

**Beliefs About Immunization and Children's  
Health Among Childbearing Mothers in  
Nepal**

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# Abstract

This study assessed specific cultural beliefs about immunization and children's health, and also tested the four components of the Health Belief Model in relation to use of childhood immunizations among childbearing mothers in Nepal. One hundred and eighteen surveys were administered to mothers visiting one of two health care facilities in the country – Kanti Children's Hospital on the northern side of the Kathmandu Valley and Patan Health Post in the northeastern Himalaya region. Of those surveyed, 69% reported being immunized and 65% indicated that their spouse had also been immunized. Most surprisingly, 102 out of the 118 subjects (or 86% of the total sample) reported that all of their children were immunized, 2 reported that half of their children were immunized, and 13 stated that none of their children were immunized. Based on multiple regression analyses, perceived benefits was the only component of the Health Belief Model that was significantly related to immunization use, with greater perceived benefits being associated with greater frequency of vaccination among the mothers ( $p < 0.05$ ). In addition, those mothers with higher levels of education were more likely to have higher immunization rates ( $p < 0.05$ ). Furthermore, qualitative findings indicated that mothers reported benefits of immunizing children that appeared to be a major reason for their children's immunization. The results of this study suggest that mothers who have received less formal education may be at greater risk of not being immunized and that health education interventions in this community may be more effective if they focus on perceived benefits of immunization in future intervention efforts.

# Introduction

Viewed globally, vaccines are the most cost-effective medical intervention to prevent death and disease (World Bank, 1990). Not solely a good in itself, childhood immunization represents the gateway to provision of comprehensive health care to which all children ought to be entitled. Moreover, pediatric immunization programs have eradicated many of the infectious diseases of childhood and have been one of the most remarkable public health accomplishments in the history of medicine (Edwards, 2000).

In the developed world, the implementation and large-scale application of immunization programs have been remarkably successful in eliminating or reducing the prevalence of infectious diseases. For example, in the U.S., childhood immunizations are now a vital component of health promotion. The first large-scale effort to immunize the American public against communicable diseases began in the 1940's with the institution of widespread diphtheria, pertussis, and tetanus immunization programs (Mark & Darden, 1999). Since that time, the concept of vaccinations as a method of disease prevention has gained broad acceptance by the American public. The most recent figures for the year 2000 indicate that the United States has achieved the lowest rates of vaccine-preventable diseases and the highest rates of immunization ever recorded (MMWR, 2000).

Overall, worldwide immunization coverage in the developed world has improved considerably during the past decade. From the early 1980s to the early 1990s, the reported coverage increased from under 20% to approximately 80%, and millions of

deaths were estimated to have been avoided as a result during this period (UNICEF, 1994). Despite these advances, however, diseases that are preventable through immunization still remain a major public health problem in many developing countries. In 1995, a single disease among them, measles, claimed the lives of an estimated 1.2 million children and infected more than 45 million people (WHO, 1995b). And by the end of the twentieth century, researchers discovered that, in the developing world, more than 3 million children still die annually from measles, neonatal tetanus, and pertussis, while more than a quarter of a million children are crippled by poliomyelitis (Henderson, 1999).

Among the developing countries, those in South Asia have shown some of the worst figures with regard to prioritizing health and the assessment of favorable health outcomes (Ramalingaswami, 1996). In these countries, recent policies of structural adjustment have led to an increase in poverty and social inequality, and comparatively few resources have been allocated to health care and health related research. Moreover, indicators of the health of mothers and children continue to demonstrate poor health, and statistics on health and proper disease prevention rank among the worst in the world (UNICEF, 2000).

### ***A Paradigm for Good Health?: The Case of Nepal***

Similar to its South Asian neighbors, Nepal is one of the least developed countries in the world, with an infant mortality of 98/1,000 live births, maternal mortality of 1500/100,000 live births, 26% adult literacy, and a prevalence of contraceptive use of

23% (HDR 1996). The estimated population in the capital of Kathmandu is 500,000, with an annual urban growth rate of 7.4% (World Bank, 1990). With 250 beds, 15, 000 deliveries annually, and countless outpatient services, Kanti Children's Hospital remains the only pediatric hospital in the entire country. Situated on the northern side of the bustling Kathmandu Valley, it is an ideal location in which to assess the progress that Nepal has made in the realm of children's health and disease prevention, particularly in the realms of specialized neonatal, immunization, oncological, and cardiac care. In contrast, the Patan Health Post is tucked away below the sleepy Himalayas and represents a typical Nepalese health facility located in the most rural of settings. Both locales provide optimal settings for research on health behavior, and studied together, they add significant contextual variability to the measures examined in this study.

According to official government reports, Nepal has had tremendous success since its immunization program was launched in 1977. National immunization coverage in 1989 was as high as 95% for tuberculosis (Bacille Calmette-Guérin, or BCG), 80% for polio and diphtheria/pertussis/tetanus (DPT), and 69% for measles. This impressive achievement meets the global targets of 80% and 90% coverage of all immunizations by 1995 and 2000, respectively (UNICEF, 1996). However, the impact of immunization coverage on reducing morbidity and mortality in Nepal is not yet properly documented. Moreover, Onta has argued that these official national figures on immunization coverage are highly exaggerated as a result of overreporting from the Primary Health Care Service Outlets and the District Health Office. As a result, he has expressed concern that false assurance of high coverage will not result in the planned reduction of morbidity and

mortality of vaccine-preventable diseases. Instead, he suggests that a failure to control these diseases will further hinder a trust-building process among people, which in turn may obstruct the success of the country's entire immunization program (Onta, 1998).

