesh data because only one wave of data from the TCP India Project was available at the time of this dissertation. The following specific research objective is addressed in this section:

Test the direction of the association between product risk perceptions and behaviour change. Specifically, this involves exploring if product risk perceptions predict whether a tobacco user continues using their product, switches to a different tobacco product, or quits using tobacco; or, if changes in use of tobacco products result in changes to product risk perceptions.

The prediction for this section was described in section 3.1 and is summarized below:

Risk perceptions of specific tobacco products should not predict whether a tobacco user switches products if the risk perceptions are maintained as a means of justifying one's current behaviour. Rather, I expect that a tobacco user's risk perceptions of products will change if he/she switches products, in order to justify their behaviour, as predicted by previous research on cognitive dissonance and optimistic bias. However, in these cases the beliefs should not be completely reversed following a product switch, but rather shifted more in the direction of the belief the user wishes to maintain, as predicted by the Theory of Motivated Reasoning.

9.2 Methods

9.2.1 Measures

Measures used in this chapter include two of the product risk perception variables that were described in Chapters 7 and 8: whether bidis are more harmful, less harmful, or no different in harm compared to cigarettes, and whether smokeless tobacco is more harmful, less harmful, or no different than cigarettes. In addition, three variables to represent whether tobacco users changed their tobacco use status between waves were created; these variables represent tobacco users who were respondents in two consecutive survey waves. First, a 3-point variable was created to represent cigarette-only smokers at Wave 1 who either 1: remained smoking only cigarettes at Wave 2, 2: switched to using only bidis at Wave 2, or 3: quit smoking at Wave 3. Next, a 4-point variable was created to represent cigarette-only smokers at Wave 2 who either 1: remained smoking only cigarettes at Wave 3, 2: switched to using only bidis at Wave 3, 3: began using bidis in addition to cigarettes at Wave 3 to become a dual smoker, or 4: quit smoking by Wave 3. Finally, an additional 4-point Wave 2 to 3 variable was created to represent cigarette smokers at Wave 2 who continued using only cigarettes at Wave 3, became a mixed tobacco user (smoked and smokeless products), became a smokeless-only user, or quit smoking by Wave 3.

In logistic regression analyses, previously reported demographic measures were used as control variables (division, urban or rural status, sex, age group, income, and education), along with a measure of intention to quit smoking, a dichotomous variable where 1= plans to quit within the next 6 months and 2 = plans to quit beyond 6 months or not at all.

Lastly, measures of tobacco users' reasons for switching products or starting their current product were explored. Users at Wave 2 who switched products were specifically asked why they switched, with a list of reasons to which they could respond 'yes', 'no', or 'don't know'.

Users at Wave 3 were asked why they started their current product. In each case, one of the reasons that were presented was that their current product is less harmful than other products. The specific measures of reasons for using a product that were included in this section are presented in Table 23.

Table 23. Measures of Reasons for Switching or Starting Product: Less Harmful

Respondents To Whom Measure Was Asked	Measure and Response Options as Presented in Surveys
Wave 2 bidi smokers who did not smoke bidis at Wave 1	Why did you switch from smoking cigarettes to smoking bidis? Bidis are less harmful than cigarettes 1 Yes 2 No
Wave 3 bidi smokers	Why did you start smoking bidis? Bidis are less harmful than other forms of tobacco 1 Yes 2 No
Wave 3 smokeless users	Why did you start using smokeless tobacco? Smokeless tobacco is less harmful than other forms of tobacco 1 Yes 2 No

9.2.2 Data Analysis

Before conducting any analyses to determine whether and how product risk perceptions changed along with changes in tobacco use status, I first needed to determine whether there were enough users who switched products between waves to analyse. The number of recontacted tobacco users who changed tobacco use status (either to a different type of tobacco user or to a quitter) or maintained the same status between Waves 1 and 2 is presented in Table 24 and the number who switched status (or remained using the same product) between Waves 2 and 3 is presented in Table 25. Because mixed users and smokeless-only users were not identified with separate surveys until Wave 3 (in previous waves, smokeless users were included in non-smoker surveys if they didn't use other products or in cigarette/bidi surveys if they used those products),

the numbers of people who switched products from Waves 2 to 3 excludes those who indicated they had used smokeless tobacco within the previous 6 months at Wave 2. Those who had quit using tobacco at a subsequent wave (they currently did not use tobacco at least once a week at the time of the survey) were identified as quitters, though at Wave 2, cigarette or bidi quitters may still have used smokeless tobacco.

The numbers of individuals who switched products between any survey waves were quite small. The largest group of tobacco switchers was the 55 individuals who were cigarette smokers at Wave 1 and bidi smokers at Wave 2, so analyses were conducted on this group first. Analyses were also conducted on Wave 2 cigarette smokers who switched to bidis (n=30), dual smoking (n=27), mixed use (n=56), smokeless use (n=31) or quit (n=87) by Wave 3, though most of these groups were too small to draw confident conclusions from.

Table 24. Tobacco Use Status Changes from Wave 1 to Wave 2

Wave 1 Status	Wave 2 Status			
	Cigarette	Bidi	Dual	Quitter
	n (%) of recontacts from W1 status group			
Cigarette Smoker	1644 (86.8%)	55 (2.9%)	39 (2.1%)	156 (8.2%)
Bidi Smoker	16 (6.5%)	180 (72.6%)	18 (7.3%)	34 (13.7%)
Dual Smoker	73 (29.4%)	59 (23.8%)	96 (38.7%)	20 (13.7%)

Table 25. Tobacco Use Status Changes from Wave 2 to Wave 3

Wave 2 Status	Wave 3 Status					
	Cigarette	Bidi	Dual	Mixed	Smokeless	Quitter
n (%) of recontacts from W2 status group						
Cigarette Smoker	1035 (81.8%)	30 (2.4%)	27 (2.1%)	56 (4.4%)	31 (2.4%)	87 (6.9%)
Bidi Smoker	26 (23.9%)	17 (15.6%)	21 (19.3%)	23 (21.1%)	9 (8.3%)	13 (11.9%)
Dual Smoker	27 (15.1%)	28 (15.6%)	102 (57.0%)	14 (7.8%)	4 (2.2%)	4 (2.2%)
Quitter	40 (20.0%)	5 (2.5%)	2 (1.0%)	11 (5.5%)	35 (17.5%)	107 (53.5%)

Weighted frequencies for product risk perceptions of cigarettes versus bidis at both Wave 1 and Wave 2 were compared for those who were exclusively cigarette smokers at both waves, those who switched from cigarettes to bidis, and those who quit smoking by Wave 2. Pearson’s chi-square tests of independence were conducted to determine whether product risk perceptions of cigarettes versus bidis significantly differed by tobacco status at Wave 1 (when all groups were cigarette smokers) and at Wave 2 (after some groups had changed status). Two multinomial logistic regression models were then conducted, both controlling for demographic characteristics including division, urban or rural status, sex, age group, income, and education, and Wave 1 intentions to quit smoking. The first model looked at Wave 1 product risk perceptions of cigarettes versus bidis as a predictor of whether cigarette smokers changed status (to bidis or quit) by Wave 2. If significant, this would indicate that risk perceptions are part of the reason why some users switch to other products. A second model looked at whether a user switched as a predictor of Wave 2 product risk perceptions, which would indicate whether risk perceptions change as a function of what product one is currently using. These same analyses

were also conducted to compare product risk perceptions of cigarettes versus bidis for those who were cigarette smokers at Wave 2 and switched to bidis, dual use, quit, or continued smoking cigarettes at Wave 3. Finally, risk perceptions of cigarettes versus smokeless tobacco were examined among those who were cigarette smokers at Wave 2 and switched to using smokeless tobacco, mixed use, quit, or remained using only cigarettes at Wave 3. All analyses used weighted data unless otherwise indicated.

A brief post-hoc analysis was also included in the discussion section to examine changes in product risk perceptions over time in Bangladesh; that is, I did not intend to look at this a priori. In order to determine if risk perceptions significantly changed over time, I created a long-format dataset in SAS 9.2 and ran a weighted Generalized Estimating Equation (GEE) to determine if responses of ‘no difference’ in harm significantly changed across survey waves.

9.3 Results

9.3.1 Risk Perceptions of Bidis vs. Cigarettes from Wave 1 to Wave 2 among Wave 1 Cigarette Smokers Who Switched Products, Quit, or Remained Smoking at Wave 2

Table 26 presents product risk perceptions of bidis versus cigarettes at both Wave 1 and Wave 2, comparing those individuals who were exclusively cigarette smokers at Wave 1 and remained smoking only cigarettes at Wave 2, to cigarette smokers who switched to using only bidis at Wave 2 or who quit smoking completely by Wave 2. The results suggest that exclusive cigarette smokers who remained using only cigarettes did not appear to change in their risk perceptions from Wave 1 to Wave 2; the majority (around 65%) at both waves said that bidis are more harmful than cigarettes, consistent with earlier findings. However, those who switched to using bidis or quit smoking by Wave 2 appeared to change their risk perceptions. Whereas the

majority of smokers in both groups said that bidis are more harmful than cigarettes at Wave 1, by Wave 2, the majority said that there is 'no difference' in harm between the two products.

