CHAPTER 4

RESEARCH METHODOLOGY OF STUDY 1

Study 1 is divided into four phases: 1) extraction of salient beliefs associated with attitude, subjective norm and behavioral controls by in-depth interviews, 2) setting up hypothesized model, 3) questionnaire development and 4) the final survey, as presented in Figure 3.

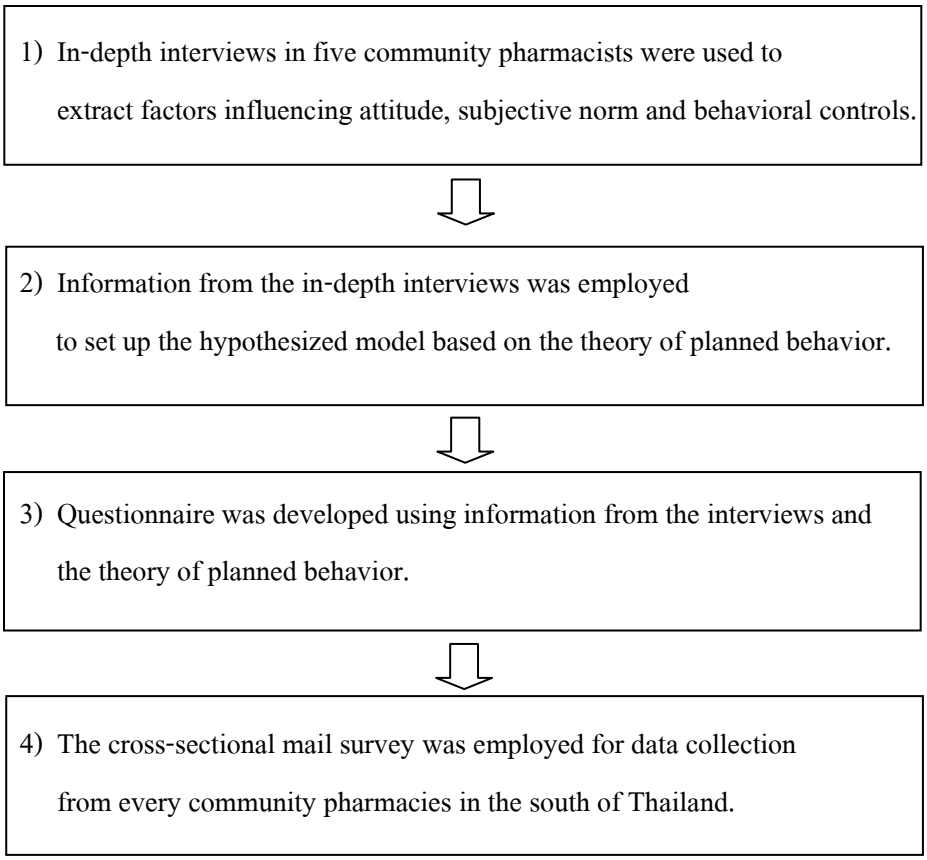

Figure 3 Diagram of four steps in methodology of study 1

1. Method of study 1

1.1 In-depth interviews

In-depth interviews of five community pharmacists were conducted at their drugstores in order to identify the factors related to attitude, subjective norm and perceived behavioral control. Each interview lasted between 40 to 60 minutes. The pharmacists were aged between 34 and 44 years. Their dispensing experience ranged between 10 and 14 years. All of them were volunteers and gave consent to the interview.

At the beginning of the interview, an interviewer described a patient with uncomplicated URI. Secondly, the interviewer asked a series of open-ended questions derived from the guidelines by Ajzen and Fishbein (Ajzen, 1991; Ajzen and Fishbein, 1980).

A set of three questions was used to identify the factors contributing to attitude, subjective norm and perceived behavioral control.

For attitude, the questions included:

1) What do you believe are major benefits of antibiotic dispensing for URI?
2) What do you believe are major disadvantages of antibiotic dispensing for URI?
3) Are there any other important outcomes that influence your decision to dispense antibiotics for URI?

For subjective norm, the questions were:

1) Are there any individuals or groups who would approve of your dispensing of antibiotics for URI?
2) Are there any individuals or groups who would disapprove of your dispensing of antibiotics for URI?
3) Are there any individuals or groups who come to mind when you think about dispensing antibiotics for URI?

For perceived behavioral control, the questions were:

1) What factors or circumstances would make it easy for you to dispense antibiotics for URI?
2) What factors or circumstances would make it difficult or impossible for you to dispense antibiotics for URI?

3) Are there any factors or circumstances that come to mind when you think about dispensing antibiotics for URI?