This lack of accurate statistics on immunization in Nepal is indicative of a much larger problem in the country – that Nepalese administrators, government officials, and health care providers do not have a basic understanding of the indicators and determinants of the health of their citizens. Economist Maubub ul Haq best described the current situation when he characterized Nepal as “emerging as the poorest, the most illiterate, the most malnourished, the most deprived region in the world. Yet it continues to make more investment in arms than in the health and education of its people” (Ul Haq, 1997). As a result, there have been few resources allocated to health care and health related research on mothers and their children, and it remains to be seen what implications this will have on the future health and well-being of the Nepalese.

While there is little that can be done to reverse this trend, there is one area in which a little research and early prevention can go a long way: childhood immunization. In recent years, the research that has been done on vaccination and disease prevention has been meager, but it is slowly beginning to gain speed. One of the most recent studies done by Prislin et. al. has suggested that a wide array of factors influence the immunization of Nepalese children, but, by far, the most important factor is parents' beliefs, attitudes, and perception of immunization (Prislin et al., 1998). Thus, the primary aim of this thesis is to utilize a relevant theoretical model to build upon these preliminary findings and achieve a

deeper understanding of how Nepalese parents' beliefs and attitudes about immunization effectively translate into their subsequent health behavior.

### ***The Theoretical Foundations of the Study: The Health Belief Model***

Of the various models in health psychology that are used to explain health behavior, the Health Belief Model provides the most appropriate theoretical framework in which to examine how Nepalese parents think about immunization and disease. The Health Belief Model (HBM) is a social-cognitive model developed in the 1950's by the U.S. Public Health Service (Mullen, Hersey, & Iverson 1987), which is often used to explain and predict health related behaviors (Strecher & Rosenstock, 1997). This model has often been used to predict a variety of preventative health behaviors, such as dental checkups, dieting, driving under the influence, and sexual risk behavior.

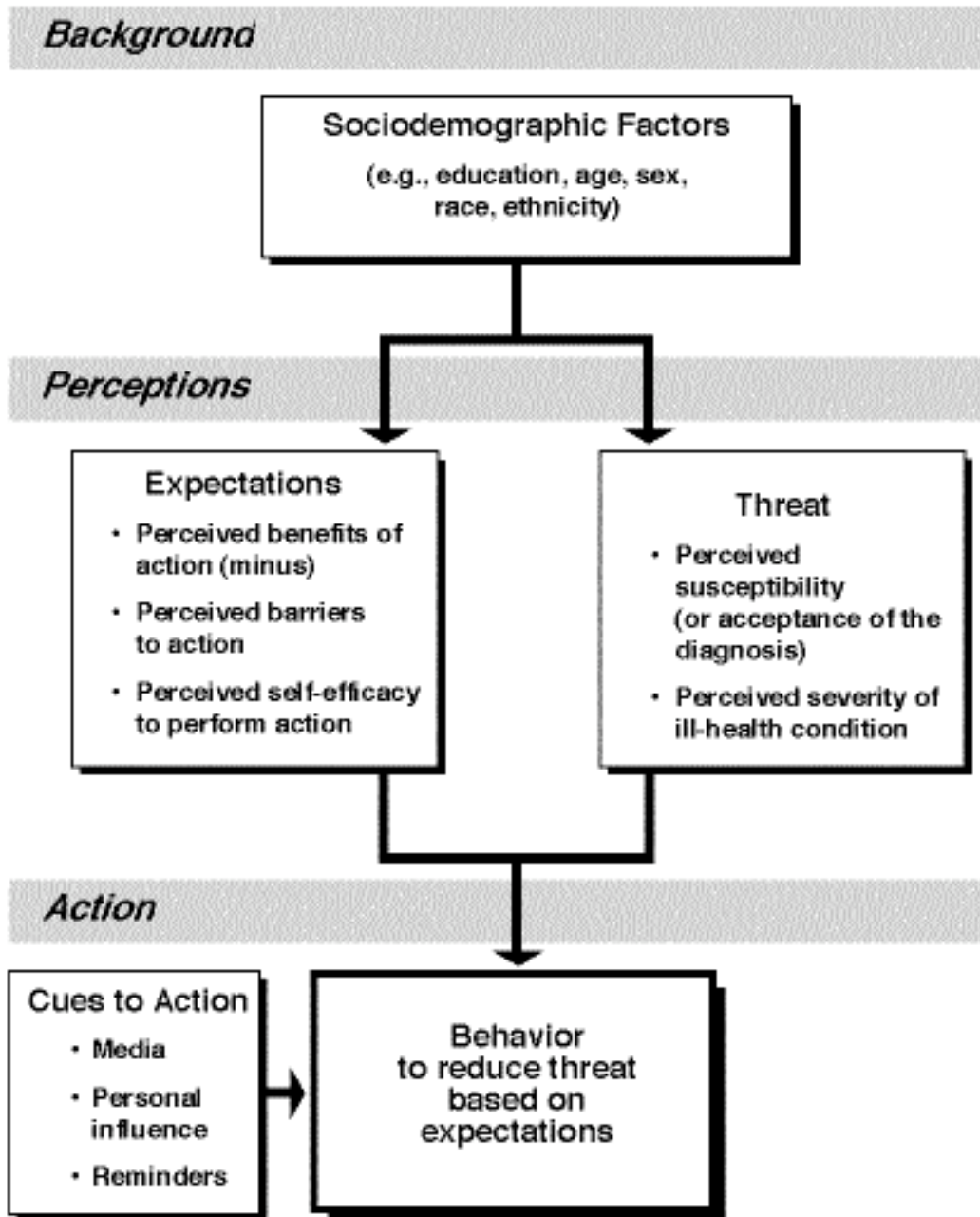
The basic components of the Health Belief Model are derived from a well-established body of psychological and behavioral theory whose various models hypothesize that behavior depends mainly upon two variables: (1) the value placed by an individual on a particular goal; and (2) the individual's estimate of the likelihood that a given action will achieve that goal. In the context of health-related behavior, these correspondences are: (1) the desire to avoid illness (or if ill, to get well); and (2) the belief that a specific health action will prevent illness. For example, if a person's goal is to avoid a health problem, the individual must feel personally vulnerable (perceived susceptibility) to a problem judged to be potentially serious (perceived severity), and he or she must estimate that specific action will be beneficial in reducing the health threat