Table 26. Risk Perceptions of Bidis vs. Cigarettes for Cigarette Switchers and Non-Switchers from Wave 1 to Wave 2

Product Risk Perceptions of Bidis vs. Cigarettes	Tobacco Use Status		
	Cigarette (W1) to Cigarette (W2) (n=1644)	Cigarette (W1) to Bidi (W2) (n=55)	Cigarette (W1) to Quitter (W2) (n=156)
	% (n)	% (n)	% (n)
Wave 1			
Bidis less harmful	1.5% (24)	1.6% (1)	1.7% (2)
Bidis more harmful	64.1% (1025)	61.9% (36)	71.2% (104)
No difference	30.9% (495)	27.0% (16)	21.6% (31)
Don't know	3.5% (56)	9.6% (6)	5.5% (8)
Wave 2			
Bidis less harmful	1.6% (25)	0.3% (1)	1.8% (3)
Bidis more harmful	65.9% (1054)	29.6% (17)	29.2% (44)
No difference	30.9% (495)	57.0% (34)	66.4% (99)
Don't know	8% (26)	13.2% (8)	2.6% (4)

Note: The total n size for each group is unweighted, but n sizes associated with frequencies are weighted, so they may not add up to the total.

These same risk perceptions are also presented visually in the form of a line graph in Figure 5 for ease of interpretation (with 'don't know's excluded). The graph makes it easy to see that cigarette smokers who did not change their tobacco use status from Wave 1 to Wave 2 also did not appear to change their risk perceptions of bidis versus cigarettes. However, among those who switched to bidis or quit smoking, perceptions that bidis are more harmful than cigarettes greatly declined, while perceptions that there is no difference in harm increased, with steeper slopes for quitters compared to product switchers.

Chi-square tests of independence between risk perceptions and tobacco use status *change* at both Wave 1 and Wave 2 were conducted to test for significant associations between the variables at each wave. At Wave 1, there was no significant relationship between product risk

perceptions of bidis versus cigarettes and whether a cigarette smokers changed their tobacco use status or not ($X^2(6, N = 1845) = 12.08, p = .217$), indicating that the three groups of cigarette smokers (those who remained cigarette smokers, those who switched to bidis, and those who quit) did not initially (at Wave 1) differ in their product risk perceptions. At Wave 2, however, there was a significant association ($X^2(6, N = 1846) = 138.01, p < .001$), indicating that the three groups did differ in risk perceptions at Wave 2. Unweighted z-tests of column proportions indicated that the cigarette-only group significantly differed (at the $p = .05$ level) from those who switched to bidis or quit in their beliefs that bidis are more harmful than cigarettes and that there is no difference in harm at Wave 2.

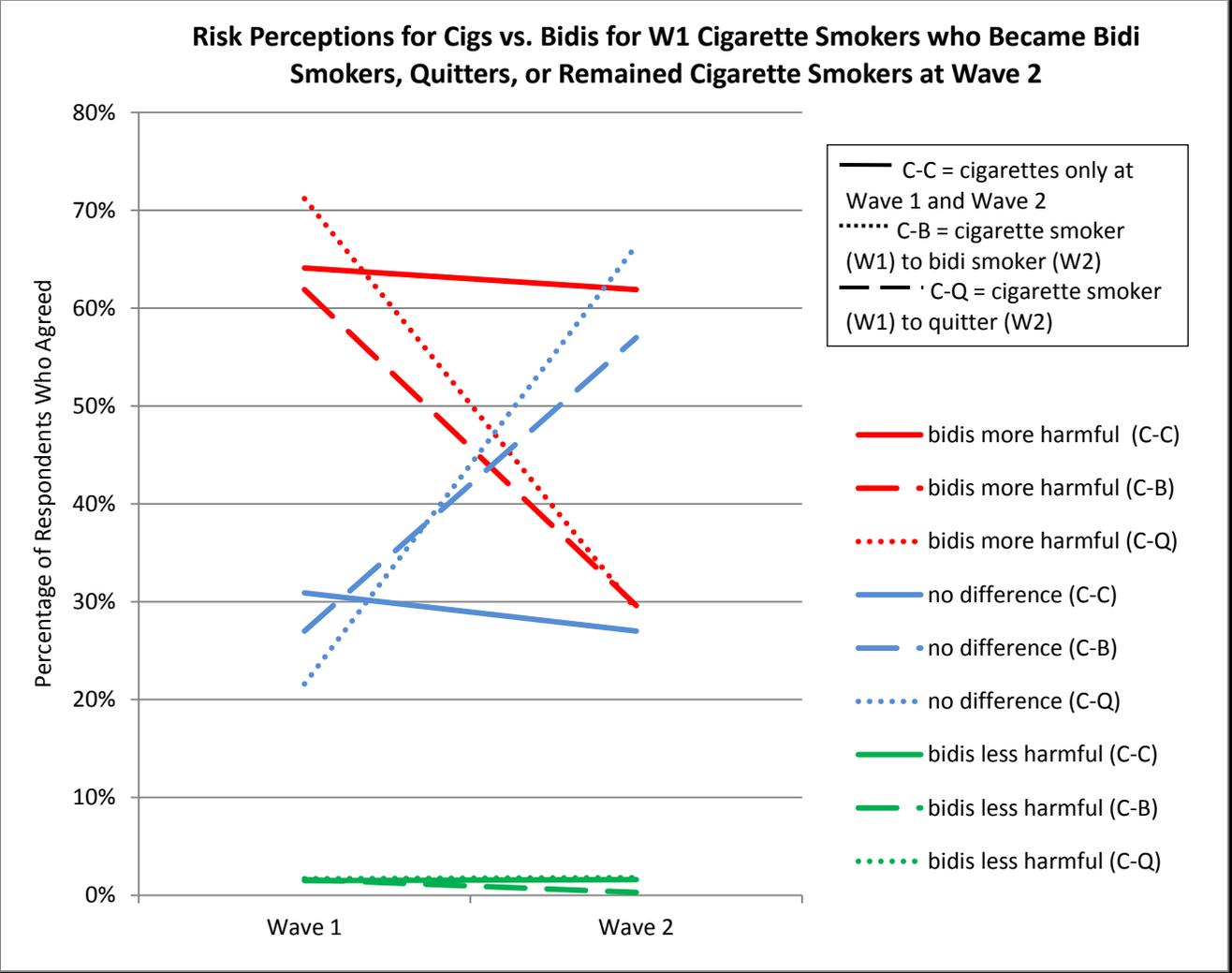


Figure 5. Risk Perceptions of Bidis vs. Cigarettes for Cigarette Switchers and Non-Switchers from Wave 1 to Wave 2

In order to test whether changes in product risk perceptions were associated with changes in tobacco use status, two regression models were conducted. First, Wave 1 risk perceptions of cigarettes versus bidis were used to predict whether a cigarette smoker remained smoking only cigarettes, switched to only bidis, or quit smoking at Wave 2. Controlling for division, urban or rural status, sex, age group, income, education, and Wave 1 intention to quit smoking (whether they planned to quit within the next 6 months or not), Wave 1 risk perceptions were not a significant predictor of tobacco use status changes ($p = .753$). Intentions to quit was a significant predictor, however, ($p = .030$), with those who intended to quit at Wave 1 being 1.93 times more likely (95% CI [1.18-3.18]) to be a quitter (compared to a cigarette smoker) at Wave 2.

In the second regression model, the tobacco status change measure was used to predict Wave 2 product risk perceptions of cigarettes versus bidis. After controlling for the same measures as the first model, tobacco status change was a significant predictor of Wave 2 product risk perceptions ($p < .001$), suggesting that product risk perceptions change following changes in tobacco use status. In particular, those who switched to using bidis had significantly greater odds than those who remained cigarette smokers of saying there is no difference in harm versus bidis are more harmful (OR=5.71, CI [1.76-18.57]), and significantly greater odds of saying 'don't know' versus bidis are less harmful (OR=43.08, CI [3.33-557.10]), bidis are more harmful (OR=28.81, CI [7.01-118.30]), or no difference in harm (OR=5.05, CI [2.05-12.43]). Quitters had significantly greater odds than cigarette smokers of saying that there is no difference in harm (OR=5.43, CI [3.14-9.38]) or 'don't know' (OR=4.75, CI [1.27-17.78]) versus bidis are more harmful.

9.3.2 Risk Perceptions of Bidis vs. Cigarettes from Wave 2 to Wave 3 among Wave 2 Cigarette Smokers who Switched Products, Quit, or Remained Smoking at Wave 3

Table 27 presents risk perceptions of bidis versus cigarettes for four categories of smokers from Wave 2 to Wave 3: those who were exclusive cigarette smokers at both waves, those who switched from cigarettes to bidis, those who switched from cigarettes to dual smoking (added bidis), and those who quit smoking. These perceptions are also presented in Figure 6, with the ‘don’t know’ responses excluded.