To validate the results, the interviewer read a summary of the responses to the interviewees and asked them to verify the accuracy of the information. The interview data for identifying factors influencing the determinants of attitude, subjective norm and perceived behavioral control were sufficient and became saturated since there was no new factor identified in the last interview. Thus, no more pharmacists were interviewed.

1.2 Conceptual framework and hypotheses

The information obtained from the in-depth interviews was used to develop the hypothesized model based on the theory of planned behavior (Figure 4).

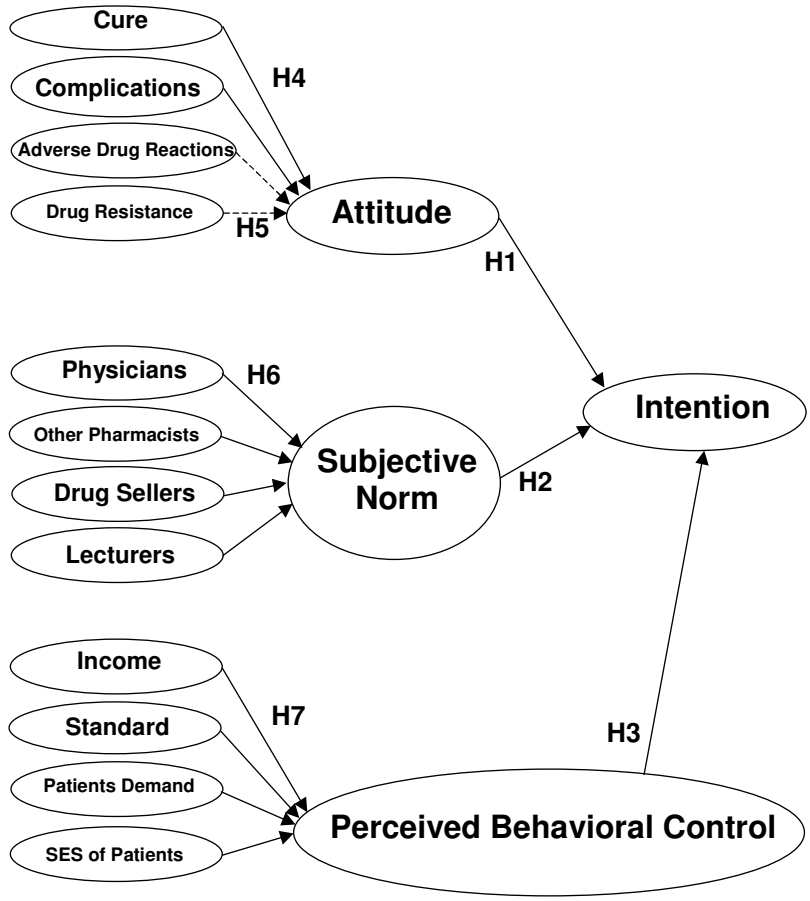

Figure 4 Hypothesized model explaining dispensing behaviors of pharmacists
(H reflects research hypotheses)

The components of the model were defined as follows:

Behavior:

The observable acts that are investigated in the current study. It is under volitional control. The interested behavior in this study is antibiotic dispensing in patients with URI.

Behavioral intention:

How much of an effort a pharmacist is planning to dispense antibiotics for URI.

Behavioral attitude:

A pharmacist's favorable or unfavorable evaluation of dispensing antibiotics for patients with URI. In this study, higher score of attitude means positive evaluation of antibiotic dispensing and lower score means negative evaluation of antibiotic dispensing. A pharmacist's attitude is positive or negative feeling on antibiotic dispensing.

Behavioral belief:

A pharmacist's belief that antibiotic dispensing will produce the consequent outcome to the patient. The four main outcomes identified from the pharmacists' interviews are:

1) Beliefs that antibiotics lead to the cure of the disease (as cure in Figure 4).

2) Beliefs that antibiotics prevent complications of the disease (complications).

3) Beliefs that antibiotics cause adverse drug reactions (adverse drug reactions).

4) Beliefs that antibiotics cause drug resistance (drug resistance).

Referents:

The important individuals or groups who influence a pharmacist on dispensing medications as a health care professional.

Subjective norm:

A pharmacist's perception of the social pressure put on him or her whether to dispense antibiotics or not. In this study, higher score of subjective norm means referents approve antibiotic dispensing and lower score means referents do not approve antibiotic dispensing.

Normative belief:

A pharmacist's belief that a referent approves or disapproves antibiotic dispensing for URI.

From the interviews of pharmacists, the referents are distinguished into 4 groups:

1) Physicians
2) Other pharmacists
3) Drug sellers
4) Lecturers in Faculty of Pharmaceutical Sciences

Higher score of normative belief in a group of referents reflects that referent group approves antibiotic dispensing.

Perceived behavioral control:

A pharmacist's perception of the power or controllability of external factors over antibiotic dispensing. In this study, higher score of perceived behavioral control means external factors control antibiotic dispensing and lower score means external factors cannot control antibiotic dispensing.