(perceived benefit) and will not involve overcoming obstacles (perceived barriers). Thus, as Rosenstock notes in describing this model, “The combined levels of susceptibility and severity provided the energy or force to act and the perception of benefits (less barriers) provided a preferred path of action” (Rosenstock, 1966).

When applied to parents’ immunization behavior, the Health Belief Model suggests that simply having knowledge and awareness about infectious diseases will not necessarily result in increased visits to a hospital for vaccinations. Instead, the model specifies four related elements that must be present for knowledge about disease to be translated into preventative action (Onta, 1998). First, an individual must perceive that he or she is susceptible to an infectious disease, and second, that person must also perceive that the disease is a serious condition. Third, he or she must believe that there are benefits to taking preventive action. Finally, the individual must also perceive that any potential barriers to taking preventive actions are outweighed by potential benefits. Based on this model, perceived susceptibility, perceived severity, and perceived benefits are likely to be positively related to immunization behavior, while barriers to taking action are likely to be negatively related to it.

A final variable completes the original Health Belief Model: the presence of an internal or external stimulus, or “cue to action,” that triggers the individual’s health behavior. An internal cue may include symptoms of illness, whereas external cues include media campaigns about health promotion or interpersonal interactions, such as

learning that a friend has been affected by a health problem. A diagram of the HBM is presented below in Figure 1.



**FIGURE 1. A Schematic Outline of the Health Belief Model Proposed by Rosenstock, et al., 1990**

More recently, the concept of “self-efficacy” has been added to some versions of the Health Belief Model. Rosenstock suggests that self-efficacy was not explicitly incorporated into early versions of the Health Belief Model because the original focus was on circumscribed preventive actions, such as receiving an immunization or accepting a screening test. (Rosenstock 1990) He proposes that self-efficacy is more useful in understanding behaviors, such as those related to chronic illness care, which occur over a period of time and require lifelong changes in behaviors. Because the behavior of interest in this study was a circumscribed action, the concept of self-efficacy was not felt to add explanatory power and thus was not included in the model.

Although the Health Belief Model has been used extensively in studies of health behaviors, critics of the model have pointed out a variety of limitations. There has been a lack of uniformity in testing the model, especially in the way variables are operationalized (Champion, 1984). Tools used to measure Health Belief Model components have not been refined or standardized. In addition, the model does not apply numeric coefficients to the concepts of susceptibility, severity, benefits, and barriers, nor does it delineate the specific nature of the relationships among the variables (Rosenstock, 1990). Most studies, however, have treated the model as additive and have tested only direct relationships between the variables and the health-related behavior of interest.

Another problem with the Health Belief Model is a lack of consistency in the use and testing of the model. That is, not all variables have been included in all studies. For example, identifying and measuring the concept of cues to action has been problematic.

Cues can be diverse in nature, may occur in a fleeting manner, and an individual may or may not consciously remember events that trigger action. In retrospective studies, the nature and importance of cues is more difficult to evaluate because research participants are questioned about behaviors performed in the past. For these and other reasons, the variable “cues” has not been included in many studies based on the Health Belief Model (Harrison, 1992).

Because the Health Belief Model is a psychosocial model, it accounts for only as much of the variance in health behaviors as can be explained by attitudes and beliefs that are obvious to and consciously evaluated by individuals (Janz, 1984). Other factors related to the individual, such as demographic variables, personality factors, social support, or previous health experiences, may play a role in influencing behavior, but they are not an explicit part of this model. Instead, they are thought to influence the major variables in the model. In addition, concepts reflective of the larger social structure, such as institutional or public policy, poverty, and social isolation that may affect access to health care, are not included in the Health Belief Model. However, this criticism could also be directed at most other psychosocial models.

In spite of the criticisms, the Health Belief Model has been used successfully for over thirty years to understand health behaviors in a variety of circumstances. As Kirscht wrote in his analysis of the model, it is “complex and variable in its history, yet surprisingly robust and useful” (Kirscht 1988). Thus, it is a very useful method for explaining health behavior - one that should provide substantial power in predicting the perceptions that underlie immunization behavior in Nepalese parents.