Though it is hard to draw conclusions from the data with small sample sizes for those who switched products (i.e., 30 cigarette smokers switched from cigarettes to bidis and 27 added bidis, becoming dual smokers), generally it appears that in all four groups, the overall proportion of respondents who believed that bidis are more harmful than cigarettes decreased dramatically from Wave 2 to Wave 3, while the proportion saying that there is ‘no difference’ in harm increased. The only two groups for whom beliefs that bidis are less harmful than cigarettes increased were the groups who switched to using bidis (bidi and dual smokers).

Pearson’s chi-square tests of independence were conducted to determine if risk perceptions significantly differed among the groups at Wave 2 and Wave 3. Wave 2 risk perceptions of cigarettes versus bidis were significantly related to tobacco use status when all four categories of tobacco users were included (cigarette to cigarette, cigarette to bidi, cigarette to dual, cigarette to quitter), $X^2(9, N = 1172) = 23.78, p = .041$. This suggests that these four types of users differed in their risk perceptions *before* deciding to switch products or quit smoking. However, unweighted z-tests of cell proportions revealed that the differences lay only between those who remained cigarette smokers and those who quit. A second chi-square with only cigarette smokers who remained smoking cigarettes and those who switched to bidis did not

show significant differences in Wave 2 risk perceptions ($X^2 (3, N = 1058) = 5.63, p = .173$).

Wave 3 risk perceptions were significantly associated with tobacco use status both when all four groups were included ($X^2 (9, N = 1159) = 32.74, p = .029$) and when only cigarette smokers and bidi switchers were compared ($X^2 (3, N = 1046) = 21.09, p = .003$).

Table 27. Risk Perceptions of Bidis vs. Cigarettes for Cigarette Switchers and Non-Switchers from Wave 2 to Wave 3

Product Risk Perceptions of Bidis vs. Cigarettes	Cigarette (W2) to Cigarette (W3)	Cigarette (W2) to Bidi (W3)	Cigarette (W2) to Dual Smoker (W3)	Cigarette (W2) to Quitter (W3)
	(n=1035)	(n=30)	(n=27)	(n=87)
	% (n)	% (n)	% (n)	% (n)
Wave 2				
Bidis less harmful	1.8% (18)	0% (0)	0% (0)	1.5% (1)
Bidis more harmful	69.4% (688)	52.3% (16)	49.2% (18)	54.7% (45)
No difference	26.6% (264)	44.6% (14)	48.2% (18)	43.5% (36)
Don't know	2.1% (21)	3.0% (1)	2.6% (1)	0.3% (1)
Wave 3				
Bidis less harmful	2.2% (21)	11.9% (4)	9.3% (3)	0.6% (1)
Bidis more harmful	29.9% (295)	15.3% (5)	32.0% (12)	25.2% (21)
No difference	64.3% (633)	59.7% (18)	50.3% (19)	68.0% (56)
Don't know	3.6% (36)	13.1% (4)	8.4% (3)	6.3% (5)

Note: The total n size for each group is unweighted, but n sizes associated with frequencies are weighted, so they may not add up to the total.

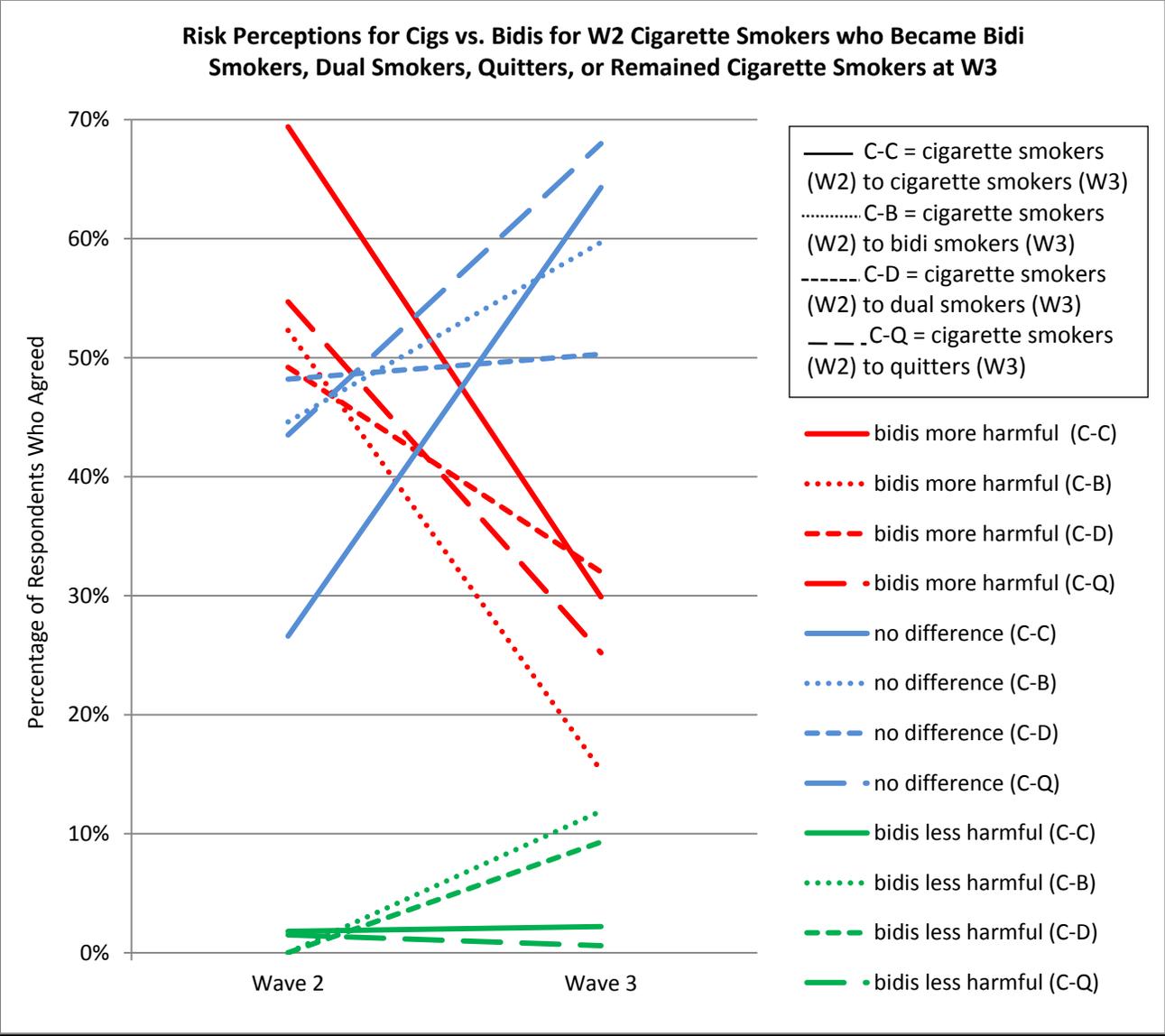


Figure 6. Risk Perceptions of Bidis vs. Cigarettes for Cigarette Switchers and Non-Switchers from Wave 2 to Wave 3

To explore whether changes in product risk perceptions of cigarettes versus bidis were associated with changes in tobacco use status from Wave 2 to 3, two multinomial logistic regression models were conducted. First, Wave 2 product risk perceptions of cigarettes versus bidis were used to predict whether a cigarette smoker continued using exclusively cigarettes at Wave 3, switched to bidis or dual use, or quit altogether. Controlling for division, urban or rural status, sex, age group, income, education, and Wave 2 intention to quit smoking, Wave 2 risk perceptions were a significant ($p < .001$) predictor of tobacco use status change, but due to quasi-complete separation in the data, odds ratios could not be interpreted to determine where the significant differences lay and thus it was difficult to draw conclusions from the model. Based on the previous chi-square analyses, the differences arose because of the difference between cigarette smokers and quitters.

In the second model, tobacco use status change predicted Wave 3 product risk perceptions, controlling for the same demographic variables and intention to quit. Tobacco use status change was a significant predictor of Wave 3 risk perceptions ($p = .019$), with the main differences in risk perceptions occurring between those who continued smoking cigarettes and those who switched to dual smoking. Cigarette to dual switchers were significantly more likely than cigarette-only continuers to say that bidis are less harmful than cigarettes compared to 'no difference' (OR=6.36, 95% CI [2.01-20.15]) or 'bidis are more harmful' (OR=4.55, 95% CI [1.59-13.03]) at Wave 3. This somewhat supports my predictions, but because both models were significant, it is difficult to draw any conclusions from these analyses.

9.3.3 Risk Perceptions of Smokeless vs. Cigarettes from Wave 2 to Wave 3 among Wave 2 Cigarette Smokers who Switched Products, Quit, or Remained Smoking at Wave 3

Table 28 and Figure 7 present product risk perceptions of smokeless tobacco versus cigarettes for those exclusive cigarette smokers at Wave 2 who either remained smoking only cigarettes at Wave 3, switched to using only smokeless tobacco, became a mixed (smoked and smokeless) user, or quit smoking. As with the previous analysis, it was difficult to draw conclusions from this data as there were only 31 individuals who switched from exclusively cigarettes to smokeless tobacco from Wave 2 to Wave 3. The majority of all groups at each survey wave said there is no difference in harm between cigarettes and smokeless tobacco. Interestingly, the two groups who switched products (to smokeless or mixed) did not change very much in their risk perceptions from Wave 2 to Wave 3, with the majority of both groups at each wave saying that there is ‘no difference’ in harm. Among those who remained smoking cigarettes or quit smoking, perceptions that smokeless is less harmful than cigarettes decreased and perceptions that there is no difference in harm increased.