Control belief:

A pharmacist's belief that external factors can facilitate or impede antibiotic dispensing.

Four external factors identified from pharmacists' interviews are

1) Beliefs that antibiotic dispensing is necessary to generate income for drugstore (income)
   Higher score of these beliefs reflects antibiotic dispensing is necessary to generate income for drugstore.
2) Beliefs that the standard practice guidelines of The Pharmacy Council encourage antibiotic use in uncomplicated URI (standard)
   Higher score of these beliefs reflects the standard practice guidelines encourage antibiotic use in uncomplicated URI.
3) Beliefs that patients always demand antibiotics (patient demand)
   Higher score of these beliefs means that patients always demand antibiotics.
4) Beliefs that SES of patients (SES of patients) affects antibiotic dispensing.
   Higher score of these beliefs means that SES of patients is high, and they could afford antibiotics.

Research hypotheses

According to the model in Figure 4, the following hypotheses on pharmacist dispensing were tested.

Hypothesis 1: Pharmacist's attitude toward antibiotic dispensing positively correlates with intention to dispense antibiotics.

Hypothesis 2: Pharmacist's subjective norm positively correlates with intention to dispense antibiotics.

Hypothesis 3: Pharmacist's perceived behavioral control positively correlates with intention to dispense antibiotics.

As in the theory of planned behavior (Ajzen, 1991), a central factor in this theory is the individual's intention to perform a given behavior. Intention captures the motivation factors that influence a behavior. Generally, the stronger the intention to engage in a behavior, the more likely should be its behavior. This conclusion is supported by the literature (Abraham, et al., 1999; Millstein, 1996). The intention depends jointly on three determinants, attitude toward the behavior, subjective norm and perceived behavioral control. The more favorable attitude and subjective norm and the stronger the perceived behavioral control result the greater intention to perform the behavior.

For better understanding of pharmacists' dispensing behaviors, this study also investigated the most fundamental level of the theory, i.e., a behavioral intention is a function of individual's belief system. Three types of beliefs are distinguished: behavioral beliefs which provide the basis for attitude, normative beliefs which influence subjective norm and control beliefs which relate to perceived behavioral control.

Hypothesis 4: Beliefs that antibiotics lead to curing the disease and preventing the complications positively correlate to attitude.

Hypothesis 5: Beliefs that antibiotics cause adverse drug reactions and drug resistance negatively correlate with attitude.

Hypothesis 6: Beliefs in approval of influential referents on antibiotic dispensing such as physicians, other pharmacists, drug sellers and lecturers positively correlate with subjective norm.

Hypothesis 7: Beliefs in facilitating power in antibiotic use of external factors, which are income, standard practice guidelines, patient demand and SES of patients, positively correlate with perceived behavioral control.

The specific consequences from antibiotic dispensing, the important groups for pharmacists' dispensing (or referents) and external factors that are associated with dispensing behaviors of pharmacists were identified from the in-depth interviews of five community pharmacists. The finding agreed with the finding of Lambert, et al. (1997)'s study which reported that related outcomes were cure, adverse drug reactions and important referent groups included physicians and other pharmacists. Results were also compatible with the study by Liabsuetrakul, et al. (2003) which found that important outcomes were causing adverse drug reactions and important groups were physicians and lecturers, and external factors included patient demand and standard practice guidelines. Meanwhile, antibiotic resistance was also mentioned by Larrabee (2002) who reported that inappropriate use of antibiotics increased antibiotic-resistant organisms.

1.3 Questionnaire development

Development of the questionnaire followed the guidelines suggested by Ajzen and Fishbein (1980). Questions were generated to measure 16 constructs depicted in Figure 4. Each construct was measured by three items. The items were measured on a 7-point scale ranging from 1 (strongly disagree/very unlikely) to 7 (strongly agree/very likely). The questionnaire development took the following steps.

1) Items were generated based on definitions of terms in the theory of planned behavior and information from the in-depth interviews.
2) Five experts (lecturers in the Faculty of Pharmaceutical Sciences, Prince of Songkla University, with at least 10 years experience in dispensing) assessed the relevance of items to the definitions and the clarity of the questions. Experts also provided comments on items that should be added.
3) Five lecturers in the Department of Clinical Pharmacy at the Faculty of Pharmaceutical Sciences were asked to comment on the wording and clarity of the questions.

4) The questionnaire was pre-tested twice in two samples of 25 community pharmacists who worked in Bangkok. Questions in the scale with low Cronbach's alpha (less than 0.70) were modified to improve clarity.