Several studies have already provided evidence supporting the utility of the Health Belief Model in understanding the factors associated with parents' vaccination behaviors. A 1996 study of parents in a rural Cameroonian village analyzed factors associated with caregiver compliance to child immunization schedules. The researchers found that both perceived susceptibility and perceived severity of infectious diseases were reliably associated with greater compliance to appropriate vaccination timelines (Tuma, 1996). Another study conducted among mothers and primary caregivers in Indianapolis, Indiana (USA) also showed that perceived severity and susceptibility were two components of the Health Belief Model that were significantly related to greater likelihood of immunization (Zimet, 1995)

While these studies suggest that the perceived threats (susceptibility and severity of disease) are the most significant predictors of parents' vaccination behaviors, other studies have challenged this conclusion. In particular, an epidemiological study conducted among young adults in Denmark found that perceived benefits and, more importantly, perceived barriers were significantly related to immunization rates in both parents and their children (Nexoe, 1997). Moreover, several additional studies have indicated perceived barriers to be the component of the model that is most related to childhood vaccination behavior among parents (Janz 1984; Mark 1999; Henderson 1999).

### ***The Experimental Objectives of this Study: Putting it All Together***

Given these findings, it is likely that the components of the Health Belief Model that are most related to increased immunization among parents vary by community, age, and other group characteristics. This thesis specifically investigates the efficacy of the Health Belief Model in accounting for the variance in immunization behavior among childbearing mothers in Kathmandu, Nepal. The model's four components – perceived susceptibility, perceived severity, perceived benefits, and perceived barriers – are examined in relation to parental and childhood immunization behavior. The first three components of the Health Belief Model (perceived susceptibility, perceived severity, and perceived benefits) were hypothesized to be positively correlated with immunization behavior, whereas the fourth component (perceived barriers) was hypothesized to be negatively correlated with immunization behavior. By thus examining the relationships among these factors and likelihood of immunization use in this Nepalese community, it will be possible to focus on the most salient components of the model in developing future intervention strategies and educational efforts.

This study also examines the cultural beliefs of Nepalese mothers in relation to their general understanding of children's healthy and diseased states, and also their specific beliefs about potential benefits and barriers to immunization. As a qualitative component to this thesis, several open-ended questions are included in this study in order to capture the beliefs of these mothers in their own words. First, they are asked why some children stay healthy and why others get sick, and then they are asked more direct questions about what prompted them or prevented them from endorsing immunization for

their children. While there were no specific hypotheses for this portion of the study, it was expected that mothers' responses would provide deeper insight into the beliefs that may underlie their immunization behavior.

In summary, the primary objective of this thesis was to examine the hypothesis that immunization behavior would be more frequent among Nepalese mothers who endorsed the first three components of the Health Belief Model: perceived severity, perceived susceptibility, and perceived benefits. Similarly, immunization use was expected to be much less frequent among those mothers who perceived greater barriers to immunization. A second objective of this study was to assess mothers' more general understanding about children's health and to extract a deeper understanding of the perceived benefits and barriers associated with childhood immunization in Nepal.

# Methodology

## *Participants*

In December of 2001, data were collected for this study in Kathmandu, Nepal using a protocol that had been approved by an appropriate institutional review board. At two government health facilities, 120 mothers were approached and recruited to participate in an anonymous survey. All of the mothers who were approached agreed to participate in the study. Many of the participants were at the facility in order to have their child immunized against polio and DPT, while others were there for family planning purposes. All of the subjects were adults; however, one person approached was under the age of 18 and was therefore not included in the study. Those who expressed notable discomfort or pain from health problems and those who did not provide complete data were also eliminated from the study. One mother did not provide complete data on her survey, and so her data were not included in the results. Thus, there were a total of 118 participants in this survey.

All 118 subjects spoke Nepalese and therefore they could understand the study questionnaire and consent forms (which were administered via two Nepalese translators). As a result, no potential participants were excluded because of an inability to understand the language.

The sample was 100% female, with subjects' ages ranging from 18 to 55 (mean age = 27.9 years, SD = 7.3). The demographic characteristics of this sample are summarized below in Table 1.

**TABLE 1. Demographic Characteristics of 118 Nepalese Mothers in Kanti  
Children's Hospital and Patan Health Post**

<b>Demographic Variable</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Age</b>		
18-24	44	37.3
25-33	49	41.4
34-40	18	15.1
41-49	5	4.2
50-55	2	1.6
<b>Education</b>		
No education	28	23.7
Only informal education	24	20.3
Primary education (1-5)	12	10.2
Secondary education (6-10)	33	28.0
College	19	16.1
Post-baccalaureate	2	1.7
<b>Religion</b>		
Hinduism	69	58.5
Buddhism	24	20.3
Christianity	25	21.2
<b>Income (in Rupees)</b>		
No income	5	4.2
1-4,000 Rs.	20	16.9
4,001-7,000 Rs.	52	44.1
7,001-10,000 Rs.	31	26.3
10,001 Rs.-above	10	8.5

## *Procedure*

All of the subjects in this study were recruited for participation after first being seen by a nurse. When approached, they were asked if they wanted to participate in a study about children's health and immunization. Since most of the subjects were illiterate, the process to ensure informed consent was conducted orally, and once each subject consented, she was individually interviewed in Nepalese by one of two translators. The study was anonymous and was administered in a private room near the back of the clinic, so as to ensure the privacy of each subject. Back-translation of the interviews was used to verify the accuracy of the initial translations, and if any of the mothers appeared uncomfortable during any part of the interview, they were reminded that they had the option not to answer questions.

## *Measures*

The 24-question survey included items measuring demographics the four dimensions of the Health Belief Model, immunization history, and a series of open-ended questions that probed for mothers' general beliefs about the causes of children's illness and the barriers to immunizing children.