Pearson’s chi-square tests of independence were conducted in order to determine if the differences in risk perceptions across groups were significant at each wave. At Wave 2, there was no significant association between tobacco use status change (cigarette to cigarette, cigarette to smokeless, cigarette to mixed, or cigarette to quitter) and product risk perceptions of smokeless tobacco versus cigarettes ($X^2(9, N = 1445) = 12.01, p = .542$). When only those who remained cigarette smokers at both waves and those who switched from cigarettes to smokeless tobacco were compared, there was still no significant difference between the two groups in Wave 2 risk perceptions ($X^2(3, N = 1231) = 4.11, p = .302$), which would suggest that the groups didn’t differ in their risk perceptions before deciding whether to change products. Chi-square tests of

product risk perceptions at Wave 3 revealed there was a significant association with tobacco use status change ($X^2(9, N = 1426) = 67.61, p < .001$). Z-tests of differences in cell proportions revealed that those who switched to smokeless or mixed tobacco had significantly greater proportions of users saying that smokeless tobacco is less harmful than cigarettes at Wave 3 compared to those who remained smoking cigarettes or quit. Those who switched to smokeless tobacco had significantly lower perceptions that smokeless is more harmful compared to those who continued using cigarettes or became mixed users. These findings were all in line with predictions.

Multinomial logistic regression analyses were also conducted in order to determine if Wave 2 risk perceptions predicted a tobacco use status change, or if a tobacco use change predicted Wave 3 risk perceptions. However, when controlling for demographic variables and Wave 2 intentions to quit, neither predictor was significant. That is, Wave 2 risk perceptions did not significantly predict whether a Wave 2 cigarette smoker switched products, quit, or continued smoking cigarettes ($p = .844$), as predicted, but a tobacco use change did not significantly predict Wave 3 risk perceptions either ($p = .117$), which went against predictions.

Table 28. Risk Perceptions of Smokeless vs. Cigarettes for Cigarette Switchers and Non-Switchers from Wave 2 to Wave 3

Product Risk Perceptions of Smokeless vs. Cigarettes	Cigarette (W2) to Cigarette (W3) (n=1035)	Cigarette (W2)to Smokeless (W3) (n=31)	Cigarette (W2) to Mixed User (W3) (n=56)	Cigarette (W2)to Quitter (W3) (n=87)
	% (n)	% (n)	% (n)	% (n)
Wave 2				
Smokeless less harmful	27.2% (270)	27.6% (10)	22.4% (13)	28.9% (24)
Smokeless more harmful	19.0% (189)	11.8% (4)	31.3% (18)	21.4% (18)
No difference	47.4% (471)	60.6% (22)	46.3% (26)	47.0% (39)
Don't know	6.4% (64)	0% (0)	0% (0)	2.7% (2)
Wave 3				
Smokeless less harmful	6.0% (59)	27.7% (10)	15.5% (8)	4.7% (4)
Smokeless more harmful	27.8% (273)	7.5% (3)	33.1% (18)	22.7% (19)
No difference	61.7% (606)	59.0% (21)	43.3% (23)	65.1% (53)
Don't know	4.6% (45)	5.8% (2)	8.1% (4)	7.5% (6)

Note: The total n size for each group is unweighted, but n sizes associated with frequencies are weighted, so they may not add up to the total.

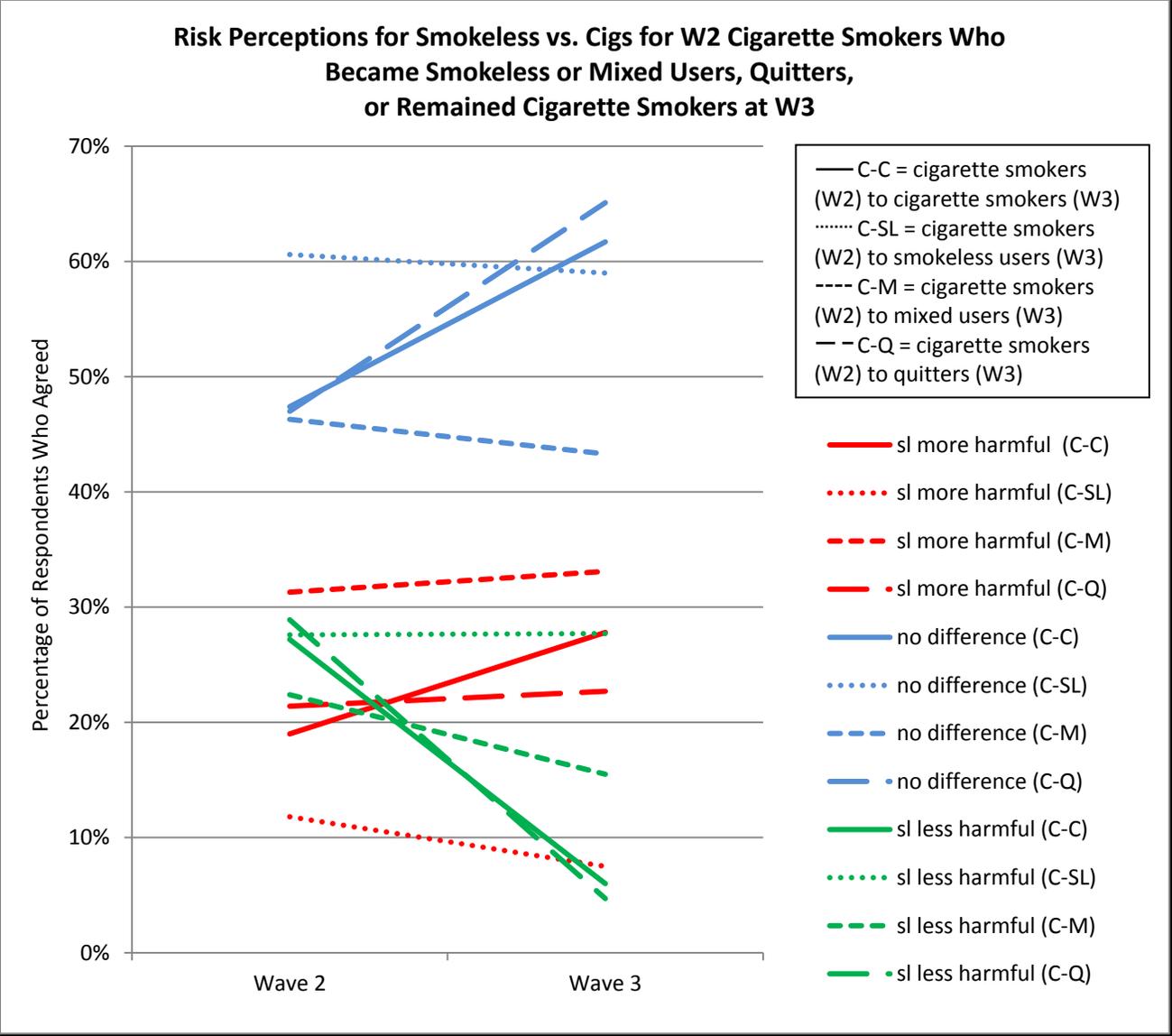


Figure 7. Risk Perceptions of Smokeless vs. Cigarettes for Cigarette Switchers and Non-Switchers from Wave 2 to Wave 3

9.3.4 Reasons for Switching Products

Table 29 presents findings from the tobacco users from each group of product switchers who responded to the measure of whether or not they started using their current product (the one they switched to) because it is less harmful. The majority of respondents in each group (74.6% of Wave 1 cigarette to Wave 2 bidi smokers, 81.5% of Wave 2 cigarette to Wave 3 bidi smokers, and 71.7% of Wave 2 cigarette smokers to Wave 3 smokeless users) said that they did not switch to their current product because it is less harmful.

Table 29. Respondents Who Switched to a Product Because It Is Less Harmful

	W1 Cigarette Smokers to W2 Bidi Smokers (n=18)	W2 Cigarette Smokers to W3 Bidi Smokers (n=34)	W2 Cigarette Smokers to W3 Smokeless Users (n=50)
	% (n)	% (n)	% (n)
Started (bidis/smokeless tobacco) because it is less harmful			
Yes	4.6% (1)	13.7% (5)	27.7% (15)
No	74.6% (18)	81.5% (28)	71.7% (38)
Don't know	20.8% (5)	4.8% (2)	0.6% (1)

Note: n-sizes at the top of each column represent the (unweighted) number of respondents in that group who responded to the question. This may not add up to the total number of respondents who were in that group because not everyone responded to this question, or the number associated with each percentage in the table, which are weighted.