1.4 Sample and data collection

This study used structural equation modeling (SEM) to analyze the data. It is accepted that the minimum sample size for SEM is 200 (Hoelter, 1983). Bentler and Chou (1987) proposed that a ratio of at least 5 respondents per parameter would be sufficient for data with normal distribution. In the current study, the number of parameters estimated for the model was approximately 160 (Figure 4). A ratio of 5 respondents for each parameter was used to calculate the sample size. Thus, an adequate sample size was estimated to be 800. We expected a poor response rate from community pharmacists. Research in the past found that the proportion of community pharmacists that responded to the questionnaires (23.9%) was less than in other groups of pharmacists such as hospital pharmacists (73.8%), public health pharmacists (60.0%), educational pharmacists (44.2%), marketing pharmacists (28.6%), and industrial pharmacists and others (48.9%) (Chaibu, 2003). Therefore, we decided to conduct the study in every community pharmacists in Thailand. We intentionally selected the pharmacists in the south as subjects in order to be able to follow up the survey to maximize response rate. The questionnaires were distributed to every community pharmacist in 14 provinces in the south of Thailand. The lists of pharmacists' names and pharmacies' addresses were gathered from Provincial Public Health Offices and the Alumni Association of the Faculty of Pharmaceutical Sciences, located in the southern part of the country.

A total of 862 questionnaires were mailed to the targeted pharmacists. A reminder postcard followed the questionnaire one week later. Two weeks after mailing the postcard, a second questionnaire was mailed to each non-respondent at either the drugstore or the office where the pharmacists also worked full time. Non-respondents who worked in large hospitals, received the questionnaires from a pharmacist who was their colleague whom the researcher contacted for help. Phone calls were also made to the non-respondents whose numbers were available. For pharmacists who did not respond to any mailings, a third questionnaire was mailed with 40 Baht (US$ 1) as an incentive for completing the survey.

2. Statistical analysis

Data analyses were performed using SEM. Confirmatory factor analysis (CFA) aims to test a hypothesized model and its consistency with the data. CFA has some advantages over exploratory factor analysis. It is possible for CFA to specify the correlations of constructs (latent variables or latent factors), the relationships between constructs and indicators (observed variables) and assessments of measurement errors. Consequently, CFA provides better reliability and validity in model evaluation. It depicts the links between constructs and their indicators (measurement model). In addition to CFA, SEM expresses the links among constructs themselves (structural model) as a full model (Byrne, 1998; Musil, et al., 1998). The SEM consists of two parts: the measurement model and the structural model. In this study, SEM involves the constructs in the theory of planned behavior. Each construct is represented by indicators. The SEM procedure allows the simultaneous evaluation of the relationships between constructs, and the relationships between constructs and indicators. The SEM was performed using LISREL 8.54 with maximum likelihood (ML) method for estimation (Joreskog and Sorbom, 2003). The method assumes multivariate normality of the data. Tests of multivariate skewness and kurtosis for the data showed that Z-scores were 72.88 and 34.18, respectively, indicating a non-multivariate normal distribution. Nevertheless, the evidence revealed that ML is acceptable for estimation of univariate or multivariate non-normality when the sample size is 200-500 and its distribution is not considerably non-normal (univariate skewness < 2 and univariate kurtosis < 7) (West, et al., 1995). In this study, the sample size was more than 500 (862 samples) and the data distribution agreed with these criteria, therefore ML was employed in the estimation procedure.

The goodness-of-fit statistics chosen to determine the fit between the hypothesized model and data were chi-square statistics, root mean square error of approximation (RMSEA) with 90% confidence interval, standardized root mean square residual (SRMR), Tucker-Lewis Index (TLI) and comparative fit index (CFI) (Hu and Bentler, 1999). The chi-square test indicates the discrepancy between the model and the data. However, it is sensitive to the sample size. For a large sample size (generally above 200), the chi square test has a tendency to indicate a statistical difference. Nonetheless, the researchers are interested in obtaining a non-significant chi-square value (Hu and Bentler, 1995). As a result, it is important to complement the

chi-square test with other goodness-of-fit measures (such as RMSEA, SRMR, TLI and CFI) in assessments of model fit and selection of the best model (Hu and Bentler, 1999). RMSEA values of 0.05 or less indicate a very good fit to the data, values of 0.08 or less indicate a reasonable fit, and values higher than 0.10 indicate a poor fit (Browne and Cudeck, 1992). SRMR values below 0.08 are interpreted as indicating a close fit to the data. The TLI and CFI with values greater than 0.95 are considered to reflect acceptable fit models (Hu and Bentler, 1999). For comparison of the two models with nested sequence, the difference between the two was tested with the chi-square difference test (Byrne, 1998). A type I error level of 0.05 was used to decide the statistical significance for all tests.

3. Ethical approval

This study was approved by the ethics committee of the Faculty of Pharmaceutical Sciences, Prince of Songkla University.