*Demographics.* Levels of completed education among Nepalese mothers were assessed using a 6-point scale, with "1" = no education, "2" = informal education, "3" = primary education (grades 1-5), "4" = secondary education (grades 6-10), "5" = college, and "6" = post-baccalaureate. Also, the age of each mother was elicited in an open-ended format, and information about family occupation was also obtained, using four

categories: “1” = agriculture, “2” = service, “3” = business, “4” = other. Since there were two different settings in which the surveys were administered (one urban and one rural), each survey was coded as follows: “1” = interviewed at Kanti Children’s Hospital, and “2” = interviewed at Patan Health Post. Finally, religion was assessed using four categories: “1” = Hinduism, “2” = Buddhism, “3” = Christianity, and “4” = Other.

In order to account for other salient variables, particularly social class, two additional measures were included in the survey demographics. First, average income per month was elicited and coded using the following scale: “1” = no income, “2” = 1-4,000 rupees (Rs.), “3” = 4,001-7,000 Rs., “4” = 7,001-10,000 Rs., “5” = 10,001 Rs. or higher. Second, social caste was assessed using a 4-point scale: “1” = Brahman, “2” = Chetri, “3” = Baishyai, and “4” = Sudra.

*Immunization History:* Each mother was also asked if she herself had been immunized, if her spouse had been immunized, and the number of her children who had been immunized. All of the responses were coded as either “yes”, “no”, or “I don’t know,” with a score of “3” corresponding to a “yes,” “2” corresponding to an “I don’t know,” and “1” corresponding to “no.” In addition, mothers were asked the following question about their educational history: “Did you have a class about immunization at school?” with responses being coded the same as above.

*Health Belief Model:* The four components of the Health Belief Model were assessed by developing items that tested culturally salient aspects of each component.

The scales included the following: perceived benefits (Cronbach's alpha = 0.86), perceived barriers (Cronbach's alpha = 0.64), perceived severity (Cronbach's alpha = 0.89), and perceived susceptibility (Cronbach's alpha = 0.84). Participants answered several questions each using a 5-point scale (with "1" = Definitely will not happen, "2" = Not likely, "3" = Slightly likely, "4" = Likely, "5" = Definitely will happen). Each question was repeated for each of the following six childhood diseases: diphtheria, pertussis, tetanus, measles, polio, and tuberculosis. In the perceived benefits scale, the questions asked "The process of immunization will prevent a child from getting the disease against which he/she was immunized." The questions asked for perceived barriers focused on the statement "The immunization will cause undesirable side effects," and perceived severity was examined using the item "Death will occur from the following illnesses." Finally, the perceived susceptibility scale included the question "A child will contract the disease if he/she is not immunized against it."

*Open-Ended Questions:* In addition to the above closed response items, three additional open-ended questions were asked for each of the participants in the survey. The first examined mothers' general beliefs about the causes of children's illness by asking, "Why do some children stay healthy and why do some children get sick?" The second question assessed the reasons that mothers gave for immunizing their children, in order to obtain a more personal account of each participant's motivations for immunizing their children. The question that was posed to mothers who had their children immunized was, "Why did you have your child(ren) immunized" Finally, for those mothers who did

not get their children immunized, they were asked, “What is the biggest barrier to immunizing your child(ren)?”

### *Data Analysis*

First, a series of correlation coefficients were computed to ensure that the Health Belief Model measures were not strongly correlated with each other, and a similar reexamination of the relationships among the demographic variables was conducted. Second, the primary hypotheses of this thesis were tested using a multiple regression analysis, with the primary dependent variable being immunization history. In the first regression, three demographic variables (education, setting, and having taken a class on immunization) were entered as a first block, using a stepwise forward procedure for the entry of variables. The second block used the simultaneous procedure for the entry of the four Health Belief Model measures.

A second multiple regression analysis was conducted using a stepwise forward procedure for entry of the following five demographic variables in the first block – education, setting, having taken a class on immunization, income, and caste. As in the first regression, the four Health Belief Model scales were entered in the second block.

Finally, the three open-ended questions were coded and simple frequency statistics were computed based on the participants’ responses.

## Results

### *Descriptive Statistics on Immunization History of Participants, Spouses, and Children*

An average of 82 participants (69% of the total sample) reported being immunized, and 77 of these subjects (65% of the total sample) also reported that their spouse was immunized. Sixty-nine of the 118 participants, or 58.5% of the total sample, had at least one class on immunization at school, while 33 participants reported never having had a class on immunization.

Out of the 118 mothers surveyed, 102 reported that all of their children were immunized, 2 reported that half of their children were immunized, and 13 stated that none of their children were immunized. As a result, this scale lacked enough variance to be included as a variable that could be tested in this study, as a high percentage of the mothers had all of their children immunized.

### *Correlations Among the Independent Variables*

Table 2 below shows the correlations among the measures of the Health Belief Model. None of the four variables (perceived benefits, perceived barriers, perceived severity, or perceived susceptibility) were strongly correlated with one another.