9.4 Discussion

In the previous chapter, it was established that tobacco use status is a significant predictor of tobacco product risk perceptions. The purpose of this chapter was to further explore the relationship between tobacco use status and risk perceptions using longitudinal data from

Bangladesh. I predicted that risk perceptions at one wave would not be related to switching to a different product or quitting by the next wave if risk perceptions are indeed a cognitive bias maintained as a means of justifying tobacco use behaviour. Along the same lines, if an individual changed tobacco products, I predicted they would also adjust their beliefs to match (and justify) their behaviour.

These predictions were supported by data from Wave 1 to Wave 2 recontact participants who were cigarette smokers at Wave 1. Those who remained exclusively cigarette smokers at both waves did not change their risk perceptions of cigarettes compared to bidis; the majority at each wave said that bidis are more harmful than cigarettes. However, those who quit smoking cigarettes by Wave 2 or switched to using bidis also changed their risk perceptions: while at Wave 1 the majority of all groups said that bidis are more harmful, at Wave 2, the majority of those who switched status then said there is 'no difference' in harm. Analyses indicated that changes in tobacco use status (whether cigarette smokers switched products or quit) were not predicted by initial product risk perceptions, but rather, changes in tobacco use status predicted changes in product risk perceptions. This suggests that a tobacco user perceives their own product to be less harmful than others in order to be consistent with and to justify their current tobacco use behaviour.

Another important finding was that those who changed their tobacco use status did not completely reverse their risk perceptions to match their current behaviour (e.g., cigarette smokers who switched to bidis did not switch from saying bidis are more harmful to less harmful), but rather tended to adjust their perceptions to now say there is 'no difference' in harm. This supports Kunda's Theory of Motivated Reasoning (1990) that beliefs are constrained by knowledge of our prior attitudes, which only allow us to change our beliefs to be more in line

with one that we are motivated to hold rather than reverse them completely. Because the survey waves were only one year apart, it is possible that this was not a long enough time period to completely change risk perceptions; perhaps if respondents were followed up over a longer period in future survey waves they would eventually reverse their risk perceptions as they gathered enough evidence to support the belief they wish to hold, an account that would be consistent with Motivated Reasoning Theory.

Further evidence that product risk perceptions are maintained more as a means of justifying one's current behaviour was provided by tobacco users' responses to why they started using their product. The majority of tobacco users who switched products did not cite lower harm as a reason for using their current product, which coincides with the findings that product risk perceptions did not predict future behaviour. In addition, this finding suggests that it was not the case that tobacco users gained new information about the harms, changed their risk perceptions, and then changed their behaviour between waves, because if this was the case we would expect a higher percentage of respondents to say that they switched products due to concerns about the harms. Nevertheless, due to the lack of experimental control and the correlational nature of the data, it cannot be ruled out that an unmeasured external factor may have influenced risk perceptions before a user decided to switch products between waves, so the data cannot establish that a change in tobacco use status *caused* a change in product risk perceptions.

Although the pattern of data from the Wave 1 to Wave 2 recontact respondents appeared to support my hypotheses, when data from Wave 2 to Wave 3 recontact cigarette smokers was analyzed, the same pattern of results was not found, and thus these findings did not support my predictions. While there was no evidence that Wave 2 risk perceptions predicted whether a

cigarette smoker switched to using bidis or smokeless tobacco (in line with predictions), there was also no consistent evidence that a tobacco use status change predicted changes in product risk perceptions, which did not support predictions. Then again, it is difficult to draw conclusions from these analyses as the sample sizes for those who switched products between Waves 2 to 3 were quite low, providing less power to detect an effect.

In addition, a pattern appeared to emerge among all respondents, regardless of tobacco use status, wherein the proportion of those saying there is ‘no difference’ in harm between products increased from Wave 2 to Wave 3. As I had previously only looked at product risk perceptions cross-sectionally at the most recent wave of data (Wave 3), I conducted quick post-hoc analyses to look at product risk perceptions across all three waves in Bangladesh. Figure 8 displays changes in product risk comparison measures from Waves 2 to 3, including Wave 1 for comparisons of bidis versus cigarettes, which was the only measure that was asked of all respondents at Wave 1. The figure displays the large increase in responses of ‘no difference’ for each product comparison from Wave 2 to Wave 3.

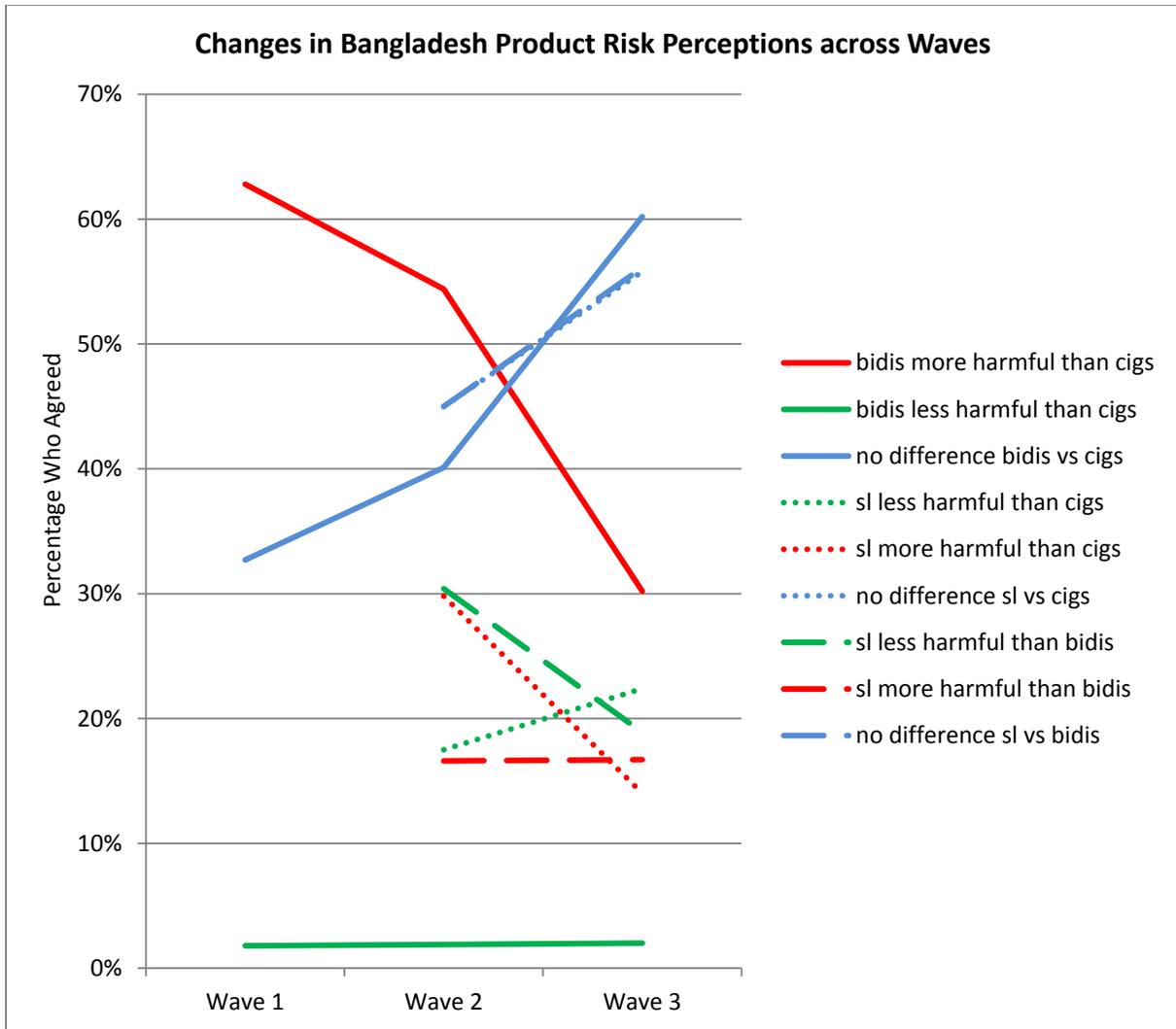


Figure 8. Changes in Bangladesh Product Risk Perceptions from Wave 2 to Wave 3

In order to determine if the proportion of respondents replying ‘no difference’ significantly increased over time, a simple weighted GEE binomial logistic regression model was conducted (using SAS 9.2) to evaluate changes in the proportion of respondents who said there was ‘no difference’ in harm between products compared to any other response at each wave. For the measure of bidis versus cigarettes, responses of ‘no difference’ significantly increased from Wave 1 (32.7%) to Wave 2 (40.1%), with respondents at Wave 2 having 1.51 times greater odds of saying ‘no difference’ versus any other response compared to respondents at Wave 1 (CI

[1.33-1.71], $p < .001$). There was also a significant increase from Wave 2 to Wave 3 (60.6%), with responses of 'no difference' being 2.09 times more likely at Wave 3 versus Wave 2 (CI [1.83-2.39], $p < .001$). Responses of 'no difference' versus other responses also significantly increased from Wave 2 to Wave 3 for the measures of smokeless versus cigarettes (44.9% to 55.0%, OR=1.51, CI [1.32-1.70], $p < .001$) and smokeless versus bidis (44.3% to 55.9%, OR=1.59, CI [1.40-1.81], $p < .001$).

It is unclear why this change would have occurred as there were no major policy changes to pricing or health warnings on various packages in Bangladesh between this time period, though it is possible that there was a media campaign during this time that may have influenced beliefs. Regardless, because of this change and the smaller sample sizes among the Wave 2 to Wave 3 respondents, I am inclined to have greater confidence in the analyses from the Wave 1 to Wave 2 respondents, which supported our predictions. However, more research will certainly be needed in order to determine if risk perceptions are indeed adjusted based on one's current tobacco use, especially due to the correlational nature of survey data. Experimental research as well as future survey waves of the ITC Bangladesh and TCP India Surveys may provide more insight into the role of product risk perceptions, especially with the ability to follow up users over longer time periods.

10.0 General Discussion

10.1 Summary of Findings

Generally, the findings from this dissertation suggest that tobacco users in India and Bangladesh tend to perceive their own product to be less harmful than other products, and that these risk perceptions represent a type of optimistic bias about one's product that may be used as a rationalization for one's tobacco use. There were three main conclusions that could be drawn from this study. First, the majority of tobacco users underestimate the health risks they personally face from their tobacco use, despite acknowledging that tobacco use is harmful. Second, tobacco users seem to have biased risk perceptions about their own tobacco product, perceiving it to be less harmful than other tobacco products. Finally, these risk perceptions about tobacco products may represent a type of rationalization or risk-minimizing belief about tobacco use, in that they may be maintained as a means of justifying a harmful behaviour.

10.2 Biased Health Risk Perceptions of Tobacco Use

The majority of tobacco users and non-users in both India and Bangladesh acknowledged that smoking and smokeless tobacco use are not good for one's health. This is not surprising given that both countries have enacted several tobacco control policies and education campaigns about the harms of tobacco over the last several years. This finding is also consistent with research from other countries, wherein the majority of smokers recognize that smoking is harmful and are generally aware of the major diseases caused by smoking, such as lung cancer. However, when asked about the harmfulness of tobacco use for their own personal health, respondents underestimated their risks.

Less than half of tobacco users in India and Bangladesh perceived themselves to be 'much more likely' than a non-tobacco user to get lung cancer (smokers) or mouth cancer

(smokeless users). Considering that in reality, smokers are in fact 15 to 30 times more likely than non-smokers to get lung cancer (Centers for Disease Control and Prevention, 2013b) and smokeless tobacco users have about an 80% higher risk of developing oral cancer compared to non-users (Boffetta, Hecht, Gray, Gupta, & Straif, 2008), tobacco users in our findings - consistent with other research - generally underestimated their own risk of disease from tobacco use. In addition, even fewer (less than 15%) tobacco users perceived their health to have been damaged a lot from tobacco use or were worried that their tobacco use would damage their health a lot in the future. These findings supported my prediction and previous research findings (e.g., Weinstein, 1998) that tobacco users demonstrate an optimistic bias about the health risks they face as a tobacco user, minimizing their personal risk of harm despite being aware that tobacco use in general is harmful. Of course, there is the possibility that some users genuinely did not understand the probability or severity of the health risks they face from using tobacco, and because the survey did not include a more specific measure of optimistic bias (one that would ask respondents to compare their risk to that of another user who used the same product(s)), it cannot be concluded that all users held biased risk perceptions, but certainly that they underestimated the risks.

Nevertheless, perceptions of the risk of cancer were very similar across both India and Bangladesh, and were also very similar to previous ITC findings from four high-income countries (U.S., Canada, U.K., Australia), where about 35% of smokers perceived themselves to be much more likely to get lung cancer than a non-smoker (Costello et al., 2012). Those four countries have very different patterns of tobacco use than India and Bangladesh, as well as stronger tobacco control policies and stronger social norms against smoking, so the finding that tobacco users across all of these countries seemed to have equal levels of perceived risk about

their personal tobacco use suggests that an optimistic bias about one's tobacco use represents a robust cultural pattern. This is an important finding considering that the majority of previous research on perceived risk and tobacco use has only been conducted in high-income countries. It also suggests that the risk perceptions measured in the ITC surveys do not represent only a difference in information about the harms, but rather how users interpret risks as they apply to themselves.

Another advantage of this study over previous research in addition to expanding to LMICs was the ability to look at differences in health risk perceptions across different types of tobacco users. Generally, every type of tobacco user in this study showed evidence of an optimistic bias about their tobacco use, with no significant differences in health risk perceptions of one's own product across different user types. This suggests that all types of tobacco users, regardless of which product they use, underestimate the risk of harm they face from tobacco use.

In addition, because all users responded to general measures of whether smoked and smokeless tobacco are good for health or not, it was possible to compare these perceptions of each product across user types. In both India and Bangladesh, smoked tobacco users were less likely than smokeless users to say that smoked tobacco is not good for health, and smokeless users were less likely than other users to say that smokeless tobacco is not good for health. For example, while an overall evaluation of perceptions of harm of smoked tobacco in India revealed that almost all tobacco users in India (94% overall) said that smoked tobacco is not good for your health, taking a step further to look at responses of different types of tobacco users separately revealed significant differences; only 5% of smokeless users did *not* say that smoked tobacco is 'not good for your health', but this percentage doubled to 10% of smoked tobacco users.

Uncovering these differences in health risk perceptions by tobacco product user type was an important first step in exploring differences in product risk perceptions.

10.3 Biased Risk Perceptions of Specific Tobacco Products

Beyond evaluating differences in health risk perceptions across tobacco user types, another strength of this study and the ITC Surveys was the inclusion of measures to evaluate respondents' risk perceptions of a specific type of tobacco product in comparison to another. Only a handful of previous studies have evaluated risk perceptions of different tobacco products other than cigarettes and compared these risk perceptions across individuals who use those products. These studies have found evidence suggesting that tobacco users perceive their own product to be less harmful than others, but none have evaluated tobacco product risk perceptions outside of the United States or longitudinally. Data from the ITC Surveys in India and Bangladesh, where multiple tobacco products are used, allowed us to evaluate specific tobacco product risk perceptions and compare these perceptions across different tobacco users. The findings from this study demonstrated that tobacco users in India and Bangladesh tend to perceive less risk of harm from using their own product compared to other products, and they perceive their own product to be less risky compared to the perceptions of other types of tobacco users.

In both India and Bangladesh, a pattern emerged whereby the majority of non-tobacco users, including quitters, and mixed tobacco product users (users of both smoked and smokeless tobacco) perceived no difference in harm between any tobacco products. In addition, tobacco users of one product tended to perceive no difference in harm between two other products that they did not use. Differences in product risk perceptions emerged only when a tobacco user was asked to compare their own product to one which they did not currently use. In these cases, the

majority of tobacco users in both countries generally said that their own product is less harmful than the other tobacco product. This suggests that lower risk perceptions for one's own product are not due to differences in knowledge or education on the harms of tobacco but rather represent an optimistic cognitive bias about one's own tobacco use.

While these biased risk perceptions about the harmfulness of one's own tobacco product emerged in both India and Bangladesh, there was also a tendency in Bangladesh at Wave 3 (2011-2012) for the majority of respondents, regardless of tobacco type, to say that there was no difference in harm between any products. While it is possible that a media campaign occurred between Waves 2 and 3 to emphasize a common message that there is no such thing as a safe tobacco product, it is unclear from available resources if such a campaign did indeed exist, and if so, whether it may have influenced product risk perceptions. The reasons for the large proportion of respondents believing all products to be equal in harm at the most recent survey wave in Bangladesh deserve future research, and when Wave 4 data is soon available, trends in product risk perceptions can be analyzed further.

10.4 Potential Mechanisms behind Biased Product Risk Perceptions

10.4.1 Summary and Interpretation of Longitudinal Findings

While it was clear from the data that the majority of tobacco users perceived their own product to be less harmful than others, it was unclear from cross-sectional analyses if these individuals truly believed their product is the least harmful tobacco product (which is perhaps why they use it), or if this perception was formed after already becoming a user of the product, perhaps as a type of cognitive mechanism to justify or rationalize their behaviour. However, the longitudinal design of the ITC Surveys made it possible to explore the role of perceived product risk in more depth by examining the relationship between these perceptions and future

behaviour. If product risk perceptions are based on knowledge of the harms of tobacco products and maintained with the belief that they are accurate, then risk perceptions should remain consistent even if a tobacco user switches products or quits. On the other hand, if risk perceptions represent an optimistic bias to justify one's current tobacco use, then these perceptions should change following a change in behaviour. Indeed, we predicted that if a tobacco user switched products, his or her risk perceptions of the product they switched to and from would also change in order to justify their current behaviour. This would support the theory of cognitive dissonance as well as previous research on smokers' rationalizations or risk-minimizing beliefs (e.g., Fotuhi et al., 2013).

We found partial support for this prediction within the longitudinal data from Bangladesh, particularly among cigarette smokers at Wave 1 who were recontacted at Wave 2. At Wave 1, the majority of all cigarette smokers said that bidis are more harmful than cigarettes. At Wave 2, those who were still using only cigarettes maintained these risk perceptions, but those who had switched to using only bidis also adjusted their risk perceptions, with the majority of this group now saying there is no difference in harm between products. Wave 1 product risk perceptions did not predict whether a cigarette smoker quit or switched to bidis, but a change in status did significantly predict a change in product risk perceptions of cigarettes versus bidis from Wave 1 to Wave 2, which suggests that tobacco product risk perceptions represent an optimistic bias towards one's own product that is maintained as a means of justifying one's current behaviour.