**TABLE 2. Correlation Data Comparing the Four Components of the Health Belief Model**

	<b>Benefits</b>	<b>Barriers</b>	<b>Severity</b>	<b>Susceptibility</b>
<b>Benefits</b>				
Pearson Correlation	1	-0.205*	0.176	0.288**
Sig. (2-tailed)	---	0.026	0.056	0.002
<b>Barriers</b>				
Pearson Correlation	-0.205*	1	0.063	0.120
Sig. (2-tailed)	0.026	---	0.500	0.196
<b>Severity</b>				
Pearson Correlation	0.176	0.063	1	0.218*
Sig. (2-tailed)	0.056	0.500	---	0.018
<b>Susceptibility</b>				
Pearson Correlation	0.288**	0.120	0.218*	1
Sig. (2-tailed)	0.002	0.196	0.018	---

\* Correlation is significant at the 0.05 level (2-tailed)

\*\* Correlation is significant at the 0.01 level (2-tailed)

### *Multiple Regression Analyses Using the Health Belief Model*

The results of the first multiple regression analysis on the frequency of immunization use among mothers are presented in Table 3 below. Overall, the regression was statistically significant in predicting subjects' immunization history ( $p < 0.05$ ), with an overall adjusted  $R^2 = 0.117$ . Of the demographic variables, education was significantly related to immunization history in Nepalese mothers, with higher levels of education being associated with greater likelihood of mothers getting immunized ( $p <$

0.05). Also, setting turned out to have a statistically significant effect on the frequency of immunization, with mothers in urban areas being more likely to have had immunizations ( $p < 0.05$ ). Finally, the only component of the Health Belief Model that was found to be significantly related to immunization usage was perceived benefits, with greater perceived benefits being associated with higher immunization rates ( $p < 0.05$ ). None of the other components of the Health Belief Model were found to be significantly related to the use of immunizations among childbearing mothers.

**TABLE 3. Results of Multiple Regression Analysis on Frequency of Immunization Use Among Nepalese Mothers**

<b>Independent variable</b>	<b>B (Non- standardized)</b>	<b>Beta (Standardized)</b>	<b>t</b>	<b>Sig.</b>
<b>Education</b>	0.132	0.293	3.108	0.002
<b>Setting (urban or rural)</b>	0.302	0.221	2.307	0.023
<b>Had class on immunization</b>	0.126	0.135	1.518	0.132
<b>Perceived benefits</b>	0.033	0.207	2.095	0.038
<b>Perceived barriers</b>	0.013	0.069	0.719	0.474
<b>Perceived severity</b>	0.007	0.053	0.573	0.568
<b>Perceived susceptibility</b>	-0.017	-0.075	-0.728	0.468

Table 4 shows the results of the secondary multiple regression analysis, which was identical to the first analysis except that it also included two additional demographic variables – income and caste. The overall regression model was statistically significant ( $p < 0.05$ ) and the overall adjusted  $R^2 = 0.112$ . Neither income nor caste was significantly related to the frequency of immunization by Nepalese mothers, with  $p$ -values of 0.72 and 0.27, respectively. Additionally, the impact of setting lost its significance ( $p = 0.07$ ), while the same two variables of education and perceived benefits still maintained their statistical significance, both with  $p$ -values less than 0.05.

**TABLE 4. Results of Multiple Regression Analysis on Frequency of Immunization Use Among Nepalese Mothers (Including Income and Caste Measures)**

<b>Independent variable</b>	<b>B (Non- standardized)</b>	<b>Beta (Standardized)</b>	<b>t</b>	<b>Sig.</b>
<b>Education</b>	0.137	0.305	3.101	0.002
<b>Setting (urban or rural)</b>	0.269	0.197	1.805	0.074
<b>Had class on immunization</b>	0.129	0.139	1.554	0.123
<b>Perceived benefits</b>	0.035	0.219	2.148	0.034
<b>Perceived barriers</b>	0.015	0.079	0.814	0.418
<b>Perceived severity</b>	0.009	0.064	0.691	0.491
<b>Perceived susceptibility</b>	-0.015	-0.065	-0.622	0.535
<b>Income</b>	0.028	0.039	0.358	0.721
<b>Caste</b>	0.094	0.100	1.113	0.268

## *Beliefs, Benefits, and Barriers*

With regard to mothers' general beliefs about the causes of children's illness, 25.5% of the respondents stated that "Illness is caused by unhealthy or malnourished diet," 22.4% of the subjects responded with, "Illness is caused by uncleanness or dirty environment," and 20.4% of the sample said that "Illness is caused by lack of care for the child."

When asked "Why did you get your child(ren) immunized?," 78.9% of the subjects answered with a response indicating "To prevent my children from getting diseases." Additionally, 11.9% of the mothers responded with a statement worded such as follows, "I had my children immunized to keep them healthy and full of immunity power," while 5.9% indicated that immunization was important to "help eliminate any concerns about communicable diseases."

In response to the final open-ended question, "What is the biggest barrier to immunizing your child(ren)?," 32.5% of the sample stated that there were "no barriers to immunization," 31.6% of the sample noted that "lack of knowledge about immunization" was a significant barrier, and 11.1% of the sample indicated that "lack of transportation" was the biggest barrier to getting their children immunized.

The complete results for each of the open-ended questions is presented below in Tables 5, 6, and 7.

**TABLE 5. Descriptive Statistics on Subjects' Responses to the Open-Ended Question, "Why do some children stay healthy and why do some children get sick?"**

<b>Subject's Response</b>	<b>Frequency</b>	<b>Percentage</b>
<b>"Illness is caused by uncleanliness or dirty environment"</b>	22	22.4
<b>"Illness is caused by unhealthy or malnourished children"</b>	25	25.5
<b>"Illness is caused by lack of health education and knowledge"</b>	11	11.2
<b>"Illness is caused by children's lack of energy, physical weakness, or immunity power"</b>	7	7.1
<b>"Illness is caused by lack of care of the child"</b>	20	20.4
<b>"Illness is caused by hot or cold environment"</b>	10	10.2
<b>"Illness is caused by heredity"</b>	3	3.1

**TABLE 6. Descriptive Statistics on Subjects' Responses to the Open-Ended Question, "Why did you get your child(ren) immunized?"**

<b>Subject's Response (Quoted or Paraphrased)</b>	<b>Frequency</b>	<b>Percentage</b>
<b>"In order to prevent my children from getting disease"</b>	93	78.9
<b>"In order to keep my children healthy and full of immunity power"</b>	14	11.9
<b>"In order to give the baby a long life"</b>	1	0.8
<b>"In order to help eliminate any concerns about communicable diseases"</b>	1	0.8
<b>"I did not get my child immunized"</b>	7	5.9
<b>"I don't know"</b>	2	1.7

**TABLE 7. Descriptive Statistics on Subjects' Responses to the Open-Ended Question, "What is the Biggest Barrier to Immunizing Your Child(ren)?"**

Subject's Response	Frequency	Percentage
"There are no barriers to immunizing my child(ren)"	38	32.5
"Lack of money due to poverty"	7	6.0
"Lack of belief in Western medicine"	3	2.6
"Laziness"	1	0.9
"Mother is too sick or busy with work"	5	4.3
"Lack of knowledge about immunization"	37	31.6
"Mother is too busy caring for other children"	3	2.6
"Lack of transportation"	13	11.1
"Lack of hospital nearby"	2	1.7
"Superstition – a belief that has nothing to do with health"	2	1.7
"Fear of child crying from injections"	1	0.9
"I have no idea"	5	4.3

## Discussion

With national childhood immunization rates as high as 95% for tuberculosis (BCG), 80% for polio and diphtheria/pertussis/tetanus (DPT), and 69% for measles, it is evident that Nepalese mothers have very impressive health behaviors with regard to childhood immunization. This thesis research replicated these statistics with the finding that well over half of the Nepalese mothers sampled were fully immunized (approximately 69% of all mothers interviewed for this study), that nearly the same percentage (approximately 66%) reported that their spouses were immunized, and that over 85% of these mothers reported that all their children were immunized. For the purposes of this thesis, the low variance in childhood immunization prevented a satisfactory examination of factors related to mothers' number of children that had been immunized using multiple regression analyses to analyze potentially related factors as a composite model. Thus, the question remains unanswered about what accounts for this exemplary behavior seen among childbearing mothers throughout this highly impoverished country.

At a first glance, it would seem that these mothers have been well schooled in the traditions of Western medicine (no doubt from the numerous polio and TB eradication programs initiated by the U.S. in the late 1980s), and have subsequently adopted the regimens of Western behavior. However, the results of this thesis suggest that there may also be another story that accounts for this high level of immunization behavior.

Using demographics as a starting point, the education levels of Nepalese mothers were the most significant predictor of healthy immunization behavior – the more educated a mother was, the more likely she was to use immunizations as a means of protection from disease. The overall literacy rate of these mothers was very low, and most of them had obtained their education through oral traditions and stories passed down to them by their parents and schoolteachers. As a result, most of the respondents indicated that they learned about health and immunization from their families, friends, and schoolteachers rather than from formal education or from their nurses or doctors. Although the majority of the sample (approximately 60%) had at least one class on immunization at school that taught them about the importance of vaccinations, this was not related to mother’s immunization history and suggests that the examination of their beliefs may shed additional light on factors associated with immunization.

Turning to the Health Belief Model for a clearer understanding of possible links between health beliefs and immunization behavior, I discovered that perceived benefits was the only component of the model that was significantly related to immunization among Nepalese mothers. This suggests that the benefits associated with immunization may be important to these mothers in providing impetus for healthy vaccination behavior. Moreover, this suggests the potential importance of emphasizing perceived benefits of vaccinations in future intervention and education efforts in this community.

Contrary to my hypothesis, perceived threat (including susceptibility to and severity of disease) was not significantly related to immunization in Nepalese mothers.

These results suggest that mothers' fears of the major infectious diseases of childhood (such as polio, tuberculosis, diphtheria, pertussis, tetanus, and measles), and beliefs that these illnesses provide a serious threat to their children are not related to their immunization behavior. Another unexpected finding was that perceived barriers showed no significant relationship to mothers' immunizations. From the perspective of most of these subjects, there were essentially no insurmountable obstacles that stood in the way of getting them or their children appropriately vaccinated. Clearly, there is much more to the story than Nepali mothers adopting Western beliefs resulting in increased immunization behavior.

In order to ensure that other variables were not confounding these results, I thought it important to also account for social class in my multiple regression analysis. To accomplish this, two additional measures of social class in Nepalese society (average income and social caste) were included in the analysis and the results revealed that neither of these variables were statistically significant correlates of immunization behavior. In fact, the only two variables that stood the test of both regressions were levels of education and perceived benefits associated with immunization.

While these results reveal some important factors associated with healthier immunization behavior in Nepalese mothers, they still do not shed much understanding on exactly what characterizes the health beliefs of this sample. The subjects' responses to open ended-questions afforded them the opportunity to express their health beliefs in their own words and on their own terms.