The finding that cigarette smokers who switched to bidis did not completely reverse their risk perceptions (i.e., from saying bidis are more harmful to less harmful) but instead adjusted their beliefs to say there is no difference in harm between the products supports Kunda's Theory

of Motivated Reasoning (1990). According to this theory, a biased search for information to confirm a belief that one is motivated to hold (such as the belief that your tobacco product is less harmful than others) is constrained by reality such as knowledge of one's prior attitudes. In this case, one can still change their attitude, but rather than completely reversing a belief, it can only be shifted to be more in line with the belief you are motivated to hold. Tying in with cognitive dissonance theory, beliefs are easier to change than addictive behaviours, but there is a limit to the degree to which beliefs can be changed. In the case of tobacco use, it appears that product risk perceptions function as a means to justify tobacco use behaviour, which is difficult to change or quit, but these perceptions themselves are also difficult to completely reverse. However, risk perceptions could only be measured across two survey waves which took place one year apart, so it is possible that a longer time period may have allowed for a greater change in risk perceptions. In addition, there might have been more movement in risk perceptions following a change in products if the scale had more variability rather than only three possible responses.

Of course, it is difficult to draw conclusions from this one sample of respondents, especially because it was not possible to establish causality due to lack of experimental control. In addition, when data from Wave 2 to Wave 3 recontact respondents was analyzed, there was weak or no evidence of the same pattern of findings. However, these analyses were limited by very low sample sizes of individuals who switched products between Wave 2 and Wave 3. More analyses will therefore need to be conducted in the future in order to more fully understand the role of product risk perceptions on tobacco use behaviour, which will be possible with upcoming ITC survey waves in both India and Bangladesh.

10.4.2 Alternate Explanations

It is also important to consider alternate explanations for product risk perceptions beyond cognitive dissonance theory. One possible interpretation for tobacco users perceiving their own product to be less harmful than others is through the mere exposure effect or familiarity principle. According to this widely demonstrated phenomenon (described earlier in section 2.3.3), people perceive familiar stimuli to be more safe than novel ones, as novelty is associated with uncertainty and greater potential risk (Zajonc, 1968). Similarly, perceptual fluency can influence risk perceptions and judgements in that stimuli that are more quickly and fluently processed are perceived to be more familiar, eliciting a more positive affect and lower perception of risk compared to disfluently processed stimuli (Song & Schwarz, 2009). The mere exposure effect has previously been applied to tobacco research as an explanation for the effectiveness of tobacco marketing. Increased exposure to cigarette brands through advertising creates more positive feelings towards that brand, even without conscious control (Morgenstern, Isensee, & Hanewinkel, 2013). These positive feelings towards a brand or product can then lead to lower risk perceptions for that product through the workings of the affect heuristic (Slovic, Peters, Finucane, & Macgregor, 2005).

It is possible that some of the findings from this dissertation could be explained by the mere exposure effect. That is, tobacco users may perceive their own product to be less harmful than others simply because they are more familiar with it and can more fluently process it, thus they would perceive it to be less risky than a more unfamiliar product. If a tobacco user switches products to one that they had previously judged to be more risky, they may subsequently lower their risk perceptions of this product because it has become more familiar and easier to process now that they use it. However, while this explanation is possible, it seems more likely in an

environment where the product judged to be more risky is truly unfamiliar. For example, in a country like Canada where bidis and chewing tobacco are much less common than in Southeast Asia (Propel Centre for Population Health Impact, 2014), these products would be unfamiliar to the majority of people and thus would be more likely to be judged as riskier products than cigarettes. In contrast, bidis and smokeless tobacco are more prevalent than cigarettes in India and Bangladesh (World Health Organization, 2009a, 2009b), so even a cigarette smoker who has never used these products should still have been exposed to them many times by seeing others use them or seeing them for sale, and every exposure should make these products appear more familiar and thus less risky. Another important finding that, if replicated, would provide stronger evidence against the familiarity bias explanation, is that among all groups of product switchers that were examined, especially among the Wave 1 to Wave 2 respondents, those who quit using their product adjusted their perceptions from saying their product is less harmful to that there is no difference in harm. If risk perceptions were based on only familiarity with a product, then those who quit using tobacco without switching to another product should have maintained their risk perceptions as their product familiarity gained from repeatedly using a product should not have changed. In this sense, the familiarity hypothesis may not work as well as an explanation for our findings as cognitive dissonance theory, but it may certainly still play a role in risk perceptions, as a tobacco user should still have had many more exposures to their own product than one they do not use.

Another possible interpretation of the findings in this dissertation is through the affect heuristic, which influences risk perceptions when an individual faces an uncertain stimuli or complex decision and unconsciously accesses his or her positive or negative feelings to guide their risk estimation (Slovic, Finucane, Peters, & Macgregor, 2002). If a tobacco user is asked to

compare the risk of their own product to one they do not use and may be more unfamiliar with or have less knowledge of to guide their risk perception, the individual may rely on the immediate positive feelings of enjoyment and satisfaction they receive from their own product to make an assessment that their product is less risky than the other. However, the affect heuristic plays a greater role when risk judgements are made quickly and unconsciously, and it is unclear to what degree tobacco product risk estimations require more deliberative thought processes (Slovic & Peters, 2006).

Future experimental research may be necessary in order to gain a better understanding of the exact mechanisms behind tobacco users' biased product risk perceptions. Based on our findings, it is likely that tobacco users perceive their own product to be less harmful than others as a means of reducing any cognitive dissonance experienced for using a product they know to be harmful. However, other processes may also play into these perceptions, including greater familiarity or more positive affect towards one's own product compared to other tobacco products.

10.5 Predictors of Product Risk Perceptions

While the majority of my predictions were supported by the analyses of the responses of tobacco users in Bangladesh and India, there was not support for my hypotheses concerning the factors that would predict specific product risk perceptions. I predicted that stronger addiction to a product would lead to lower perceived risk for that product in comparison to others, as someone who is more addicted should find their behaviour harder to change, and should thus have a stronger motivation to adjust their beliefs to justify their behaviour. I also predicted that those with greater perceived health risks from their tobacco use would be less likely to believe their product is less harmful than others, as these beliefs would contradict each other. While

there was general support for these predictions within the findings from India, results from Bangladesh were more inconsistent, with very few significant predictors of product risk perceptions. It was therefore difficult to draw any firm conclusions about the factors that lead to certain product risk perceptions. However, tobacco use status was consistently a strong predictor of product risk perceptions even when controlling for other variables, with current use of a tobacco product leading to lower risk perceptions of that product in comparison to others. This suggests that one of the most important factors related to one's risk perceptions of tobacco products is whether or not one uses that product.

10.6 Implications

10.6.1 Theoretical Implications

It is important to consider the implications of this study for both theory and practice. There are three main ways in which the findings from this research support and expand upon psychological theories and previous research in this domain: the evidence supports previously established theories and research on risk perceptions, it suggests a new type of risk-minimizing belief through which tobacco users may justify their behaviour, and it demonstrates the generalizability of research on smokers' risk perceptions by expanding to countries that have rarely been studied in this domain and to tobacco products beyond cigarettes.

As previously discussed, findings that tobacco users acknowledge the harms of tobacco use but underestimate their own personal risk from harm support previous evidence of an optimistic bias among smokers, but also extend this line of research to demonstrate that an optimistic bias seems to exist among other types of tobacco users as well, and in countries with different cultures, values, and policies regarding tobacco use. This also contributes further

evidence to strengthen the argument against the tobacco industry's claims that tobacco users are fully aware of the risks they face from tobacco use.

Several mechanisms through which smokers demonstrate an optimistic bias have been identified in the past, including believing that one has a personal immunity to harm through other healthy behaviours, believing one's brand of cigarettes is less harmful than others, and believing one is less addicted or can more easily quit compared to other smokers, for example (Oakes et al., 2004; Weinstein et al., 2005; Weinstein, 1998). The findings from this dissertation suggest another type of risk-minimizing belief that tobacco users may endorse to help justify their behaviour or reduce cognitive dissonance: believing that their tobacco product is less harmful than other tobacco products which they could be using instead, which may be particularly important in mixed product markets.

Finally, much of the research on perceived risk and tobacco use has been conducted among respondents in high-income countries, which have similar levels of tobacco control, social norms around tobacco use, and types of tobacco used. As Henrich has argued, studies based on samples drawn from Western, educated, industrialized, rich, and democratic (WEIRD) societies are difficult to generalize to the rest of the human population as these samples are not representative of the majority of the world's population (Henrich, Heine, & Norenzayan, 2010). The findings from tobacco users in India and Bangladesh in this study therefore demonstrate the generalizability of cognitive dissonance theory and optimistic biases among tobacco users to other cultures.

10.6.2 Practical Implications

Practical applications of this research for tobacco control or public health interventions are less evident than theoretical implications, but some suggestions for applications can be made.