When first asked to explain their beliefs about the causes of children's illness, approximately a quarter reported that illness is caused by unhealthy or malnourished diet, and over a fifth of the sample attributed illness to uncleanness or a dirty environment. However, when probed further about the mechanism through which children contract diseases that lead to illness, the majority of respondents answered that evil spirits were responsible for causing disease in children. Not only is this an interesting finding, but it also seems to indicate an area where we need to further understand Nepalese health beliefs.

Now, a more complete story can be told. As one of the participants explained to me, the Nepalese largely believe that they are constantly monitored by powerful spirits that can place a curse on their farmland, on their homes, and even on their children. When this occurs in children, it makes them more vulnerable to the dirty environment and unhealthy food, and the only way to prevent the spirits from taking over in such a manner is to have something equally as powerful injected into the child's body. Hence, this is where the benefits of immunization come in. (It is interesting to note that since the polio vaccine is orally administered and not injected into the body, Nepalese mothers do not hold the same beliefs about polio as they do about the other childhood diseases. When only testing polio against the scales of the Health Belief Model, the measure of perceived benefits lost its power to significantly predict immunization behavior for this particular disease.)

Finally, the importance of education now makes perfect sense within this newer, more holistic context. Since the Nepalese are educated in the oral traditions and histories of the past, it is through this type of informal education that the power of evil spirits, the preventative potential of injections, and the benefits of immunization are learned. Thus, these qualitative trends support the previous quantitative finding that the more educated a mother is the more likely she is to seek out immunization for herself and her child.

The results of the second open-ended question, “Why did you get your child(ren) immunized?” also provided support to the initial quantitative findings of the study. Based on this question, the two most frequent responses focused on the preventative aspects of immunization and the benefits obtained from such healthy behavior. The respondents not only believed that immunization contained a number of benefits; more importantly, their beliefs focused on the preventative nature of vaccination as the biggest benefits associated with immunization.

The last open-ended question, which asked about the barriers parents faced in immunizing their children, suggested that perceived barriers in the Health Belief Model could play a role for a subset of mothers in their immunization of their children. With approximately a third of the sample stating that there were “no barriers to immunization,” this reinforced the finding in the multiple regression analysis that Nepalese mothers’ perception of barriers to getting immunizations is not related to their immunization behavior. However, for the small subset of the sample who indicated in the qualitative part of this study that there were, in fact, barriers to immunization, the most common

barriers included, “lack of knowledge about immunization,” “lack of transportation/access to the clinic,” and “lack of money”.

Several limitations should be acknowledged in assessing the results of this study. First, all of the data was obtained through participants’ self-report of their immunization beliefs and behaviors. Some participants may have been unintentionally biased in some of their responses or they may have felt pressured or uncomfortable discussing their immunization beliefs and history in a clinic setting in which they may have felt self-conscious, despite efforts to ensure their privacy. A second limitation was that all subjects were recruited from either hospital or clinic waiting rooms, and in an indirect way, this may have self-selected for participants who have access to health care and who are motivated to visit health care facilities to get their children immunized. Thus, the results obtained from this small, selective sample cannot necessarily be generalized to other Nepali subpopulations, which likely include mothers who do not visit healthcare facilities on a regular basis.

Additionally, the fact that I was an English-speaking American adult male conducting interviews in a predominately Nepali-speaking clinic visited by women and children could further inhibited some of the respondents from being more fully disclosing. The mothers whom I interviewed may not have felt completely comfortable with me present in the room, or they may have been hesitant to candidly discuss their health beliefs and behaviors with me. However, given that the questions I posed were

relatively unintrusive and uncontroversial, it is unlikely that this gender bias had a significant negative impact on my results.

The cross-sectional and descriptive nature of the research design further constrains the interpretation of the results. Consequently causality in the relationships that were found to be statistically significant, such as that between perceived benefits of immunization and immunization behavior cannot be definitively interpreted, although this finding is consistent with the interpretations of the Health Belief Model that greater perceived benefits results in greater immunization. Alternatively, it is possible that having been immunized results in greater endorsement for perceived benefits or that a third factor that was not examined in this study was causally linked to both of these factors.

A further limitation concerns the theoretical model on which this study is predominately based. As a psychosocial framework, the Health Belief Model can only account for only as much of the variance in health behaviors as can be explained by attitudes and beliefs that are apparent to and consciously evaluated by individuals. Other factors related to the individual, such as demographic variables, personality factors, social support, or previous health experiences, may play a role in influencing individuals' behavior, but they are not an explicit part of this model and were not able to be evaluated as part of this study.

Despite these constraints of methodology and theory, I believe that these results are still a valuable contribution to the literature on immunization in Nepal. In many ways, a principle aim of this study was to understand immunization in Nepal from a wide range of perspectives: my own perspective based on what I observed in Nepal, the Nepalese mothers' perspectives based on their qualitative and quantitative responses, and perspectives based on past research studies. All of these methods have enabled me to form a synthesis of points-of-view, to attempt to paint as comprehensive a picture as possible about a complex topic that is of great relevance to a number of communities – Western and non-Western alike.

Taken together, the results of this study indicate the importance of looking beyond the traditional framework of Western medicine in order to achieve a more culturally sensitive context for understanding health behavior. In addition to the salient components of the Health Belief Model and the statistically relevant demographics, culturally specific knowledge and beliefs must also be considered if future educational interventions are to be successful. Even though the Nepalese seem to be well on the right track with regard to childhood immunization, the dearth of systematic research on Nepalese mothers' beliefs about immunization and their children's health in relation to their immunization behavior not only suggests the importance of this particular study, but it also indicates how vital future research will be in furthering this story for generations to come.

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