Two general areas where this research may be applied will be discussed: targeting tobacco users' optimistic biases about the health risks they face from tobacco use, and addressing product risk comparisons.

Given the important role that risk perceptions play on behaviour and the previously established links between health risk perceptions and quitting, education efforts to inform the public about the health risks of tobacco use remain a key tobacco control strategy both for preventing and reducing tobacco use (Costello et al., 2012). This is an important point to emphasize, as this dissertation was focused more on the ways in which cognitive biases may interfere with risk perceptions and behaviour, and not on how health risk perceptions affect tobacco use behaviour more generally. However, the findings from this study and previous research suggest that in addition to educating about the harms, interventions aimed at helping current tobacco users to quit should *also* include strategies to target the optimistic biases or risk-minimizing beliefs that tobacco users maintain. These biased beliefs have been found to inhibit quitting (e.g., Borland et al., 2009; Oakes et al., 2004), which makes sense in the context of cognitive dissonance theory, which holds that beliefs are easier to change than behaviour when trying to reduce dissonance. In this sense, in order to promote quitting, interventions should attempt to counteract these risk-minimizing beliefs to make them more difficult to maintain. Fotuhi et al. (2011) have suggested that cessation campaigns and individual interventions should target or identify the rationalizations that may be preventing smokers from successfully quitting, in addition to simply providing information on the health risks of smoking. However, previous research has suggested that simply challenging the contradictory nature or egocentrism of optimistic biases is not effective in reducing them, but rather making the unpredictability or uncontrollability of the risk more salient may be more effective (Breakwell, 2007). In this sense,

finding ways to improve tobacco users' understanding of the true nature of addiction and difficulty in quitting may be helpful in reducing optimistic bias. Of course, more research on whether this type of strategy would be effective, particularly with other forms of tobacco and in other countries, would be needed in order to implement it.

It is slightly more challenging to consider how product risk perceptions should be addressed by public health interventions. Smokeless tobacco is less harmful for health than smoked tobacco, and some types of smoked tobacco (such as bidis) may be more harmful than cigarettes. However, educating people about these differences in harm could potentially make it easier for tobacco users to endorse a belief that their product is less harmful than another, which may give them less incentive to quit, and quitting is always better for health than any type of tobacco use. On the other hand, attempts to educate the public that *all* forms of tobacco are harmful may have the potential to prevent a smoker who does not plan to quit from at least switching to a lower harm product. Indeed, many public health organizations and campaigns, including the Centers for Disease Control and Prevention (CDC) in the United States, emphasize the message that there is no such thing as a safe tobacco product, but this message has been criticized by some as misleading consumers into believing that all products are equally harmful (Kozlowski & Edwards, 2005; Kozlowski, 2002; O'Connor et al., 2007). Given the particularly harmful effects of smoked tobacco not only for the smoker but for non-smokers as well, it may be more important for public health messages to stress the exceptionally high risks of smoked tobacco, with the view that the benefits of ensuring smokers are informed outweigh the risks of this message being misconstrued as support for smokeless tobacco use (O'Connor et al., 2007). However, the effects of this type of messaging have not been widely evaluated, especially as

they may apply in India and Bangladesh, so more research into effective message framing about the relative risks of harm of various tobacco products should be conducted in the future.

10.7 Limitations and Future Research

Several limitations of this research have already been discussed throughout this dissertation. One of the most notable limitations is the very small sample sizes of respondents who switched tobacco products between waves, which limited the power to detect effects in the data and to determine the direction of causality within the findings. The one year time period between survey waves and the lack of sensitivity within the measures of perceived product risk (i.e., a 3-point scale) may have also limited the amount of change in risk perceptions that could be seen. While data from the largest group of recontact respondents who switched products between waves (n=55) suggested that a change in products predicts a change in product risk perceptions, more data from larger groups of respondents in future waves will be needed to more clearly understand the role of product risk perceptions on behaviour. It would be particularly informative to follow up with individuals over multiple survey waves in order to examine whether a change in risk perceptions becomes greater given a longer time period after switching to a new product, and whether those who switch products multiple times continue to switch their risk perceptions.

This study is also limited more generally by the observational study design of the surveys, which did not allow for experimental control and manipulation of variables; the results are thus not definitive regarding causality. In addition, self-report data introduces the possibility of social desirability influencing some responses. However, most of the measures that were included in this dissertation did not have an obvious socially desirable response, nor is it likely that the *pattern* of the data between different respondent groups could have resulted from social

desirability, so it is likely that self-reports could not have had any more than a trivial impact on the findings and the conclusions.

There were also some issues with the wording or scaling of survey measures that have been discussed throughout this dissertation. For example, the measure of how much more likely one is to get cancer could have been interpreted differently by respondents depending on how they define “much” more likely. In addition, the argument that tobacco users hold biased risk perceptions of the harms of their tobacco use could be more strongly made if the survey had included a more direct measure of optimistic bias. The surveys asked respondents to compare their chance of getting cancer to a non-user, which is an important measure of perceived risk of tobacco use and provided valuable evidence that tobacco users underestimate their risk of harm in general. However, the addition of a measure that asked respondents to compare their chance of disease to an *average user* of their product would have been a more direct measure of optimistic bias, and comparing the chance of disease from your product to the chance of disease that a different user has from their product would have been a useful additional measure of perceived product risk. Finally, different types of tobacco users did not receive separate survey types until Wave 3 of the ITC Bangladesh Survey, which limited some analyses in earlier waves in this country. Nevertheless, the majority of measures that were included in the surveys were well-designed to answer our research questions, and future survey research may benefit from including additional measures of perceived risk and ensuring that different types of tobacco users are clearly identified.

Future research should also seek to more deeply explore the mechanisms behind tobacco users’ risk perceptions of their own products and of tobacco products in general, and whether these perceptions do indeed represent a type of optimistic bias or rationalization about one’s own

behaviour. An informative research experiment may involve making the discord between a tobacco user's beliefs and behaviour more salient and determining how this affects risk perceptions and perhaps behaviour. In addition, it would be useful to determine if changes in risk perceptions do serve the function of reducing feelings of dissonance or psychological discomfort for using a harmful product. These types of questions may be best explored through a combination of population-level survey research and controlled experimental research.

10.8 Conclusion

The burden of death and disease from tobacco use is greatest in low- and middle-income countries, where a variety of tobacco products are consumed, yet the majority of research on risk perceptions of tobacco has been conducted in high-income countries where cigarettes are the most common tobacco product. It is important to understand more about tobacco users' perceptions of the risk of tobacco use and how these beliefs affect their behaviour in order to inform interventions to prevent uptake and encourage cessation. This study is the first to examine tobacco users' risk perceptions of multiple products (cigarettes, bidis, and smokeless tobacco) in India and Bangladesh, where over a third of the population uses tobacco in some form. Using data from large, representative, longitudinal cohort surveys of tobacco users and non-users in these two countries, this study found strong evidence that tobacco users perceive their own product to be less harmful than others, and some evidence to suggest that these risk perceptions may represent an optimistic bias or risk-minimizing belief about one's behaviour.

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Appendix A: Technical Reports and Surveys

Rather than attaching the full technical reports and surveys for each wave of data collection in India and Bangladesh, which include several hundred pages of material, hyperlinks to relevant information are provided in this Appendix. All ITC technical reports and surveys are publicly available on the ITC website at www.itcproject.org, and permanent links to the specific technical reports and surveys for India and Bangladesh are provided below.

Technical Reports

The technical reports for each ITC Survey Wave describe the purpose of the project, details of the sampling design, detailed methods for enumeration, survey fieldwork, and quality control, and information on response rates and weights construction. They also include the enumeration forms, screeners, surveys, information letters, and consent forms that were used in fieldwork.

The TCP India Wave 1 Technical Report can be found on the TCP India webpage at <http://www.itcproject.org/countries/india>, or by clicking on this direct link: http://itc.media-doc.com/files/IN1-TR-July_2013-revised-v3-FINAL.pdf.

The ITC Bangladesh Technical Reports can be found on the ITC Bangladesh webpage at <http://www.itcproject.org/countries/bangladesh>.

The Wave 1 Bangladesh Technical Report can be accessed through the following direct link: http://itc.media-doc.com/files/Report_Publications/Technical_Report/bd1trfinalapr21.pdf.

The Wave 2 Bangladesh Technical Report can be accessed here: http://itc.media-doc.com/files/Report_Publications/Technical_Report/bd2trfinaljun17.pdf.

The Wave 3 Bangladesh Technical Report can be accessed through this link:

[http://www.itcproject.org/files/ITC Bangladesh Wave 3 Technical Report-FINAL-Feb2014.pdf](http://www.itcproject.org/files/ITC_Bangladesh_Wave_3_Technical_Report-FINAL-Feb2014.pdf).

Surveys

All survey measures that were used in this dissertation were presented in full in the respective sections of the dissertation where they were used. In addition, the full contents of the ITC Bangladesh and India Surveys, including each type of tobacco user survey for each wave, in multiple languages, are publicly available at the following webpage:

<http://www.itcproject.org/surveys>.